

KHULNA UNIVERSITY STUDIES

Volume 19 Number 1: January-June - 2022



KHULNA UNIVERSITY
BANGLADESH

Khulna University Studies

Volume 19 Number 1: January- June- 2022

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THE OVERSHADOWING PRESENCE OF TOXIC MASCULINITY AND
A CALL FOR REDUCING SEXISM IN KHALED HOSSEINI'S
A THOUSAND SPLENDID SUNS

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KUS: 21/22: 051121

Manuscript submitted: November 5, 2021

Accepted: January 3, 2022

Abstract

The nexus among toxic masculinity, sexism, and patriarchy; and women's oppression as an upshot of these have been potential issues stirring the interest of the researchers for centuries. The researches done on Khaled Hosseini's *A Thousand Splendid Suns* are not exceptional than those works. As the novel blatantly exposes the plight of womenfolk amid an excessive masculine setting, Hosseini's covert signal towards the male characters' poignant situation due to their toxic masculinity has been an unaddressed issue. This article aims at studying the detrimental consequences of toxic masculinity in the characters' personal, familial, and social life showing the utter helplessness of male characters who have to comply with the stereotyped notion of gender roles of real men. Because of the male characters' vague notion of masculinity, the relationship with their partners becomes toxic; Jalil does not get forgiveness from his daughter Mariam when he asks for and Rasheed's life ends horribly. Demonstrating the poignant aftermaths of toxicity, the researcher calls for reducing sexism for establishing a healthy relationship where partners will have love, respect, and trust between or among themselves.

Keywords: Chauvinism, helplessness, hypermasculine, oppression, sexism, toxic masculinity

Introduction

Khaled Hosseini in his second novel *A Thousand Splendid Suns* (2007) voices the story of devastations, exploitations, and sorrows of Afghan people, especially Afghan women whose lives are controlled by patriarchy. In conjunction with the boundless miseries of women, this novel reconnoiters the impalpable pains of men's life. Hosseini rationally sheds light on the secret world where men suffer, tolerate, and scuffle into desolations. Through his classic story, Hosseini attempts to convey the destructive effects of toxic masculinity in men's life. His two major male characters: Jalil and Rasheed never get any compassion from the characters in the novel as well as from the reader even when they suffer, because they have been fierce to women. Their tragedy lies here. Their quasi notion of masculinity carcasses their self, encumbers their thinking power, and militaries them to deny their weakness. This incapability to express innermost agony internally plagues them with enormous mental pains. They become captive in their peculiar rules and cannot escape the trap of chauvinism. The objectives of this paper are to explore the chauvinist attitude of the male characters towards female, simultaneously to investigate their silent victimization and pains in the novel. By focusing on the

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DOI: <https://doi.org/10.53808/KUS.2022.19.01.2122-ah>

harmful effects of toxic masculinity on both female and male characters, this study calls for a hale and hearty world where no sexism will be subsisted.

Theoretical Framework

In the present culture, the word toxic means a group of attributes that negatively affect a person or people's belief, behaviour, and activities; and masculinity refers to "a set of practices, norms, and behaviours associated with the idea of being male, believed to stand in opposition to femininity and women" (Waling, 2019, p. 2). In academia, toxic masculinity is considered orthodox, dogmatic, hegemonic, unhealthy, etc. It indicates 'toxic practices' of masculinity bolstering oppression, violence, and exploitation of women and trans-genders (Connell, Messerschmitt & de Boise as cited in Waling, 2019, pp. 4-5). Toxic masculinity upholds the issues that make men like machines—it depersonalizes them and makes them stigmatized. Chaplin and Aldao in "Gender differences in Emotion in Children: A Meta-analytic Review" (2013) express that; adolescent boys express less anger than adolescent girls. But as the boys grow up, they have to shoulder the attributes expected by society and culture which are usually patriarchal. It deteriorates men's mental health and causes hopelessness, anxiety, lack of confidence, etc. Brown in 2017 tells that, relationships between or among partners become toxic when they "engage in a set of psychological, sexual/financial, and/or physical practices of abuse that can lead to a number of negative and harmful outcomes to someone experiencing the toxicity" (as cited in Waling, 2019, p. 4). Toxic masculinity refers to the belief that manliness prolongs domination and aggression. It upholds toxicity. E.H. Thompson and J.H. Pleck in "The Structure of Male Norms" (1986) identify three core components of toxicity:

1. Toughness: The belief that men are strong and aggressive in behaviour and emotionally uncaring.
2. Antifemininity: Men do not possess emotions that are considered feminine like being weak, sympathetic, emotional, etc.
3. Power: It is the belief that if men can obtain power, they can earn status.

A study done in 2019 found that men who endorse toxic masculinity do not assist or console a victim (Ingram et al.). The pressures of toxic masculinity met by men have drastic consequences. There are not many rudimentary differences in the behaviour between young boys and girls. But toxic masculinity shapes men's behavior and makes them believe that a real man does not have any sensitivity. Thus, throughout their life men have to shelter the myths of patriarchy which force them to hide their authentic self and inward sentiment.

In *A Thousand Splendid Suns*, Khaled Hosseini reveals the persecuted condition of men whose anguishes are always unobserved by the social order as well as academic researches. Through his representation of Jalil and Rasheed, Hosseini reveals the veiled truth of men's lives and their silent sorrows. Their belief in toxic masculinity and offensive behaviour alienate them from their loved ones. They cannot express their feelings because of the stereotyped rules of the society. This paper will problematize these issues and try to provide a message for reducing sexism.

Literature Review

A good number of researches have been done on *A Thousand Splendid Suns*. In "A Legitimate End to Illegitimate Beginning: A Critical Analysis of Mariam's Character in *A Thousand Splendid Suns*" (2017), Akhtar et al. discuss the struggle of Mariam who tries to attain her distinctiveness fighting against the identity that society has bestowed upon her. Through close textual analysis, the researchers dig deep into the journey of Mariam from an illegitimate child to a legitimate one. The study tells that this novel is one of the finest examples of women's subjugation and oppression in a typical Taliban setting. The text shows the horrible truth of a society that makes a child illegitimate if the father refuses to provide legitimacy. Mariam is fated to be born as a harami and leads a life devoid of self-respect. The deprivation haunts her so much that she decides to resist. Her resistance shows that she cannot tolerate it anymore. Though she faces the death penalty, her resistance makes her a vigorous feminist. Her death symbolizes "the most credible decision to get away from the precarious

assault of the Soviet Union, the tyrannical regime of the Taliban, or an offensive husband” (Akhtar et al., 2017, p. 116).

In “Feminine Power as Represented in Khaled Hosseini’s *The Thousand Splendid Suns*” (2016), Aneeta Sebastian discusses how Afghanistan has been a horrible place for women centuries after centuries. In Afghanistan, women have been subjugated thrice: “socially, politically and culturally” (Sebastian, 2016, p. 52). In the beginning, the researcher introduces the author of the novel. She admires the author because in the case of Hosseini, gender does not work as a hindrance to describe the plight of another gender. He skillfully narrates the touching story of womanhood. While talking about the cruelty of patriarchy expressed through illegitimacy, deprivation, discrimination, child marriage, violence, etc. in the novel, Sebastian refers to the report about women released by The United Nations Statistics Division (2016):

- Afghanistan is one of the most challenging places in the world to be a woman.
- Many women die in pregnancy and childbirth: 460 deaths/100,000 live births (2010)
- 85% of women have no formal education and are illiterate. (as cited in Sebastian, 2016, p. 52)

According to Sebastian, as the novel’s setting is Afghanistan, Hosseini portrays the real scenario of the country. Patriarchy decides the fate of the women folk—what they will do, eat, wear, or whom to marry. Sebastian reads the novel from a feministic point of view and she claims that the author advocates for reducing gender violence.

Stefani Amanda Anggi Riany in “The Impact of Oppression toward Women Seen through Two Women Characters in Khaled Hosseini’s *A Thousand Splendid Suns*” in 2016 analyses Mariam and Laila’s poignant sufferings and how the miseries impact their attitude and behaviour. The researcher studies the oppression faced by Mariam and Laila using five faces of oppression: exploitation, marginalization, powerlessness, cultural imperialism, and violence theorized by Iris Young in 1992. Riany has found that in both Mariam and Laila’s cases, oppression leads them to resistance.

Azam Kazemiyan in “A Thousand Splendid Suns: A Rhetorical Vision of Afghan Women” (2012) tells that, though Afghan women vividly came to the notice of the world as the victims of war and violence after the occurrences on the world trade center, very few popular narrative fictions represented the difficulties of Afghan women. Kazemiyan like many scholars believes that western media misrepresented Afghan women and their struggle. As media is a strong source of information for those who do not have firsthand experience of Afghan women, U.S. media intentionally presented women as passive, oppressed, victimized to legitimize grounds for U.S. involvement and imperialist domination in Afghanistan. The researcher studies the situation of women in urban and rural settings and finds that in rural areas women contributed much in economy. In the city areas, girls were educated, wore burqas according to their wishes. From 1919 to 1929, the reforms made by King Amanullah advanced the condition of women. In 1953, when Daoud Khan came to power, women actively took part in government and the workforce. In 1978 Soviet Union took hold of power and women’s development was the chief priority then. But during the Mujahidin and later in the Taliban rule, there were many restrictions on women. The researcher intensively studies the available resources and finds that Afghan women were not only passive sufferers of the war or the state; they were also makers of societal revolution. Kazemiyan argues that Khaled Hosseini’s depiction of Afghan women goes in line with U.S. media that presented Afghan women as subjugated to legitimize U.S bombing in Afghanistan. The novel is not an innocent attempt to improve the situation of women. The author supports imperialism through his projection of women as helpless.

G. Iynisha & Dr. K. Shanthi in “Masculinity: A Gamut in *A Thousand Splendid Suns*” (2018) study *A Thousand Splendid Suns* from the perspective of the fluidity of masculinity telling the boundary of manliness is not fixed, for the characters often go beyond the expected norms of gender. They discuss varied perspectives of masculinity and find masculine traits in the female characters. They explain that the author presents caring

masculinity along with hyper masculinity. Hakim, Zaman, and Tariq are representatives of caring masculinity. Jalil and Rasheed symbolize hyper masculinity who think their pride is associated with domination and violence. Nana blurs stereotyped gender roles by giving birth to Mariam alone, showing anger and mistrust of Jalil openly. Mariam and Laila also expose masculine vigor in their resistance.

Yeasmin in "Khaled Hosseini's *A Thousand Splendid Suns*: A Saga of Afghanistan" (2020) links Afghan history and the history presented in the novel using New historic approach. She says that the novel recounts three decades of Afghan social, economic, cultural, and political history. She studies the historical documents about Daoud Khan's regime, the time of the Soviet Union, the Mujahedeen, and the Taliban rule; and analyses the textuality of history in the novel. She finds that Afghanistan had a rich cultural heritage but "The cultural landscape of Afghanistan underwent a radical change because of the nasty play played in the name of religion" (Yeasmin, 2020, p. 383). Hosseini also presents religion as the key determiner of controlling the fate of the people in Afghanistan bolstering "upheavals, destruction, violation, war, exploitation and loss" (Yeasmin, 2020, p. 383). The author recreates political upheavals, child marriage, gender discrimination, the resistance of women through the story of Mariam and Laila. The researcher concludes that Hosseini authentically draws the picture of worn-torn Afghanistan and hence the novel turns into a saga of Afghanistan.

Yeasmin & Islam study a different issue in "The Concept of Parenthood in Khaled Hosseini's *The Kite Runner* and *A Thousand Splendid Suns*" (2021). They explain the protagonists' plight that culminates in their sense of parenthood. In the novels, they find the supremacies of human relationships—father-son, and mother-daughter—that do not always need blood connection. Hosseini in the novels provides a new outlook to comprehend human bonding that is based on love, trust, and responsibility. In Amir and Mariam's cases, their sense of hollowness, deprivation of love, and craving to attain a status for curing their bloody souls lead them to involve in the journey to rescue Sohrab and Laila; and in this way, they get the ultimate bliss in their lives; they become parents to Sohrab and Laila.

In *A Thousand Splendid Suns*, exploitation of patriarchy, female subjugation, identity formation, war, loss and imperialism are the issues that have been researched by the researchers. No research has been done on the concept of toxic masculinity and its severe impacts on men's psyche. The victimization of men to meet up the norms of male chauvinism has been an ignored issue. No research urges for reducing sexism. This article will try to address these issues and fill up the gaps.

Methodology

This study is a qualitative research. So, the researcher has followed content analysis method to write this paper. It is concerned with the victimized condition of men whose sufferings are often unnoticed by the society. It aims at analysing how toxic masculinity intoxicates men's psyche and makes them violent, unemotional and sexually aggressive. This study is based on two types of sources of data: Primary source and secondary sources of data are used to write this paper. The text of Khaled Hosseini's *A Thousand Splendid Suns* is used as the primary source of data and related journals, articles, books, criticisms and web pages are used as the secondary sources of data.

Discussion

The discussion on *A Thousand Splendid Suns* is divided into three parts. In the first part, the consequences of Jalil and Rasheed's toxic masculinity on the lives of women are described. In the second phase, the pitiable situation of Jalil and Rasheed as the victims of their toxic masculine values is explained. And in the third phase, the researcher eagerly appeals for the reduction of sexism to create a healthy relationship which is crucial for establishing a healthy world.

Toxic masculinity in 1 with the toe of his shoes.

“You were ashamed of me.”

“I’ll visit you,” he muttered. “I’ll come to Kabul and see you. We’ll—”

“No. No,” she said. “Don’t come. I won’t see you. Don’t you come . . .

He gave her a wounded look. (Hosseini, 2007, p. 55)

Jalil’s incapability to express his love and affection shows the level of his helplessness. No one can understand the inner agony that hurts him. His heart is broken into pieces, he feels the pains of loss but due to his masculine mask he can’t cry, he can’t scream, he can’t tell that his heart is flouting:

She (Mariam) could hear him (Jalil) following her. When she reached the hydraulic doors, she heard him behind her.

“Mariam jo.”

.....

She did not turn to look when Jalil’s palms pressed on the glass, when his knuckles rapped and rapped on it. When the bus jerked forward, she did not turn to see him trotting alongside it. And when the bus pulled away, she did not look back to see him receding, to see him disappear in the cloud of exhaust and dust (Hosseini, 2007).

Likewise, Rasheed also fails to express his anguish and passion. Whenever he faces woe, gets hurt, feels passion, he suffers silently because the man-made law does not permit him to show any feeling except to his male child. Rasheed does not express his emotion to Mariam because if it happened Mariam could think him a weak man. In the novel, Rasheed lost his first wife and son. This loss creates a sense of emptiness in his mind. He marries twice and after marriage, he takes Mariam to show her Kabul city, restaurant, throws a party when he knows Mariam’s pregnancy. Mariam gets the honor and care that she desired. But after several miscarriages, his expectation for having a male child is lost, he becomes morose and finds fault in everything. In Afghanistan, “fertility and motherhood are considered as shields, a resistance mechanism” (Azzi & Belkhiri, 2019, p. 44) to attain value in domestic space. This chauvinistic notion about fertility leads to sexual assault and domestic violence. In Rasheed’s case, he turns into a dominant, vicious, and hostile husband like other typical husbands in the country.

Rasheed’s sense of masculinity teaches him to be uncompromising in any situation. He is adamant to retain his masculine pride by all means. Rasheed remarries to have a son. Though he takes advantage of Laila’s helplessness, it is unavoidable that he saves Laila from further adversities. He tells Mariam the cause of his decision to marry Laila, “But I suspect she won’t get far. No food, no water, not a rupiah in her pockets, bullets and rockets flying everywhere. How many days do you suppose she’ll last before she’s abducted, raped, or tossed into some roadside ditch with her throat slit?” (Hosseini, 2007, p. 209). Even though Rasheed has the hidden agenda to have a son through Laila, one thing should be acknowledged that he provides Laila, “A home and a husband” (Hosseini, 2007, p. 209) or else Aziza would be regarded as a *barami* from her childhood. Marrying Laila, he tolerates a lot; he tolerates Aziza who is not his child. He hears rumors about Laila and Tariq’s affair. After Aziza’s birth, he gets more suspicious and becomes sure through Laila’s several activities. Aziza is a female child, and he doubts the identity of Aziza. Hence, he is not even-tempered to Aziza. He gets totally unbending knowing Laila’s extramarital relationship. It hurts his masculine pride and proves him weak to society. Something is happening behind him that defiles his house and raises questions in his son’s innocent mind. It is unpardonable to him. He realizes that Laila just marries him to provide a secure fate for her child, Aziza. She has never been loyal and devoted to him. As chauvinistic laws teach him to exert control on women, he is unwilling to compromise and decides to end their lives who insult his masculinity.

Being a man, he suffers silently. He is not able to share his aches with anyone: he has lost his first wife and son, witnessed many miscarriages of his second wife, and remains childless for many years, his third wife is not loyal, he is rearing a bastard child in his home. He suppresses his inner pain and behaves like a strong man to show that man has no need and is not bothered by woe.

Patriarchy and Toxic Masculinity

Toxic masculinity forces men to shape their life according to the laws of patriarchy. When men use the patriarchal rule to dominate women, ironically, they themselves also fall into their own traps. Like women, they also become the victims of toxic masculinity. Jalil and Rasheed suffer silently, they can't show their feelings. Toxic masculinity intoxicates their inner self, snatches, and makes them masculine puppets who can only perform the roles of strong men. Jalil and Rasheed's unseen pains and sufferings silently drive them to their psychological destructions.

Jalil's letter to Mariam which is read by Laila after his and Mariam's death shows how much Jalil loved Mariam. Though he had not legalized Mariam when she craved for him, he repented a lot afterward. He went to Mariam to seek forgiveness, but he failed. In his letter he expressed his fatherly affection for her, "*I miss you. I miss the sound of your voice, your laughter. I miss reading to you, and all those times we fished together. . . You were a good daughter Mariam jo, and I cannot ever think of you without feeling shame and regret*" (Hosseini, 2007, p. 393). He apologized for his inability to welcome Mariam into his home. He understood the reason why he was a coward then; he did that behaviour for the "*Fear of losing face? Of staining my (his) so-called good name?*" (Hosseini, 2007, p. 394). Now, after experiencing many touches of melancholy he understood the futility of all his pride—the pseudo notion of masculinity, "*Perhaps this is just punishment for those who have been heartless, to understand only when nothing can be undone*" (Hosseini, 2007, p. 394). Because of his toxic chauvinism, he died with the ache of an undeserving father.

Rasheed's life also ends horribly for his toxic masculinity. As "Human behaviour is determined by society and environment" (Riany, 2017, p. 1), his behaviour is also affected by patriarchal rules and regulations. He is born and brought up in a strictly patriarchal setting where males are always supreme, and women are their subjects living in the periphery. Males are masters at home and outside. These norms legalize bullying and aggression. Rasheed is also violent to his wives. However, he is not a solely brutal man devoid of the warmth of his heart. He is never miserly to show his love and care for his son, Zalmai. He buys toys, clothes, diapers, gargets often beyond his reach. He takes Zalmai to his shop, if he does any mistake; he scolds him softly and calmly. They come back in the evening, even at that time he is not tired. Zalmai bounces him, he sits beside him. They play private games, "His patience with Zalmai was a well that ran deep and never dried" (Hosseini, 2007, p. 289). Until Mariam's proven infertility, he is not so ill-tempered. In the case of Laila, until she attempts to escape Rasheed is not violent in his behaviour with her. Sometimes he criticizes her for not caring for him after the birth of Aziza and he does not show affection for Aziza. But Laila is an escapist from the beginning of her marriage. When Laila dupes Rasheed by giving the news that she is conceiving his child, Rasheed says prayers, cares for her in every means but he does not get the return, "Rasheed, anxious and overtly attentive, was holding her elbow, directing her across the yard like a traffic policeman." (Hosseini, 2007, p. 229). Sometimes he mentions, "You're safe with me, my flower, my gul. No one tries to harm you; I'll rip out their liver and make them eat it." (Hosseini, 2007, p. 224). However, when he becomes aware of his wife's extramarital relationship and another wife's support in this matter, his sense of toxic masculinity moves him to take the vehement decision ever—he decides to kill his wives. He dies at the hand of his wife, Mariam, who resists all the cruelties he has done on her to exert his masculinity.

A Call for Reducing Sexism

In a social milieu, normally, males and females are in binary oppositions and the gender roles are 'subjugating' and 'subjugated' (Sebastian, 2016, p. 51). For this polar difference between males and females, the relation

between them is most of the time exploiter and exploited. Males do not think the females are equal partners and this unequal relationship advances toxicity, chauvinism, sexism, and so on. *A Thousand Splendid Suns* is a story of sexism and the consequences of sexism. It groups the characters into two categories: villains and heroes where oppressors are villains and oppressed ones are heroes. The heroes suffer and thereby win sympathy and admiration from the reader. Here Mariam and Laila are heroes for their woes and resistance, and Jalil and Rasheed are villains for their cruelty and defeat. The cause of war between these two groups is undeniably sexism that makes their world so toxic that no songs of compromise, forgiveness, and love can be tuned. The male characters' false consciousness of masculinity confines them so much that they do not find any way to escape. As a result, their lives also are devastated along with the devastation of women's lives. They embrace their tragic end silently.

Jalil is a chauvinist character who does not value the urge of his daughter for losing his face in society. When he realizes his fault, the gap between the father and daughter is so huge that he cannot even talk to Mariam let alone asking forgiveness:

He'd stood there for hours, waiting for her, now and then calling her name, just as she had once called *his* name outside his house. Mariam had parted the curtain once, just a bit, and caught a glimpse of him. Only a glimpse, but long enough to see that his hair had turned fluffy white, . . . he was thinner, much thinner. (Hosseini, 2007, p. 301)

If Mariam had forgiven him, their life might have been changed to something better. However, the denial from Mariam and his sense of guilt breaks his heart into pieces. He dies on his way back silently. His tragedy lies here, "He was dying then. He had driven all the way from Herat to say good-bye" (Hosseini, 2007, p. 303). Mariam also shows excessive pride when Jalil comes to her door. Therefore, she regrets after his death, "What would have been the harm to let him in, sit with him, let him say what he'd come to say?" (Hosseini, 2007, p. 302). Sexism hinders their way to healthy bondage.

Sexism also damages the healthy relationships in Rasheed's house. To exert his masculine power, he shows aggression on Mariam and Laila after Mariam's miscarriages and Laila's giving birth to Aziza and their plan to escape the house. The air in the domestic space is so deadly that the wives always live in fear of the husband. The consequence of their pains is also awful, Rasheed's "brutality can be compared to that of the Taliban as both show their inhuman act to uphold their so-called masculine power. The more Rasheed mentally and physically tortures them, the more their mother-daughter bond grows stronger" (Yeasmin & Islam, 2021, p. 24). Mariam and Laila resist him, and Mariam takes a crucial decision to murder him to rescue her loving ones. Rasheed has been an affectionate father to Zalmi but dies as a villain. His demise echoes the fate of Okonkwo in Achebe's *Things Fall Apart* whose fear of being termed as weak causes his downfall. His fear leads him to kill Ikemefuna and to take many irrational decisions that make many people of his clan go against him. Like Okonkwo, Rasheed also is afraid of losing control of his wives and decides to kill them which ironically causes his tragic ruin.

Showing the tragic consequences of toxic masculinity, Hosseini also urges for healthy masculinity for reducing sexism and the violence born out of it. In the novel, Mullah Faizullah is a representative of caring masculinity. He teaches Mariam reading, playing, and reciting the Koran. Sometimes, Mariam shares the things that she does not share even with her mother, Nana. Hakim is a caring husband and father. Ignoring the expectations of society, Hakim values his wife's opinion, cares for his daughter, ensures education for her, does everything for the comfort of Fariba and Laila. He is progressive and educated. Tariq is another symbol of healthy masculinity. Tariq's sense of healthy masculinity makes Laila feel "anchored", "sheltered" (Hosseini, 2007, p. 374) a feeling that she never felt with Rasheed. Laila's life in Murree is contented and tranquil with Tariq. When Laila wishes to back to Kabul, Tariq values her wish and comes back to Kabul. He allows Laila the freedom to visit Herat, the birthplace of Mariam, alone. This freedom enjoyed by Laila does not mean that

the common females of Afghanistan want to subvert order. The females do not want that; they want the freedom of expression, freedom of movement, freedom to fight for their rights. They also crave such kind of protection where they are respected as human beings, not victims of gender apartheid. Laila enjoys the sanctuary of Babi and Tariq as she gets her own space there.

The novel calls for the reduction of sexism showing the victimization and poignant fate of toxic masculine characters whose sexist activities exclude them from the empire of compassion. It ends with an encouraging tone demonstrating the merits of healthy masculinity. Laila and Tariq with Aziza and Zalmai are living in Kabul. Laila is teaching the kids in the orphanage. She is conceiving a baby girl in her womb. She has decided on the baby's name, that is Mariam. The fate of the girl will not be like the woman, Mariam, who had endured brutality all her life and finally killed the oppressor. The baby girl will live in a good world where the males will discard their false concept of masculinity accepting the truth that "A woman is a being. She is not an appendage of man. A woman is not the other. She is not an addition to man" (qtd. in Akhtar et al., 2017, p. 116).

Conclusion

The article studies toxic masculinity as a potential discourse addressing its evil consequences on the characters' lives. The study argues that toxic masculinity snares men in vague supremacy that prohibits men to highlight their humanitarian agencies, however, contributes to the continuation of gender binaries. Toxic masculinity makes men to forget their true self which is as sensitive as women. To retain their authority over women, men pretend to be strong but silently suffer a lot by hiding their actual feelings. This chauvinistic attitude soaks men's psyche and makes them aggressive and violent for which they face tragic ends. In *A Thousand Splendid Suns*, Khaled Hosseini portrays toxic men and their agonies. Jalil and Rasheed are the poor victims of patriarchy and male chauvinism. They suffer inwardly but are not privileged like women to express their despairs. However, this issue is unaddressed in society, in culture, even in academia. This study calls for reducing sexism screening the devastating effects of toxic masculinity. It offers a message to the world that a healthy relationship is crucial for a nonviolent world; otherwise, both genders will be the victims of sexism. It recommends a radical reform in patriarchal law and form benevolent atmosphere so that people can live peacefully.

References

- Akhtar, S., Rauf, M., Ikram, S., & Raees, G. (2017). A legitimate end to illegitimate beginning: A critical analysis of Mariam's character in *A Thousand Splendid Suns*. *English Language and Literature Studies*, 7(1), 113-119. doi:10.5539/ells.v7n1p113
- Azzi, M., S., Belkhiri, M., Y. (2019). *Patriarchy and gender stereotyping in Khaled Hosseini's A Thousand Splendid Suns* (M.A. Thesis, University of Msila). Retrieved from <http://dspace.univ-msila.dz:8080/xmlui/handle/123456789/14471>
- Chaplin, T., and Aldao, A. (2013). Gender differences in emotion expression in children: A meta-analytic review. *Psychological Bulletin* 139(4), 735-765. Doi: 10.1037/a003073
- Ghosh, H. A. (2003). A history of women in Afghanistan: Lessons learnt for the future or yesterdays and tomorrow: Women in Afghanistan. *Journal of International Women's Studies*, 4(3), 1-14.
- Hosseini, K. (2017). *A Thousand Splendid Suns*. Bloomsbury Publishing Plc.
- Ingram, K., M., Davis, J., P., Espelage, D., L., Hatchel, T., Merrin, G., J., Valido, A., Iynisha, G., & Shanti, D., K. (2018). Masculinity: A gamut in *A Thousand Splendid Suns* by Khaled Hosseini." *Language in India*, 18(2), 78-84.

- Kazemiyan, A. (2012). *A Thousand Splendid Suns: Rhetorical vision of Afghan women* (M. A. thesis, University of Ottawa, Canada). Retrieved from https://ruor.uottawa.ca/bitstream/10393/22680/1/Kazemiyan_Azam_2012_Thesis.pdf
- Riany, S. A. A. (2017). *The impact of oppression toward women seen through two women characters in Khaled Hosseini's A Thousand Splendid Suns* (Undergraduate thesis, Sanata Dharma University, Yogyakarta). Retrieved from https://repository.usd.ac.id/9510/2/124214130_full.pdf
- Sebastian, A. (2016). Feminine power as represented in Khaled Hosseini's *A Thousand Splendid Suns*. *International Journal of Research in Humanities, Arts and Literature*, 4(11), 51-58.
- Torgal, C. (2019). Longitudinal associations between features of toxic masculinity and bystander willingness to intervene in bullying among middle school boys. *Journal of School Psychology*, 77, 139-151. Doi: 10.1016/j.jsp.2019.10.007
- Thompson, E. H., & Pleck, J. H. (1986). The structure of male role norms. *American Behavioral Scientist*, 29(5), 531-543. Doi: 10.1177/000276486029005003
- Waling, A. (2019). Problematising 'toxic' and 'healthy' masculinity for addressing gender inequalities." *Australian Feminist Studies*, 1-15.
- Yeasmin, F. (2000). Khaled Hosseini's *A Thousand Splendid Suns*: A saga of Afghanistan. *Research Journal of English Language and Literature*, 8(3), 381-390.
- Yeasmin, F., & Islam, S. (2021). The concept of parenthood in Khaled Hosseini's *The Kite Runner* and *A Thousand Splendid Suns*. *Journal of Critical Studies in Language and Literature*, 2(6), 19-27. <https://doi.org/10.46809/jcsll.v2i6.92>



‘PERFORMANCE DOES NOT CHANGE THE SEX’: A STUDY OF JUDITH HALBERSTAM’S NOTION OF FEMALE MASCULINITY IN THE LIGHT OF SCIENCE, SOCIETY AND LITERATURE

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Manuscript submitted: January 18, 2022

Accepted: April 26, 2022

Abstract

Gender and sexuality are two dominant aspects in queer and feminist studies. The idea of feminine masculinity has been extensively discussed in Judith Halberstam’s *Female Masculinity* (1998)¹ to bring attention to masculine manifestations by female actors in butch-femme interplay and drag king performances. Halberstam’s arguments are based on the prevalent socio-political and cultural monopolization of gender identity that endorses patriarchy as the dominating force of economic and state manipulations. In a bid to challenge the status quo, Halberstam has propagated the notion of an alternative masculinity evident in childhood tomboyism that may lead to gender fluidity, frequently reflected and enacted in lesbian films and the American nightclub theatricals within an emergent drag king culture. The present article contends that Halberstam’s arguments for a feminine masculinity in his non-fictional prose work *Female Masculinity* (1998) are flawed in view of biological science, fictional representations of sexual orientations in dramatic performances, and real-life experiences. The results of the study indicate that outstanding human performances do not erase gender identities evident in biological anthropology.

Keywords: Gender and sexuality, drag king performance, biological anthropology

Introduction

The history of gender and sexuality has been diverse and multi-faceted over the last two centuries and a half. Mary Wollstonecraft’s (1792/2014) groundbreaking work *A Vindication of the Rights of Woman* is considered the first monumental treatise on gender equality, women’s dignity, and preservation of universal woman rights. Her *Vindication* was a part of and a counter discourse to many of the socio-political issues of her time, particularly the issues of women’s freedom and rights. As this work derived inspirations from the days of the French Revolution, it also challenged Edmund Burke’s (1757/1999) aesthetics of the female body as a conception that relates female beauty to female frailty. Thus the early stages of gender discourse were attempts at demystifying the differences between gender identities, calling for greater freedom and equal opportunities for all irrespective of gender or sexuality.

¹ All subsequent references will be used from *Female Masculinity* by Judith Halberstam (1998). Duke University Press. Copyright © 1998 by Duke University Press

The turn of the century was marked by the appearance of Jane Austen, Emma Willard, Lydia Maria Child, Sarah Margaret Fuller, Harriet Jacobs, John Stuart Mill and many more who raised their voice for gender equality and diversity. Since twentieth century and onward, gender discourse has been gathering momentum, climaxing in the first quarter of the 21st century. Gender theorists like Virginia Woolf, Simon de Beauvoir, Michel Foucault, Sylvia Plath, Julia Kristeva, Monique Wittig and Judith Butler, among others, were gaining ground. Feminists from political and academic platforms produced theoretical, fictional and philosophical discourses, commending the causes of the LGBTQ+ people plus their self-determined gender orientations. In addition to traditional feminist movements, new gender diversity represented by Butch-Femmes theatricals appears significant in the background of a normative heterosexual tradition in line with the usual biological process of the human species. Michel Foucault's (1976/1978, 23) observation in this context is noteworthy:

Homosexuality appeared as one of the forms of sexuality when it is transposed from the practice of sodomy to a kind of interior androgyny, a hermaphroditism of the soul. The sodomite had been a temporary aberration; the homosexual was now a species.

This benign view of Foucault must have fanned the imagination of the contemporary gender theorists.

Judith Halberstam professed himself as one of the pioneers of queer studies and a proponent of the theory of female masculinity. Focusing on the topic of tomboyism and drag king performances in his work *Female Masculinity* (1998), Halberstam has tried to neutralize the identity of masculinity among males as a monopoly and through a series of lesbian films and fictional illustrations has emphasized the presence of masculinity in the female performances of the butch-femmes and drag kings. While the views and concerns of Halberstam and other feminists and gender theorists sound valid and justified in view of human rights and individual freedom, their propositions are fictional rather than factual. The present article offers a biological explanation of gender and sexuality to show that Halberstam's notion of a female masculinity is scientifically unfounded and ethically unacceptable.

Discussion

Sex

Oxford Advanced Learner's Dictionary (2010) defines sex in entry (1) as "the state of being male or female" and in entry (2), as "either of the two groups that people, animals and plants are divided into according to their function of producing young" (p.1401). According to online Merriam-Webster dictionary, sex is "either of the two major forms of individuals that occur in many species and that are distinguished respectively as female or male especially on the basis of their reproductive organs and structures".

Gender

Gender, according to Oxford Advanced Learner's Dictionary (2010), is a "fact of being male or female, especially when considered with social or cultural differences, not differences in biology" (p. 644). Thus sex and gender are scientifically synonymous, but etymologically different. While sex is exclusively related to biological or genetic conditions that produce the effect of maleness or femaleness among humans, gender is a social construct that labels humans as male or female. This dichotomy, which is debatable, marks diversity in sex and gender studies.

Halberstam's notion of Sex, Gender and Masculinity

In his *Female Masculinity* (1998), Halberstam has defined masculinity as a "social and cultural and ... political expression of maleness" (p. 1). He further asserts that "masculinity must not and cannot and should not reduce down to the male body and its effects" (p. 1). The normative notion of masculinity, according to the proposition of the author, is a "subordination of alternative masculinities" (p. 1). He laments that "female masculinity has been blatantly ignored both in the culture at large and within academic studies of masculinity"

(p. 2), only to re-ensure that such predisposition has clear "ideological motivations and has sustained the complex social structures that wed masculinity to maleness and to power and domination" (p. 2). Halberstam ultimately relates male-oriented masculinity to the legitimacy of state power, patriarchy and economic advantages. Conversely, he finds feminine masculinity "in the lives of aristocratic European cross-dressing women in the 1920S...[in] butch lesbians and female-to-male transsexuals... in a history of butches in cinema" and asserts that "the shapes and forms of modern masculinity are best showcased within female masculinity" (p. 3). In this connection, he has categorically mentioned the female impersonation of James Bond and Elvis to show that the notion of masculinity is fluid and changeable, that the idea of masculinity may be, and truly, shared by both males and females.

Next, Halberstam has questioned the biological binary gender identities, suggesting innumerable gender orientations and functionalities. He has cast doubt on the taxonomy of sexologists in an attempt to show queer and lesbian culture as a result and consequence of centuries-old tradition of the practice of a "hermaphrodite," a "tribade," or a "female husband". One of the earliest examples of the origin of lesbianism lies in the individual female impulses of Tomboyism. Halberstam explains the functions of androgen with a push to show that female masculinity is independent of socially defined gender fixation:

The androgyny represents some version of gender mixing, but this rarely adds up to total ambiguity; when a woman is mistaken consistently for a man, I think it is safe to say that what marks her gender presentation is not androgyny but masculinity. (p. 57)

While such a view is biologically untenable, Halberstam has nonetheless tried to indicate the existence of masculine women down the ages.

In defense of intersex, the author has turned to "psychic mechanisms of inversion and the romantic relations between inverts and their lovers" (p. 76) with a fictional reference to Radclyffe Hall's novel of inversion, *The Well of Loneliness* (1990). On the basis of this fiction, the author arrives at the conclusion that "The masculine invert was the congenital invert who was born to an essential female masculinity" (p. 76).

One of the major sections of *Female Masculinity* (1998) deals with the Butch-Femme and Drag King theatrical performances — the core area of Halberstam's feminine discourse. In the drag king culture and male impersonation — a female performer acts in the male attire and style. He asserts that a female character playing a male role "has been a theatrical genre for at least two hundred years, but the drag king is a recent phenomenon" (p. 232). This male impersonation, he observes, continued down the ages until 1933 when Hollywood Motion Picture Production Code, "banned all performances of so called sexual perversion", and thereafter all "male impersonation died out as a mainstream theatrical practice" (p. 234). The butch-femme performativity, Halberstam mentions categorically, faced a similar challenge as "the business of survival as a butch woman is often predicated on one's ability to pass as male in certain situations", and as the economic pressure mounted high, the "camp has been a luxury that the passing butch cannot afford" (p. 232).

Halberstam, however, laments that though mainstream masculinity does not usually need a performance test for its supremacy, female masculinity is essentially performative, and sexually dysfunctional males are under threat and become exposed to "the instability of mainstream fictions of fortified male masculinities" (p. 235). Therefore, male masculinity creates a "performance anxiety" in the art of male impersonation that leads to "a neurotic fear of exposing the theatricality of masculinity" by female actors (p. 236).

So much, then, for Halberstam's laborious psychosexual and quasi-fictional representation of the idea of an arbitrary female masculinity, which can be refuted by a scientific study of the function of sex chromosomes that determine biological gender and account for the gender abnormalities among people identified as Hijra, Travesti, Kathoey and American Transgender---the true victims of genetic disorder and social prejudice.

Role of chromosomes in determining biological gender and sexuality

Once a mystery, biological differences in human species are now nothing more than simple mathematical equations. Genetic science confirms that humans are born with 46 chromosomes in 23 pairs. The presence of

X and Y chromosomes determines a person's biological sex. While males are 46XY, females are 46XX. This is the major demarcation for mainstream gender binary. The exceptions are 46XX males or 46XY females due to some faulty mutations in the Y chromosome which results in the formation of the fetus with x-gender identities evident in hermaphrodite people.

"One is not born, but rather becomes, a woman," claimed Simone de Beauvoir in her seminal work *The Second Sex* (1949/1956, 273). This declaration, which has become almost proverbial, is inconsistent with biological science and genetic manipulations. What determines male or female entities is the presence and absence of the testes. Eric J. N. Vilain (2008) has explained the event in his "Genetics of Sexual Development and Differentiation":

during all stages of fetal development maleness is a permanent molecular fight. During the past decade, a number of genes responsible for the making of a male have been characterized. When altered or, to use a genetic terminology, mutated, these genes are responsible for "demasculinization" of fetuses carrying a male, XY chromosomal constitution, resulting in individuals born intersex" or females" (p.329).

Such a process produces, in fact, three categories of humans: two binary opposites and the third called hermaphrodite or intersex. Thus hermaphrodite is an accidental outcome of 'y' chromosome mutation that ultimately triggers "Disorder of Sex Development" (p.330). Simon de Beauvoir (1949/1956) does not seem comfortable with such a possible outcome:

With a hermaphrodite we should be no better off, for here the situation is most peculiar; the hermaphrodite is not really the combination of a whole man or a whole woman, but consists of parts of each and thus is neither (p.25).

While Halberstam in his discourse has tried to delete the dichotomy of sex binary and propagated same-sex orientation, Eric J. N. Vilain (2008) concludes that, "despite a theoretically infinite spectrum of sexual and gender variations, the legal definition of sex offers no more than two choices in most societies: male or female" (p.332).

Hermaphrodites versus LGBTQ

Humans with "Disorder of Sex Development" are Hijra, Travesti, and Kathoey, commonly called hermaphrodites. The Hijras are considered as neither men nor women, but "impotent" men, looking like "female". Their genetic disorder is either a non-developed female reproductive organ leading to the uterus, or the male genitalia invisible. The travesties in Brazil, in the description of Nanda (2008) are "conceptualized as men who take the passive, receptive role in sexual interaction— they are identified as "nonmen" in a system of either men or nonmen, not as an alternative or "in-between" gender (p.460). The Kathoey are considered as hermaphrodites, with a female gender identity disorder, and counted as the third gender in Thailand, the combination being: male/female/kathoey. They are more like the Indian Hijras but less like Brazilian travesties.

Thus a biological enquiry into gender and sexuality, apart from some minor exceptions, generally confirms two legal states of all higher species: binary and intersex. Genetic scientists have quashed any evidence of a single "gay gene" (Nicola Davis (2019) in operation among LGBTQ+ bodies, a latest discovery that challenges the Foucauldian notion of a sodomite "aberration" into "homosexuality", as well as Halberstam's notion of a female masculinity.

Tomboyism versus biological eventualities

Tomboyism is more a psycho-social than biological condition. Children's dress behavior may depend on social classification, fashion and culture. A female child may develop fantasies for a male child's dress, hair-style or typical habits and vice versa. However, Halberstam's conceptualization of this behavior pattern as a natural

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genetic condition is clearly baseless. Whether male or female, children before puberty hardly realize a biological difference between themselves except the different orientation of genitals. It is the release of sex hormones by human brain cells that triggers the differentiation of the ultimate male- female gender orientation.

However, in rare cases, a female child dressed in a typical boy's attire in early childhood may develop a masculine behavioral tendency. These children are identified with a medical condition called gender identity disorder (GID). But when they reach puberty, due to hormonal change, they gradually revert to their typical feminine identity, behavior and personality.

As a clinical remedy to these psycho-physical symptoms, Zucker and Cohen-Kettenis (2008) have prescribed behavior therapy, psychotherapy, parental guidance and engagement, limit setting, and supportive attitude. If tomboyism, as propagated in Halberstam's *Female Masculinity*, is allowed a free rein, and clinical advice and treatment are ignored, these children may face serious psychosocial and psychosexual complexities in their adulthood.

LGBTQ+ culture: Anti-evolution and anti-Nature

Nicola Davis (2019) has quoted Qazi Rahman, a leading authority on sexual orientation research from King's College London, saying, "he was not surprised that the genetic variants identified only have small individual effects, pointing out that since same-sex behaviour is linked to having to fewer offspring, evolution is likely to hide such variants in effect". The observation of Qazi Rahman attests the fact that LGBTQ+ behavior is not only genetically insignificant but also against the law of Nature or "anti-evolution". The planet's ever-expanding bio-diversity is a result of a natural evolution carried on by male-female combination of production and reproduction among the species. The OALD (2010) defines species as "a group into which animals, plants, etc. that are able to breed with each other and produce healthy young are divided, smaller than a GENUS and identified by a Latin name" (p. 1481). Conversely, LGBTQ+ culture is anti-biological, genetically abnormal, anti-Nature, non-procreative and anti-civilization.

Drag King performance and butch-femme culture: Anti existential and anti-biological

In support of gender fluidity, Halberstam has referred to Simon de Beauvoir (1949/1956). Interestingly, de Beauvoir's own idea of sexuality coincides with the above clarification and contradicts Halberstam's notion of female masculinity when she (de Beauvoir) writes: "Males and females are two kinds of individuals which are differentiated within a species for the functions of reproduction; they can be defined only correlatively" (p.33). She further observes that the egg produced in the ovary floats on water and eagerly waits for fertilization. It is the male chromosome, or the sperm, that seeks it out, tries hard to penetrate the outer covering of the egg and finally takes hold of it. It is noteworthy that only one sperm is let in and then the egg quickly creates a membrane to prevent other sperms from entry. The competition among the millions of sperms is phenomenal and spectacular. While the egg is static and passive, "the sperm --- free, slender, agile---typifies the impatience and restlessness of existence" (p.41).

Clearly, de Beauvoir assigns an active role to the sperm, terms it as an impatient and restless suitor to its covetous beloved (the egg), while the beloved herself is shy, passive, but protective. Even she (the egg) is monogamous, as she maintains her sexual purity by shutting her door permanently to other "numerous suitors". Such passivity and conservative nature of the egg significantly downplays Halberstam's notion of a female masculinity.

Shakespeare's (1606) Macbeth:² 'Unsex me here'

Halberstam's propagation of female masculinity with reference to lesbian films in his book and his own drag king night club experiences may be refuted by Shakespeare's normative fictional representation of the apparently masculine role of Lady Macbeth.

² All references to *Macbeth* are from A R Brawnmueller, 1994/1606, Cambridge University Press

William Shakespeare, almost four centuries back, may have envisaged such a phenomenon among womenfolk, and designed the character of his Lady Macbeth to show the mettle of the “butch” on the dramatic stage. Her initial performance really outplays her warrior husband, and she continues to keep her grip on state affairs up to a certain period of their rule. But eventually the biologically inherent female nature gains ground and Lady Macbeth is hardly able to resist the pressure of a crime unusual for a feminine spirit and thus finally succumbs to her own frailty.

Overall, the world of *Macbeth* is a projection of dominating female power represented by both the witches and Lady Macbeth. Macbeth, the ‘brave’ and ‘valiant’ General of King Duncan, is first netted by the witch sisters whose appearance is androgynous:

you should be women,
And yet your beards forbid me to interpret
That you are so. (1.3.43-45)

But they not only try to befool this powerful General, they appear sexually perverse. One of the witches, to take revenge on a sailor’s wife, will change into a “rat without a tail” (1.3.8), an apparent hermaphrodite, who will “do and do and do” (1.3.9). The sexual connotation of “do and do and do” signals a repetition of sexual assaults, which will “drain him dry as hay” (1.3.17), and render him “dwindle, peak, and pine” (1.3.22). The magical image of the castrated rat displayed by a “pilot’s thumb” (1.3.26) is a projection of phallic fetishism of lesbian orientation. Thus, besides being filthy and obnoxious in their misdeeds, the “weird sisters” represent the perverse sexuality of modern-day LGBTQ culture.

The more powerful female figure, however, is Lady Macbeth. Her desire for a transformation into male masculinity is both interesting and alarming. To execute her heinous crime to kill the King, she makes a plea to evil spirits to “unsex” her so that she acquires necessary male “cruelty” for the desired performance. She wants to go against her female femininity by making her blood “thick”, which most probably connotes female periodical menstruation, to stop all “th’access and passage to remorse” so that “compunctious visitings of nature”, i.e. natural female compassion and infirmity, should not fail her in her purpose (1.5.39-45). The stoppage to “menstruation” is a direct reference to the idea of transgender orientation. Macbeth also notices such a transformation in his wife’s biological nature:

Bring forth men-children only,
For thy undaunted mettle should compose
Nothing but males. (1.7.73-75)

It is, however, difficult to assume, whether Shakespeare was making a mockery of such a female masculinity. The first symptom occurs when after the murder is revealed, and the ‘iron lady’ faints (debatable whether it was real or fake):

Help me hence, ho.
MACDUFF: Look to the lady.
[Exit Lady Macbeth, helped]. (2.3.112-114)

Lady Macbeth is seen onstage only briefly in Act III, Scene IV, and thereafter her assumed masculinity begins to decline until she re-appears in Act V, Scene I— sick, broken, and full of remorse. While Macbeth is preparing to fight his enemies with his last but desperate masculinity, Lady Macbeth has lost the power of her female masculinity. She is now a defeated drag king, a fake butch, who is unable to defend her own mind under the huge pressure of a rough and tough political commotion, and finally commits suicide—signaling death to the notion of Halberstam’s discourse of female masculinity.

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Real-life stories that demean the doctrine of female masculinity

The Harry Potter author JK Rowling's recent comment on gender and sexuality has attracted the attention of gender activists around the globe. The author maintains the view that gender dichotomy is real and self-evident. Alison Flood (2020) has reported "Author 'follows my conscience' after head of Robert F Kennedy Human Rights group says her views are transphobic". She has quoted Ms. Rowling as saying: "If sex isn't real, the lived reality of women globally is erased. I know and love trans people, but erasing the concept of sex removes the ability of many to meaningfully discuss their lives." The truth claimed by the Harry Potter author testifies to the lived experience of mainstream heterosexual orientation of human species.

Sexual misconducts in academic and professional arena

Sex, with the exceptions of genetic disorder, is binary opposite from being to becoming. While sexual assault is a forced performance of the male predators against the females, the opposite is rarely revealed. Even the best of the female categories---the lawyers, the barristers, university students, athletes, and military officers---are not safe and they can hardly defend themselves, however academically, intellectually or professionally strong they are. This is partly biological and the rest is due to psycho-sexual perversion. According to an article published in *The Guardian*, Owen Bowcott (2016) has reported that female barristers are frequently sexually assaulted by their male counterparts but they rarely complain for fear they might be in trouble with their career and dignity.

Sally Weale (2018) reported that the University of Cambridge has admitted it has "a significant problem" with sexual misconduct after it received 173 complaints in nine months after launching a new anonymous reporting system. The majority of complaints (119) alleged student-on-student misconduct, while seven complaints were made by staff against colleagues, and two by students against staff. The rest involved neither staff nor students.

Rape in the military: exposing the shocking truth

Stacey Samuel's (2012) report was aired by the CNN that Klay was "gang-raped" by a senior officer and his civilian friend at her Washington home, the suit contends. The officer allegedly threatened to kill Klay. She reported the rapes and the officer was eventually convicted in a military court of adultery and indecent language, and given 45 days in military confinement, Klay said.

Alexandra Topping (2012), with reference to the groundbreaking feature-length documentary *The Invisible War* (2012), reported a heartbreaking account of rape of KoriCioca, a veteran US Navy coastguard,

'He hit me across the left side of my face ... and my face hurt so bad. He screamed at me and he grabbed my arm and he raped me.' KoriCioca's heartbreaking account of her rape by a commanding officer while serving in the US Coast Guard is not the most shocking part of her testimony.

She reports that Cioca is just one of the women interviewed in *The Invisible War (2012)* that lifts the lid on the abuse of women in the US military and which got its first UK screening in the Frontline Club in London.

These examples of gendered misconducts at different social and professional settings conform to the facts of binary opposite biological conditions and are triggered by fantasies rather than conscience.

Conclusion

Judith Halberstam, in the last decade of the 20th century, propagated in *his Female Masculinity* (1998) the notion of the "drag king" in American night clubs, the "butch-femme" culture in lesbian films, and tomboyism in middle-class fashionable families to draw attention to the idea of masculine manifestations by female performers. Biological science, as this study finds, indicates the normative gender orientation as a grand design of natural selection, with the exceptions of genetic abnormalities leading to the birth of the hermaphrodites. Whether William Shakespeare foresaw an emergence of gender identity disorder in his time or not, he did try

to produce a new type of gender personae in Lady Macbeth, a modern day “butch” or a “drag king” or a “self-chosen hormone-transferred transgender”, whose on-stage failure in the fictional framework of the play, *Macbeth*, clearly downplays Halberstam’s notion of female masculinity. Shakespeare’s Lady Macbeth shows the essential hollowness of the proposition of a hybrid female masculinity that succumbs to its innate natural femininity. Likewise, the lived experiences in the meaningful explanation of life attest to the fact that the XX and XY chromosome combination is a grand demarcation of biological anthropology. Thus while the notion of a female masculinity is fairly fascinating, its grounding is baseless and flawed. Overall, the study nullifies the impact of the painting of a “Raging Bull” on the cover page of Halberstam’s book which inadvertently claims to create “a connection between the spectacle of boxing and the spectacle of the fighting butch”.

References

- Beauvoir, S De. (1956). *The second sex*. Jonathan Cape.
- Bowcot, O. (2016, July 12). Female barristers report high level of sexual harassment at work”. *The Guardian*.
- Burke, E. (1999). *A philosophical enquiry into the origin of our ideas of the sublime and the beautiful*. Oxford: Oxford University Press.
- Davis, N. (2019, August 29). Scientists quash idea of single 'gay gene'. *The Guardian*.
- Flood, A. (2020, August, 28). JK Rowling returns human rights award to group that denounces her trans views. *The Guardian*.
- Foucault, M. (1978). *The History of sexuality*. New York: Pantheon Books. Halberstam, Judith. 1998. *Female Masculinity*. Duke University Press.
- Halberstam, J. (1998). *Female masculinity*. Duke University Press.
- Kirby Dick (Director). (2012). *The invisible war*. United States: Chain Camera Pictures.
- Merriam-Webster, s. v. “sex”, accessed November 15, 2021, <https://www.merriam-webster.com/dictionary/sex/>
- Nanda, S. (2008). Cross-cultural issues. In D. L. Rowland & L. Incrocci (Eds.), *Handbook of gender and sexual identity disorder* (pp. 457-485). New Jersey: John Wiley and Sons.
- Oxford Advanced Learner’s Dictionary of Current English (8th edition), s. v. “sex”.
- Sally, W. (2018, February, 5). University of Cambridge admits significant sexual misconduct problem. *The Guardian*.
- Stacey, S. (2012, March 6). Female service members sue U.S. military for alleged rape, sexual assault. *The Guardian*.
- Shakespeare, W. (2004). *Macbeth*. Cambridge University Press.
- Topping, A. (2012, October, 29). Rape in the military: exposing the shocking truth. *The Guardian*.
- Villain, E. J. N. (2008). Genetics of sexual development and differentiation. . In D. L. Rowland & L. Incrocci (Eds.), *Handbook of gender and sexual identity disorder* (pp. 329-353). New Jersey: John Wiley & Sons.
- Wollstonecraft, M. (2014). *A Vindication of the rights of woman*. Yale University Press.
- Zucker, K J., & Cohen-Kettenis, P. T. (2008). Gender identity disorder in children and adolescents. In D. L. Rowland & L. Incrocci (Eds.), *Handbook of gender and sexual identity disorder* (pp. 376-422). New Jersey: John Wiley and Sons.



**MAN, NATURE, AND IMAGINATION: A COMPARATIVE READING OF
“THE LAKE ISLE OF INNISFREE” AND “STOPPING BY WOODS ON A
SNOWY EVENING”**

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Manuscript submitted: November 30, 2021

Accepted: June 10, 2022

Abstract

W. B. Yeats’s “The Lake Isle of Innisfree” and R. Frost’s “Stopping by Woods on a Snowy Evening” envisage nature in relation to man. Though both the poems show their Romantic legacy, they confront the theme of man’s connection with nature in a more nuanced manner. A comparative reading of the two poems shows not only where they adhere to and depart from the Romantic poets, but also how they relate to each other in this regard. Such a reading also illustrates where these two poets accord and where they differ in their presentation of this theme of man’s relationship with nature, both in their use of figures of speech like metaphors and symbols and in their recourse to imagination.

Keywords: Man; nature; imagination; romanticism; metaphor; symbol

Introduction

“The Lake Isle of Innisfree” and “Stopping by Woods on a Snowy Evening” are two of the most anthologized poems by W. B. Yeats (1865-1939) and R. Frost (1874-1963) respectively, who are two of the greatest poets of English language across the Atlantic, one from Ireland and the other from the United States. These two poems are often selected for introductory courses of poetry and of literature because they are considered very accessible to the students. Written in a space of 34 years and by poets of two different countries, these two poems, like many famous poems of the earlier Romantic period, deal with the themes of how man feels connected with nature, how he conceives nature’s beauty, and what role imagination plays in his appreciation for nature. In these regards, both the poems show some similarities and some dissimilarities, which can be explored for a better understanding of the poems.

Discussion

William Butler Yeats, often regarded as one of the best twentieth-century British poets despite his nationalistic fervor of Irish identity (Pethica, 2006, p. 130; Howes, 2006, p. 218), composed the poem “The Lake Isle of Innisfree” in 1888 and published it first in 1890 (Merritt, 1998). The poem was forming in his head with the remembrance of Innisfree when “he was standing on an actual London pavement when a jet of water at a

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DOI: <https://doi.org/10.53808/KUS.2022.19.01.2140-ah>

chemist's shop set him dreaming of it nostalgically" (Stock, 1964, p. 40). It was Yeats's most favorite poem (Hopper, 2008) and always kindled in him his deep love for the panoramic beauty of the lake Isle, which is situated in Lough Gill in County Sligo of North-west of Ireland, where he passed many of his childhood days and where he always returned until the death of his uncle severed all his ties to Sligo (Ross, 2009, p. 551). The year 1888, when the poem was composed, was not far distant from what is considered the Romantic Period in English Literature. The remarkable nature poems of the great Romantic masters like *The Prelude* of William Wordsworth, which is a meditative nature poem of epical proportion, and shorter ones like his often anthologized "To Daffodils" and "Tintern Abbey", and John Keats's greatest odes of 1819 including "Ode to a Nightingale", "To Autumn" and "Ode on a Grecian Urn", and Percy Bysshe Shelley's "Ode to the West Wind" and "To a Skylark" were still very much in the minds of readers of Yeats's time. The memorable and often quoted lines like "If Winter comes, can Spring be far behind?", "Beauty is truth, truth beauty", or "Heard melodies are sweet, but those unheard / Are sweeter" still had their incantatory effects on the English readers. Yeats's "The Lake Isle" was written in such a time when calm and solemn beauty of nature as shown in famous poems like Alfred Tennyson's *In Memoriam* of 1850 or Matthew Arnold's "Thyrsis" of 1866 was still resonant in Victorian minds. Yeats cannot be said to have escaped from the appeal of these poems' exquisite description of nature where nature often seems to transform the human world; in fact, Yeats, as "a romantic in all" began his career as an enthusiastic admirer of Blake and Shelley" before turning to a post-Romantic vision of Ireland (O'Neill, 2007, p. 34). When Frost wrote his "Stopping by Woods on a Snowy Evening" in 1922, which he published in his second book of poetry *New Hampshire* in 1923, he too like Yeats was highly influenced by the Romantic poets of England (Faggen, 2008, pp. 20, 38; Hass, 2014, p. 115).

In fact, though Yeats was always experimenting with poetry, especially with poetic style, after his early career when he wrote this poem, Frost always chose to remain a traditionalist (Sheehy, 2014, p. 223; Buell, 2001, p.116), especially in his subject matter, which generally is man's relationship with nature. Unlike the poets in the Romantic period, for whom "nature in its physical appearance emerged as the privileged material for expressing a human subject emancipated from the traditional restrictions of religion and society" (Schneider, 2000, p. 92), both Yeats and Frost did not give nature a more important role than human beings; yet it is Yeats who gives more emphasis to nature in "The Lake Isle" than Frost does in "Stopping by Woods".

Yeats's childhood connection with the Irish county of Sligo, which he visited occasionally, played a major role in the poet's turn to nature, not only because it was where the Lake of Innisfree is located, but also because Yeats felt an urge to connect to the natural beauty of Ireland as a source of inspiration for his poetic activity, which is evident in the fact that he was describing his conception of the poem while writing a fictional work:

I began *John Sherman*, putting into it my memory of Sligo and my longing for it. While writing it I was going along the strand and, passing a shop window where there was a little ball kept dancing by a jet of water, I remembered waters about Sligo and was moved to a sudden emotion that shaped itself into 'The lake isle of Innisfree' (Ross, 2009, p. 391).

Yeats confesses in *Autobiographies* that he was brokenhearted to leave county Sligo (Ross, 2009, p. 551). It should also be remembered that Yeats was fundamentally preoccupied with the deep recesses of human mind, and the occult things for which his fascination was well known, and also the automatic writing which he endorsed and absorbed (Smith, 1990, pp. 14, 104).

The historical period in which Yeats wrote this poem is reflected in the poem "The Lake Isle" in that his experience of the dullness of the city, as contrasted with the captivating beauty of rural Ireland, is evident in the highly suggestive "pavements gray". In fact, this phrase is the only image other than "roadway" that the poet uses to describe the city, either with or without color. Connoting the lack of the vivid colors that Yeats has reserved for nature, the very word "gray" indicates the loss of color in the city life, i.e., the lack of satisfaction and attraction there, since complexities were proliferating and miring the city life as

industrialization was increasing rapidly with more mills and factories being set up, more people thronging in the towns and the cities, more workers experiencing sordid poverty, and consequently more social miseries compounding the life of the common people. The disparity Yeats found between British city life and the Irish rural landscape moved Yeats to seek refuge in a sort of primordial pristine Ireland, full of enchantment and full of repose, showing "his profound belief in the spiritual superiority of Ireland to godless, industrialized Britain" (Allison, 2006, p. 189). So it was not simply the poet's personal problems as a city dweller with expectations and frustrations, challenges and failures that turned everything "gray", it was a collective loss of vividness and vivacity as well. Such ennui and boredom of urban life were not unfamiliar to contemporary readers of poetry; for example, French poet Charles Baudelaire already wrote about it in his *Les Fleurs du Mal* in 1857 and became "the starting-point for a whole new generation of writers" even in England in "the nineties" (Hough, 1961, p. 194). The squalor of city life due to the Victorian motto of progress was inescapable for an Irish poet of the time living in England, especially as he compared his rustic Ireland with the industrialized Britain. Yeats but chose to be reticent in this, yet told so much with so little; yet because of poetry's astounding capacity to condense and embellish, this reticence could sufficiently convey to his readers especially of his time the messages that he had in mind about nature vis-à-vis city.

Frost writing on the other side of the great Atlantic and in the New England terrain and culture of the United States of America would not evoke any great city in his poetry, since his was a bringing up, like Yeats's, much rooted in the countryside with frequent urban experiences. He would choose to ignore his friend the great master of Modernism Ezra Pound's call to make it new in poetry (Faggen, 2008, p. 8), but still he would not, like Yeats, conceive nature and man's connection with it in any simple terms. Frost's poems have been examples of "meaningfully asserting the human in a nonhuman world" (Baym, 1965). Whereas for the speaker of Yeats's poem nature is a place of escape, a source of peace, a purveyor of daily necessities, and an object of beauty, for the speaker of Frost's poem nature is a source of enigmatic beauty, which is compelling and mysterious at the same time and yet appropriate to forsake when human relationships and personal and social engagements may occupy the mind.

In Yeats's poem, the speaker first describes his plan as to how he will build a dwelling in the lake isle. However, the question of survival is not absent in his mind, since he is not as mesmerized with the beauty of nature as Frost's speaker is; and thus he speaks immediately about how he will cultivate foods like beans and honey for his daily sustenance. Furthermore, Yeats's speaker wants to "live alone", which is contrary to the view of the speaker in Frost's poem, who, coming across the hypnotic and unusual beauty of nature on his way to some place, is momentarily enthralled by the woods, which he finds to be "lovely, dark and deep" but which he decides in the long run to renounce, even though with difficulty, in order to ride on to his destination, i.e., to his kinsfolk or to the people he is bound by some promises to meet. Even though the captivating beauty of nature on the isle is powerfully present, the second of the three stanzas of "The Lake Isle" starts with an invocation of peace:

And I shall have some peace there, for peace comes dropping slow,
Dropping from the veils of the morning to where the cricket sings;
There midnight's all a glimmer, and noon a purple glow,
And evening full of the linnet's wings.

Evidently Yeats lays profound emphasis on "peace" as the form of ratiocination indicates, for strong is the poet's desire to escape from the monotonous and lackluster city life, which offers neither any promise of peace nor any vivid attraction compared to the fascinating beauty of nature, which is full of colors and music, the "bee-loud glade" in the first stanza reminding, suggestively of course, of the din and bustle of the city, compared to which the songbird's music sounds uncannily relaxing. In contrast to such rapturous Romantic vividness of colors and melodiousness of songs, Frost's speaker seems pretty mundane with the jingling of the horse's "harness bells" and "the sweep / Of easy wind and downy flake", which is the "only other sound". Frost's poem, however, shows the pristine view of nature, uncorrupted by the human touch of a practical-minded misanthrope in Yeats's "Lake Isle" who seeks to leave all human contact. Yet Frost is turning on its

head the very Romantic notion of the supremacy of the “sublime phenomena of external nature”, which “assert painfully the priority and dominance of the objective world” (Schneider, 2000, p. 112), and “nature’s beauty and its transcendent value” (p. 98), since natural phenomena conceived thus point to a strong possibility that a person may distrust their human obligations and social responsibilities.

Yeats introduced a divergence from Romanticism not only by demonstrating that his speaker is unable to espouse wholeheartedly the Romantic concept of nature, but also by inhibiting his speaker from leaving the city even though he has left it already through imagination. Frost extended this break with the Romantic conception of nature to a further limit by making his speaker choose an opposite direction – away from nature and towards the humans, though ultimately he becomes incapable of taking this direction. Thus, while Frost’s speaker is presented as engrossed in the captivating beauty of nature, he is yet compelled to contemplate on returning to human establishments for social engagements. Thus, Yeats, even as one of the last Romantics, does not “remain at the level of uncritical romanticism” (Hough, 1961, p 225), and yet he seems to be still pledging his allegiance, though modified to some extent, to the Romantic creed of nature. Frost, however, presents a contrary view, and even then he fails not to lend to his description of nature what generally is nature’s enigmatically beautiful side, often overlooked and seldom appreciated. And this Frost does in the simplest of terms, unlike the great Romantics and unlike Yeats.

While to the Romantic poets nature is for humanity a purveyor of solace as in Wordsworth’s “Tintern Abbey”, of revolutionary zeal as in Shelley’s “Ode to the West Wind”, of beauty and truths as in Keats’s odes, a dissociation between nature and humans prevails, however unremarkable it is, in these representative poems of Romanticism. “The demands the Romantic poets place on contexts of landscape and weather in their meditative odes are heavy and give evidence of poets who cannot fall back on the ritual structures of social life to put into motion traditional meanings either for poetry or for existence,” observes S. Stewart (2008, p. 70). And such a disconnect between nature and society marks these two poems of Yeats and Frost quite conspicuously and cogently, as if to show that a return to nature, though indispensable for its undisputed power of sustenance for emotional wellbeing and imaginative health, is gradually becoming more and more impossible in a post-Romantic period.

For the Romantic poets, the idea of nature was “the most inclusive and the most evocative” of all Romantic ideas, and it was as forceful as the “concept of creativity of the human mind and the power of the poetic imagination”, and both these ideas were “closely interrelated”, so much so that “Romantic ‘nature’ is essentially a space of the imagination, which in turn draws from her most of its imagery” (Schneider, 2000, p. 92). Both Yeats and Frost show that nature remains a powerful source of solace, though only in human imagination, the reason why Yeats’s speaker only contemplates on going back to nature, but a profound incapacity restrains him, while Frost’s speaker contemplates on social reality and human engagements but cannot dissociate himself from the essential repose that nature provides though momentarily. Unlike Keats and Shelley in their Odes, where nature is part of the poet’s existence without any cogent disconnect between nature and society, Yeats and Frost comprehend that nature is not an essential part of their life, but instead is remote from their usual experience, and thus both the poets root their speakers in social engagements – Yeats with “pavements gray”, and Frost with “village”, “farmhouse”, and “promises”. References to an aching “heart” and a “hungry generation” in Keats’s “Ode to a Nightingale” and a “high-sorrowful” heart of a “Bold lover” in his “Ode on Grecian Urn” are not as realistic a part of the poet’s existence, whether social or individual, as they are part of the poet’s or his speaker’s imaginative existence, just like Shelley’s, who in “Ode to the West Wind”, falls upon “the thorns of life” and “bleed”.

Yeats and Frost, like Keats and Shelley in these odes, supply scanty details in portraying a reality that can envisage some kind of social conflict; but unlike the Romantics, they seek to delineate even in the brevity of their poems a social surrounding, however thinly it may be. And in this regard, Frost goes further than Yeats and locates his speaker in a social engagement of “promises”, undefined though these be. Unlike the

Romantics like Keats and Shelley, for whom personal agony or human passion was immensely powerful in propelling them to the world of nature so that they can seek repose in imagination, both Yeats and Frost refrain from ennobling their pangs, which are thus left conspicuously understated – in Yeats a repeated urge for “peace” in an urban context of “pavements gray” while in Frost in the “darkest evening of the year” the repeated thought of sleep, with subtle connotations of afflictions and death. As Yeats and Frost, unlike Shelley and Keats, delineate the acuteness of personal pain in a diminished form, and as they let the social pains and preoccupations prevail, though slightly more cogently, both of them seek remedy in nature through an imaginative encounter that is less powerful than their Romantic predecessors.

Unlike the Romantic poets, both Yeats and Frost create their speakers so firmly rooted in reality that their connection with nature is presented as if in conflict with reality – either they have to choose between nature and reality, or be fixed in their imagined natural worlds, like the Romantics. While Yeats will not allow the speaker to “go” into nature, Frost sets his speaker going into nature, and if Yeats’s speaker is always looking towards nature for peace, Frost’s speaker cannot be seen as facing only one direction, as he may still be looking at nature at the end of the poem or he may be facing the society again in his mind.

In fact, the sense of beauty is unfolding in Frost’s speaker slowly but powerfully, as he watches in the very first stanza how the “woods fill up with snow”; and as he stands between “the woods and frozen lake”, nature’s beauty becomes more appealing in the sense that it is but “The darkest evening of the year”, which suggests the power of the emotions in his mind and the gravity of his burdens or his responsibilities which may soon envelop him. The most powerful expression of nature’s enigmatic beauty appears only in the first line of the last stanza:

The woods are lovely, dark and deep,
But I have promises to keep,
And miles to go before I sleep,
And miles to go before I sleep.

As in his other often anthologized poems like “Mending Wall”, “The Wood-Pile”, “The Road Not Taken”, “Birches”, and “Design”, Frost in “Stopping by Woods on a Snowy Evening” imagines a natural setting and foregrounds man there, who engage in a monologue or “talk”, “centered on the importance of metaphor” (Oster, 2001, p. 166), and in this poem the woods as a rustic metaphor for the speaker are beautiful, and casually called “lovely”, but also “dark” and “deep”. Frost wrote this poem in 1922, the year when modernist works like T. S. Eliot’s monumental signature poem “The Waste Land” and James Joyce’s experimental stream-of-consciousness novel *Ulysses* were published. Even though never truly a modernist poet in his career, Frost has nonetheless shown in “Stopping by Woods” how he dissociated himself from the other poets like Eliot and Ezra Pound who indulged in complexity of emotions in urban surroundings. Such plainness of expression, yet such immensely suggestive words, “lovely, dark and deep”, distinguishes Frost from his Romantic predecessors just as “The Lake Isle” distinguishes Yeats from them. When the lake is frozen, unlike the Lake Innisfree, the talk of depth but arouses more enigma, like the “dark” woods in the “darkest evening”; such depth and darkness connote everything that is possible. The reader can never know what the “promises” are, though the word is repeated in the incantatory last lines, nor can he ever know how such depth and darkness can become “lovely”, or beautiful; yet they are so, and that is enough to mesmerize the reader as it did the speaker.

The inescapable enigma of “Stopping by Woods” emanates from nature, description of which helps build the incantatory effect of the last stanza where each line ends with a similar end-rhyme, as this description has led the speaker to use common words in their uncommon combinations and in a captivating rhyme scheme, aaba bbcb ccdc dddd, where the third line in the first two stanzas rhymes with lines 1, 2, and 4 of the following stanzas. All this enigma makes the last stanza highly memorable for the reader, while nature’s enigmatic beauty captivates the mind of the speaker so powerfully that he feels compelled to “stop” to indulge in it. This beauty also becomes more enigmatic through the poet’s juxtaposing it against the “darkest” time as

well as against the promises that hang upon the mind of the speaker and force him to ultimately dissociate himself from the beauty of nature so that he can ride on towards the human beings with whom he is beholden in some inseparable ways. Unspecificity of such human engagements also lends more enigma to the poem and thus to nature also, contrary to the clearly mentioned reason of “peace” in the “The Lake Isle”.

For Yeats’s speaker seeking to live in nature, peace of mind is the most important objective, to which both his loneliness and the beauty of nature would contribute, and here to show that nature is capable of sustaining human life is but a symbolic way of expressing the poet’s desire to turn to nature, not simply to a village life, however simple and uncorrupted it can be, but to a more pristine nature, because the speaker considers human connection as one of the reasons why “peace” is lost. Too many monosyllabic words and an easy rhyme pattern, abab cdcd efef, in Yeats’s poem contribute to the poem’s simple message, in other words to the simplicity of the poem. Though Frost’s poem seems a simple exercise in iambic tetrameter, Yeats’s is predominantly iambic with plenty of variations. In its rich though not elaborate description of nature’s beauty, Yeats’s poem employs imagery of every kind though mostly visual and auditory images predominate, making the poem evoke nature as manifested in great Romantic poems, and it should be noted that such praise of nature is not to be found as powerfully in any other often anthologized poem of Yeats as perhaps in “The Wild Swans at Coole”.

Since the subject matter in “The Lake Isle” and “Stopping by Woods” demand a substantial description of nature, both the poems, quite understandably, employ a lot of concrete words, in the midst of which a few abstract words become highly conspicuous and express the contrast quite effectively. Thus, it is “peace” that stands out in Yeats’s poem, though such “peace” is shown to be emanating from the virgin nature, while it is “promises”, repeated twice, in Frost’s poem that jolts the reader to a lurking reality in the speaker’s mind. In Yeats’s poem “peace” is presented in a powerful metaphor (“peace comes dropping slow”), which is suggestive neither of rain nor of fog, “Dropping from the veils of the morning to where the cricket sings”, but of something else or of both rain and fog, indicating a slow iridescent movement of peaceful time from the dawn to the dusk and beyond. There are also other figures of speech here like a synecdoche (“Nine bean-rows will I have there”) and a personification as in the cricket’s singing which contribute to the description of nature.

Frost’s personification of nature is but at an extended level, as the “little horse” is made capable of thinking and asking a question “if there is some mistake”. “The darkest evening of the year” appears to be an exaggeration, but the expression has nonetheless a superb metaphoric range, which condenses so much meaning in it, as the “year” can synecdochically mean the whole life till now. The metaphoric “darkest” and “evening” can connote all the troubles lurking in the mind, which perhaps have compelled the speaker to set off on the journey in order to fulfill the promised tasks and which indubitably now urge him to forsake the fascination with nature for the sake of reality. It is indeed hard to tell whether the worst moment till now denotes the worst crisis in life or whether the darkness that enshrouds the woods which are now being filled up with snow lends an extraordinary, preternatural charm to nature’s beauty. Nevertheless, it is also possible that darkness here augments the beauty of nature and makes it all the more enigmatic and thus more appealing. Such a darkness denoting lack of light may create further problems for the poet-traveler in maintaining his course, but such a predicament is not presented with any other details. So this darkness is suggestive of both crisis and beauty; in fact, the very oxymoronic expression, “lovely, dark and deep”, adds to the mysterious aspect of nature, and by extension to the inscrutable aspects of human life.

The symbols of nature that both Yeats and Frost have employed show how they conceive man and nature in their distinctive ways. In “The Lake Isle” the isle itself is not only a symbol of pristine nature, untainted with extensive human contact, but also of peace that can be achieved through a sojourn or continual residence in nature. Despite seeking peace in nature, Yeats’s speaker cannot envisage peace in its panoramic beauty, instead he conceives peace in nature in its procreative power, as he reflects on planting vegetables as

well as on collecting honey in an apicultural pastime. Nature comes to his mind no less in the form of contemplation as of imagination; therefore, he muses on staying in the isle on his own terms, by transforming it for his own interests, if not for the worse for nature itself. Conscious that presence of any other man would vitiate the natural landscape here, he cannot imagine that others would disturb the peace that nature exudes; and thus even honey-bees in Yeats’s poem may not symbolize any other men or women living on the isle alongside the speaker.

On the other hand, it is not at all improbable that the little horse in “Stopping by Woods” may even symbolize, though remotely, a human companion, even though Frost remembered to have thought about the idea of the poem when he went out to look at the sun after a night-long work on “New Hampshire” (Fagan, 2007, p. 219). Yeats in his poem “The Lake Isle” does not allow human beings to taint nature, but allows the connection between man and nature to remain active to some extent. He does not make such a connection symbolic of a rural setting, even of an ideal one, where humans live in a simple, innocuous relation with nature, since he intimates that city people who are wholly preoccupied with their hectic urban schedules and consequent burdens are not capable of living in nature, though paradoxically they have nowhere to go for peace but to nature. As for the speaker, he has contemplated enough to perceive this truth, which he expects will offer him the license to live in nature on such particular terms.

Frost’s speaker, unlike Yeats’s, is but a traveler on one of life’s journeys which he realizes would break his transient hypnotic connection with nature and take him to a destination of reality and practicality; and thus to him the woods symbolize an object of beauty and enchantment which is powerful but momentary, a relationship of love and attachment which seems inseparable but is in fact transitory, and an occupation of attraction and enjoyment which is satisfying but only temporarily.

Conclusion

Both “The Lake Isle of Innisfree” and “Stopping by Woods on a Snowy Evening” evince in their simple but evocatively powerful figurative language how cogent man’s connection with nature had been to Yeats and Frost when they were writing around the turn of the twentieth century, not very long after their Romantic predecessors. Both feel uncommonly attracted to the splendid beauty of nature, which for Yeats is in its virginity that he wants to retain in his rather misanthropic retreat from the society, and which for Frost is in its enigma that will not allow him to presently return to society. Both the poets are, in a rather Romantic manner, conspicuously reticent about the pains human society afflicts them with; however, neither of their speakers is ready to abandon society altogether in favor of nature, and both are shown to be uncommonly fascinated and mesmerized with nature’s captivating beauty, which continues to offer to them an attraction that is immensely powerful to deny.

Both Yeats and Frost in these two poems symbolically present their unique introspections on man and nature. They do not conceive nature in innocent and uncomplicated terms, and, unlike their Romantic predecessors, they position nature in such a relation with society that either a journey towards nature or a journey away from it seems immensely difficult though especially significant since nature to them is still so powerfully present in the human imagination.

References

- Allison, J. (2006). Yeats and politics. In M. E. Howes & J. S. Kelly (Eds.), *The Cambridge companion to W. B. Yeats* (pp. 185-205). Cambridge University Press, Cambridge, UK.
- Baym, N. (1965). An approach to Robert Frost’s nature poetry. *American Quarterly*. 17(4) 713-723.
<https://doi.org/10.2307/2711128>
- Buell, L. (2001). Frost as a New England poet. In R. Faggen (Ed.), *The Cambridge companion to Robert Frost* (pp. 101-122). Cambridge University Press, Cambridge, UK.

- Fagan, D. (2007). *Critical companion to Robert Frost: A literary reference to his life and work*. Facts on File.
- Faggen, R. (2008). *The Cambridge introduction to Robert Frost*. Cambridge University Press, Cambridge, UK.
- Hass, R. B. (2014). "Measuring Myself against all Creation": Robert Frost and pastoral. In M. Richardson (Ed.), *Robert Frost in context* (pp.114-122). Cambridge University Press, Cambridge, UK.
- Hopper, K. (2008). A sense of place: W. B. Yeats and 'The Lake Isle of Innisfree'. *Geography*, 93(3), 176-180. <https://www.jstor.org/stable/40574283>
- Hough, G. (1961). *The last romantics*. University Paperbacks.
- Howes, M. (2006). Yeats and the postcolonial. In M. E. Howes & J. S. Kelly (Eds.), *The Cambridge companion to W. B. Yeats* (pp. 206- 225). Cambridge University Press. <https://doi.org/10.1093/english/47.188.103>
- Merritt, H. (1998). Rising and going: The 'nature' of Yeats's "The lake isle of Innisfree". *English: Journal of the English Association*, 47(188), 103-109.
- O'Neill, M. (2007). 'A vision of reality': mid-to-late Yeats. In *The all-sustaining air: Romantic legacies and renewals in British, American, and Irish Poetry since 1900* (pp. 34-59). Oxford University Press, Oxford, England.
- Oster, J. (2001). Frost's Poetry of Metaphor. In R. Faggen (Ed.), *The Cambridge companion to Robert Frost* (pp. 155-177). Cambridge University Press, Cambridge, UK.
- Pethica, J. (2006). Yeats, folklore, and Irish legend. In M. E. Howes & J. S. Kelly (Eds.), *The Cambridge companion to W. B. Yeats* (pp. 129-143). Cambridge University Press, Cambridge, UK.
- Ross, D. A. (2009). *Critical companion to William Butler Yeats: A literary reference to his life and work*. Facts on File.
- Schneider, H. J. (2000). Nature. In Brown M. (Ed.), *The Cambridge history of literary criticism. Vol. 5. Romanticism* (pp. 92-114). Cambridge University Press, Cambridge, UK.
- Sheehy, D. G. (2014). "What became of New England?": Frost and rural sociology. In M. Richardson (Ed.). *Robert Frost in context* (pp. 217-224). Cambridge University Press, Cambridge, UK.
- Smith, S. (1990). *W. B. Yeats: A critical introduction*. Macmillan Education Ltd.
- Stewart, S. (2008). Romantic meter and form. In Chandler J. & McLane, N. M. (Eds.), *The Cambridge companion to British romantic poetry* (pp. 53-75). Cambridge University Press, Cambridge, UK.
- Stock, A. G. (1964). *W. B. Yeats: His poetry and thought*. Cambridge University Press, Cambridge, UK.



EXPLORING THE UNDERLYING FACTORS OF DROPPING OUT AT SECONDARY-LEVEL SCHOOLS IN KHULNA, BANGLADESH

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KUS:21/19: 131021

Manuscript submitted: October 13, 2021

Accepted: June 06, 2022

Abstract

Despite a remarkable development in the education system in Bangladesh, the country still experiences a huge amount of dropout cases every year which is alarming. This study attempts to explore the whys and wherefores of dropping outs of the secondary-level students in the Khulna district. Apart from this, the research also investigates the current conditions of the dropped-out students. Quantitative and qualitative data have been collected from 52 dropouts who were selected using convenience sampling method. The respondents are secondary-level students enlisted in the dropout lists of 10 high schools in Khulna. This study identifies multiple reasons responsible for students' dropout like financial crisis, inability to take private tuition, the effect of bad company, parental negligence, and early marriage. This study also reveals the miserable current condition of the dropouts as a substantial number of them are not engaged in any productive activities and suffer from frustration. The majority of those feel guilty and regret their decision of leaving school. Around 60 percent of them want to start their schooling again although they are getting very little or no support in some cases from the stakeholders. As ensuring quality education is one of the objectives of SDGs adopted by the United Nations, this study will carry values to school authorities, education policy-makers, and other stakeholders in solving the issues of dropouts to ensure quality and effective education for all. This research is expected to contribute to finding out ways to improve the socio-economic condition of the dropouts.

Keywords: Dropout, secondary level, education, SDGs

Introduction

Among the South Asian countries, Bangladesh has the bottommost proportion of children in high schools where the net enrolment rate is 50 percent and the rate of girls' dropping out is more than double than that of boys in sixth and seventh grade (UNICEF Bangladesh, n.d.). Due to several reasons, a large number of students are dropping out of secondary-level schools every year. The significant number of dropout cases at the secondary level is one of the most severe problems in ensuring quality education in the country. The underlying factors of dropping out are related to several factors, including the economic condition of the students, customs, superstition, gender discrimination, socioeconomic status, living in hard-to-reach areas, and other social aspects. Financial difficulties, guardian's reluctance, the distance between school and home,

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DOI: <https://doi.org/10.53808/KUS.2022.19.01.2119-edu>

deficiency of basic amenities, substandard quality of the education, inadequate school infrastructure, overloaded classrooms, inappropriate languages of teaching, negligence of teaching staff, and insecurity in girls' schools are found as foremost causes of student dropouts in different countries (Latif, 2015).

Successful completion of the Secondary School Certificate (SSC) exam facilitates the students to become competitive in the broader avenues of life. Therefore, it is high time to find out the reasons behind drop-out and take the necessary steps to prevent it at this level. Ensuring inclusive and equitable quality education is one of the goals of SDGs adopted by the United Nations and one of the targets to achieve the goal is to ensure that all girls and boys complete free, equitable, and quality primary and secondary education (United Nations, n.d.). But eradicating drop-out at this level is a major challenge to achieve here in Bangladesh. Thus, this study possibly will help comprehend the nature and motives of drop-out, address the current condition, and emphasize the probable solution to this alarming issue.

According to Bangladesh Education Fact Sheet-2020, students' completion rates in primary education, lower secondary education, and higher secondary education are 83 percent, 65 percent, and 29 percent respectively (UNICEF Bangladesh, 2021). Though the dropout rate of primary students has decreased partly over the years, at the secondary level it is still high. The Bangladesh Bureau of Educational Information and Statistics (BANBEIS) report -2019 depicts that the male and female ratio is 54:46 in the high schools where around 1.03 crore students had been enrolled and the dropout rate at this level was 36 percent (Alam, 2021).

As a significant number of female students are victimized of dropping out every year in Bangladesh, they remain unqualified and amateurish in the field of attaining life skills and it stops their mental growth and maturity (Banu, 2011).

Bala (2014) pointed out three reasons--expectations from girls to be engaged in household chores, safety concerns of girls traveling alone, and girl's suffering from lack of infrastructure like separate toilets at schools that are responsible for girls' dropping out of school in India.

Several socio-economic reasons including vulnerable teaching approaches, unqualified and untrained teachers, and lack of inspiration persuade children to discontinue school. Children of marginalized areas like char areas, hoar areas, and hill tracts are deprived of education because of extreme poverty (Hasnat, 2017).

A study demonstrates that Bangladeshi rural students mainly gave up their studies due to poverty, being unable to pay exam fees, and being incapable to meet the demands to take the test examination at Grade X or the SSC exam (Ahmed et al., 2010). The weak socio-economic and educational status of the guardians is connected with the dropout cases of their children (Chugh, 2011). In a study, Ramirez and Carpenter (2008) categorized the reasons behind drop-out of schools as home-based, society/community-based, school-based, and student-based. They highlighted single-parent households, poor home situations, homes with many siblings, homes with a history of dropouts, homes with a history of substance abuse and physical violence, and exposure to wider society as factors that cause students to disregard school (Ramirez & Carpenter, 2008).

Smita et al. (2020) pointed out 12 causes of drop-out of slum children from non-formal schools. The reasons are - outdoor labors for disbursement, domestic labor, early nuptial, various types of disabilities, pursuing a liberated life, juvenile pregnancy, illness, unconcern for education, recurrent failure, guardians' reluctance, intimidation, and lack of suitable amenities at the schools.

The aforementioned literature indicated several motives for dropping out of school in different socio-economic contexts. Though some reasons behind students' dropping out have been addressed in some studies, the present scenario of the dropouts and their emotional state has not been explored.

Theoretical framework

In this study, Academic mediation theory, deviant affiliation theory, general deviance theory, poor family socialization theory, and structural strain theory were used to find out the reasons behind drop-out from

schools. According to previous studies, one of the largest indicators of dropping out is poor academic performance (Rumberger, 2008). The academic mediation theory inspects the impact of poor academic accomplishments on other characteristics related to school dropout, for instance, deviant affiliation, personal deviance, familial socialization, and structural stresses (Battin-Pearson et al., 2000). Beyond the effect mediated by low academic success, there is a very significant link since general deviation is a substantial forecaster of dropout (Gubbels et al., 2019). According to deviant affiliation theory, if a student is at risk of dropping out and/or has a poor school attachment, they are classified as antisocial. If a student has antisocial companions, he or she is far more likely to drop out of school, independent of academic performance (Monahan et al., 2009). The association between family history and dropout rates is investigated by the poor family socialization theory. The link is not extremely strong, and bad family socialization has far more of an impact than low academic success (Battin-Pearson et al., 2000). Low parental expectations and a parent's lack of knowledge are two factors that contribute to poor family socialization (Yamamoto & Holloway, 2010). The association between demographic characteristics including socioeconomic class, gender, ethnicity, and dropout is the subject of structural strain theory (Eitle, 2010). The impact of ethnicity on dropout rates has been a source of debate. It is apparent, however, that it has some impact. Aside from poor academic performance, a low socioeconomic position is a key predictor of dropout (De Witte et al., 2013).

Objectives of the study

The general objective of this study is to unearth the underlying factors of students' drop-out of secondary schools and to explore the current condition of the dropouts. This research not only finds the reasons behind drop-out in a southern district of Bangladesh but also investigates the current circumstance and feelings of the dropouts. This study may also help find out ways to improve the socio-economic condition of the dropouts.

Methods

The study was conducted following a mixed research design in 10 high schools, which were selected purposively. The criteria of the unit of analysis are boys and girls who were enlisted in the dropout lists of those 10 schools located in the Khulna district. The researchers selected the schools purposively to make the data gathering process easy and effective. The schools' authority generally maintains the dropout lists. The names and other details of the dropouts of a particular school were enlisted following a simple process. At the time of admission, students' names and their details are written down on registry sheets and at the end of the year, they check the attendance sheets to find out who is continuing or discontinuing their school. By following this process, they figure out the number and make a list of the dropouts. To determine the population size considering the aforementioned attribute, a total of 58 dropped-out students were identified (31 boys and 27 girls) as the population size. Applying the convenience-sampling technique, a sample of 52 dropouts (28 boys and 24 girls) was selected. The first author who completed his first degree personally visited all of the respondents for collecting quantitative and qualitative data. A questionnaire-based survey method was applied in this study. There were both open and close-ended questions in the questionnaire to collect qualitative and quantitative data. The survey was conducted in four consecutive months of 2019, from September to December. The researchers maintained the privacy as well as anonymity of the study participants. The summary of the total 52 participants and their details are provided in Table 1.

Table 1. Demographic profile of the participants (Source: Field Survey 2019)

| | |
|----------------|--|
| Age | 13-16 years |
| Sex | 28 boys and 24 girls |
| Marital Status | 19 dropouts were married and 33 dropouts were unmarried. Among the married, 15 were girls and 4 were boys. |
| Study Area | Khulna district |
| Institutions | 10 secondary level schools |

Results

Dropping out stages: Here, Figure-01 shows that 63.46 percent of the respondents dropped out before completing Grade VIII or before passing Junior School Certificate (JSC). The remaining 36.54 percent dropped out before completing Grade X or achieving their SSC degree. In Bangladesh, two public examinations are held at the secondary level. So, in this study, the giving up stages of the respondents have been categorized into two sections. JSC is held as the final assessment in Grade VIII and SSC in Grade X.

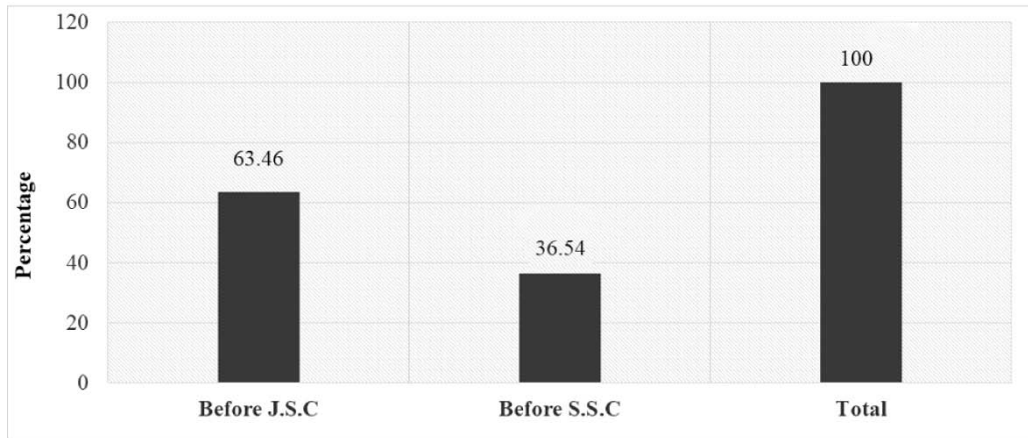


Figure 1. Dropping out stages of the respondents (Source: Field Survey 2019)

From the above figure, we have found that dropping out of secondary schools in Khulna mostly happens before the students have appeared in the JSC exam. 33 respondents among the 52, which is 63.46 in percentage, have been dropped out before achieving the minimum level of education by which they cannot manage a lower class government job. According to various job circulars published in different national dailies, the basic requirement to apply for comparatively lower-level jobs like a plumber, guard, gardener, cleaner, sweeper, driver, etc requires the completion of Class VIII as the minimum educational level. Therefore, the students who have dropped out before passing the level will be supposed to be unable to manage even a lower grade government job in their career life. It is required to take special care of the students of Class VI, VII, and VIII to achieve Goal-8 among the Sustainable Development Goals that state to ensure productive employment and decent work for all (United Nations, n.d.).

Reasons behind dropout: Table 2 depicts that the majority of the participants, which represents 59.61 percent of the dropouts, gave up their studies due to financial inconsistency. 11.54 percent of them dropped out because of their inability to receive private tuition, and 11.54 percent gave up their studies because of the effect of bad company. 9.62 percent stopped their study because of their parents' negligence in taking care of them properly, and 7.69 percent leave school for early marriage and premature affairs.

Through analyzing the qualitative data from the open-ended questions of the survey questionnaire, the underlying factors behind dropping out have been explained. Using the narrative data collected from the respondents, the quantitative findings of Table-02 have been clarified and explained here.

Financial Problem: According to our study, the majority of the participants gave up their studies due to poverty. Most of the dropouts claimed that their parents could not bear the expenditure of their children's schooling.

A respondent explained, *"While it was very tough for my father to manage sufficient food for us, bearing schooling costs was quite impossible for him. I have seen my family pass many days without having food. So, I had to quit my school."*

The majority of the respondents believed that it was a reality for them to give up their studies as their parents were struggling with poverty to manage the basic needs of their family.

Another participant stated, *“Where our parents have to struggle to provide me and my siblings with adequate food and clothes, how can they afford our educational cost and how can we pressurize them to do so when we are at the age of supporting them? My parents would have asked people for help pass our days and earn our livelihood if I had not given up studying and started working.”*

Table 2. Reasons behind dropout (Source: Field Survey 2019)

| Reasons behind dropping out | Frequency | Percentages of the respondents |
|--------------------------------------|-----------|--------------------------------|
| Financial Problem | 31 | 59.61 |
| Inability to Receive Private Tuition | 6 | 11.54 |
| Effect of Bad Company | 6 | 11.54 |
| Parental Negligence | 5 | 9.62 |
| Early Marriage | 4 | 7.69 |
| Total | 52 | 100 |

Inability to Receive Private Tuition: More than one-tenth of the respondents dropped out of school because of their inability to receive private tuition. Six respondents claimed that some of their teachers gave more emphasis on their coaching business instead of delivering class lectures properly at schools. These respondents claimed that they were compelled to give up studying because of their inability to bear the additional cost of private coaching.

A respondent alleged, *“It disheartened me that without conducting the classes properly, some of my teachers were inviting me to their coaching for their financial interest. They do not think of the students who are not able to spend extra money on private tuition. This kind of mentality demoralized me to continue my regular classes.”*

Another participant narrated, *“I faced difficulty in some specific subjects. I never found those subjects easy. My parents could not send me to coaching or a private tutor. So, I decided to stop studying.”*

Effect of Bad Company: More than one-tenth of the respondents gave up their studies because of the effect of bad company. Some of them stated that they could have done something better if they had been a little bit more cautious in the selection of friends as they were very talented and promising students in the school.

A participant stated, *“I failed to pass JSC, as I used to pass my valuable time gossiping with some of my drug-addicted friends. I began to smoke regularly and play cards with them. I had negligence to take preparation for my exam.”*

Another participant said, *“I along with some of my friends was addicted to mobile and online gaming. Very often, we were absent in the classes as we were busy playing video games together.”*

Parental Negligence: Negligence, insincerity, and lack of skill of the parents is responsible for dropouts. Family negligence for children appears when they lack deep attention. Around 10 percent of the respondents stopped their studies because of their parents’ negligence. Because of the educational background of the parents, they were unable to realize the necessity of their children’s education.

A respondent claimed, *“My parents never encouraged me to continue my study. They did not inquire about my classes. When I asked them to buy stationery materials or necessary books for my educational purposes, they seldom paid heed to me. Day by day, I started losing the desire to study.”*

The dropouts could not flourish properly because of the lack of cognitive and mental support from parents. They were encouraged to earn rather than acquire knowledge from their parents. This is why – the parents are living there with superstition and they are unaware of the light of education.

One of the female participants expressed, *“My parents told me girls are born to look after the family, they do not need any kind of education. It will be a waste of money to educate a girl child.”*

Early Marriage: 7.69 percent of the respondents dropped out of school because of early marriage and premature affairs. Even some of them got married at a premature age as well. This study found three factors that accelerated girls’ early marriage and caused dropout. These are-- eve-teasing or sexual harassment and disturbances created by some local boys, considering marriage proposals for school-going female children in that stage, and stereotype perceptions and beliefs of some parents on female education.

A female respondent said, *“When I was a student of Class-VI, one of my uncles came to our house with a marriage proposal from a well-off family. My parents agreed with the proposal without taking my consent. They thought that they might not get any better proposal later. After marriage, I could not continue my study as I used to be busy with household chores in my in-law’s house.”*

Three girls among the respondents reported that they were forced to get married as some local boys were victimizing them by eve-teasing regularly on the street while going to and coming back from school.

A respondent stated, *“Some local boys were continuously harassing me at that time. To get rid of this problem, my parents arranged marriage though I was only 15 then. My mother often stated that girls do not need to go to school rather they need to learn how to cook, how to manage family, and how to bring up children.”*

Current activities of the dropouts: Table 3 shows that 15 dropouts (28.85 %) were involved in a full-time jobs and became wage earners. 14 married female dropouts (26.92 %) were taking care of their husbands and in-laws. Nine dropouts (17.31%) were involved in the family business like working in fathers’ shops. Four dropouts (7.69%) were taking electrical training, three (5.77%) were taking computer training and two (3.85%) were learning welding. The rest five (9.62%) were not involved in any productive activities.

Table 3. Current Activities of the dropouts (Source: Field Survey 2019)

| Current activities of the dropouts | Frequency | Percentage |
|---|-----------|------------|
| Job (Full Time) | 15 | 28.85 |
| Homemaker | 14 | 26.92 |
| Involvement in a family business | 9 | 17.31 |
| Taking electrical training | 4 | 7.69 |
| Taking computer training | 3 | 5.77 |
| Learning to weld | 2 | 3.85 |
| Not involved in any productive activity | 5 | 9.62 |
| Total | 52 | 100 |

Using the narrative data collected from the respondents, the quantitative findings of Table 3 have been explained here. A significant number of dropouts work at various factories, private companies, and other institutions and earn their living.

A respondent who works in a garment factory said, *“As I had to quit my study to get involved in financial activity, now I am in it. I get a monthly salary and can take care of my family.”*

Another participant who works as a delivery boy believed, *“I am happy with what I am doing right now. My parents wanted me to quit my study and I think they were logical from their side. We were not solvent enough and it was not guaranteed that I will get a good job after finishing my study.”*

Another substantial number of dropouts especially the females got married and became homemakers.

A participant and mother of a one-year-old infant stated, *“I was intended to complete my education and get a prestigious job. Now I have to take care of my husband, my child, my in-laws, and others. Now I have to be so busy all day long that I cannot get sufficient time to recall my old days.”*

Around one-tenth of the dropouts used to pass their times idly. They did not involve in any industrious activities. As a result, their parents fear their offspring being engaged in antisocial activities.

An unemployed respondent said, *“Since I do not have the opportunity to pass my whole life sitting idly, one day I will have to do something. I will try to get involved in something. Now, I used to play cricket, and football with some local boys in the afternoon.”*

Keeness towards the education of the dropouts: Table 4 delineates that the percentage of the respondents who were willing to study is 61.54 percent. These 32 dropouts were willing to study but could not continue for adverse circumstances. 38.46 percent of them were not willing to study. These 20 dropouts could not accept study from the heart; rather they were interested in some other matters.

Table 4. Keeness towards education (Source: Field Survey 2019)

| Keeness towards education | Frequency | Percentage of the respondents |
|---------------------------|-----------|-------------------------------|
| Yes | 32 | 61.54 |
| No | 20 | 38.46 |
| Total | 52 | 100 |

The study found that 32 of the 52 dropouts had still a keeness towards study after being dropped out but they could not get the chance to return to their schools due to an unfavorable environment. Though the eagerness of the dropouts to study is a very good sign, they could not fulfill this wish because of their current adverse situation.

A respondent who had an eagerness to start schooling thought, *“Still I am willing to study. However, due to a hostile situation, I cannot do it. To be frank, it is not possible to return to school because of the job that I am performing right now.”*

Many dropout students are not in a very good mental state and they are keen to be enrolled in schools or further education.

One of the participants mentioned, *“I am feeling sorry for being dropped out of school. If we get the opportunity to study again it will be a happy event for us.”*

On the other hand, 20 dropouts were not willing to study at all. This study also explores the reasons why these dropouts were not willing to study. The findings are described in Table 5. The study found that 10 dropouts (50 percent) were indifferent to studying, as they perceived that education became a burden to them because of various circumstances. Five dropouts (25 percent) did not want to return to their classes, as they felt that subjects of their curriculum were difficult while three dropouts believed that the teaching quality of their schools is substandard. The rest two dropouts (10 percent) were reluctant to return to their schools, as they prefer games and sports, using social media, passing time with friends rather than studying. Among the 52 participants of this study, 20 dropouts have an aversion to education. Half of these 20 dropouts perceived that education has become an encumbrance rather than an opportunity because of adverse situations.

An unemployed youth among the participants claimed, *“Education was nothing but a burden to me. I did not want to study. It seems that education is imposed on me. In fact, I could not enjoy my lessons at all.”*

Some dropouts narrated education as a burden as they are not motivated in the right way to learn.

A homemaker among the participants asserted, *“After being married, I can't go to school as I fear that I would not be able to take permission from my husband. I do not have any eagerness to study rather it is a burden to me. My family has now become the priority rather than study.”*

Five of these dropouts could not cope with their syllabus and curriculum. They feared their classes as different subjects seemed very difficult for them to understand. Most of these students had weaknesses in English and Mathematics.

A participant claimed, *“English was very difficult for me. I did not find any simplicity in it. The boring lectures on grammar frustrated me. I completed my primary level with many difficulties but I could not understand the sentences of my book written in English. In my classroom, I just eagerly awaited when the bell would ring.”*

Many of their teachers forced students to memorize lessons rather than realizing them with logic. This is another cause- students lost their interest in education. Besides, their teachers are not sincere enough to inspire students, As a result, they found a particular subject difficult to learn.

Table 5. Reasons behind aversion towards education (Source: Field Survey 2019)

| Reasons behind aversion towards education | Frequency | Percentage of the respondents |
|---|-----------|-------------------------------|
| Education became a burden | 10 | 50 |
| Subject difficulty | 5 | 25 |
| Substandard teaching quality | 3 | 15 |
| Others | 2 | 10 |
| Total | 20 | 100 |

Another respondent said, *“I would not understand Algebra and Trigonometry. I failed several times in Mathematics exams. I was also unable to take private tuition due to financial problems. It is preferable to me to give up study rather than solving problems in Mathematics.”*

Three dropouts claimed that the teaching quality of their school was not up to the mark. The teaching staffs of their schools are not qualified enough and they could not present the lessons effectively to them.

A participant said, *“I found most of the classes dull and monotonous. I was used to seeing some angry faces around me. A few teachers could teach us through entertainment. Some of the teachers did not take the classes properly. Some of them always rebuked me if I failed to understand anything. So, the classes were not enjoyable to me.”*

The other two dropouts have an aversion towards education, as they were interested in some other things like engagement in games and sports, using social media, using smartphones, gossiping, etc., and feared that school classes and regular studies would be a hindrance to their freedom to do anything.

A respondent said, *“I like to play online video games with my friends using my smartphone. I also love to pass my time with my friends by playing cards and gossiping. Classes, assignments, or exams are boring to me.”*

Another participant said, *“I have a great fan of cricket and I want to be a cricket player. Passing a single day without playing cricket is difficult for me. I go to various places to participate in cricket tournaments and earn money. In this case, going to school regularly and participating in all the classes is a hindrance for me.”*

The existing emotional state of the dropouts: Table 6 reveals that 59.62 percent of the respondents feel worse and suffer from frustration due to their dropout issues. 7.69 percent of them often get angry with themselves for being dropped out as they forwent study due to their wrong decision. 5.77 percent often express their anger towards their family members because they had to give up their studies due to their parental negligence or family members’ enforcement. 26.92 percent have mixed feelings such as some of them cannot express their actual mental state and some of them do not have any feelings when they meet their friends who are still studying.

Table 6. Existing emotional state of the dropouts (Source: Field Survey 2019)

| The existing emotional state of the dropouts | Frequency | Percentage of the respondents |
|--|-----------|-------------------------------|
| Feel worse and suffer from frustration | 31 | 59.62 |
| Get angry with themselves | 4 | 7.69 |
| Get angry with family members | 3 | 5.77 |
| Others | 14 | 26.92 |
| Total | 52 | 100 |

This study tries to explore the condition of the dropout's thoughts or feelings. Three-fifth of the dropouts feel remorse and suffer from frustration for leaving their schools.

A respondent stated, *"It still really hurts me that I could not continue my study. I miss my classroom, teachers, and classmates. I miss my good old days of school life."*

Some other respondents blamed themselves for taking the wrong decision to give up their studies and they often got angry with themselves. Some other respondents were annoyed with their family members since they perceived that they had dropped out because of their family members. Sometimes they get involved in quarreling with their family members in this regard, they mentioned.

"When I recall my lost school life days, everything becomes intolerable to me. Sometimes I am involved even in quarreling with my family members. However, day by day it is getting normal. And I do not react in this regard as before."

The rest of the respondents mentioned that they have mixed feelings such as some of them cannot express their feelings and some of them do not have any feelings about it.

"I do not know how it feels when I think of my school life. Sometimes I laugh unknowingly when I think of my school life. I do not know whether it was the right decision or not to give up my study."

Current condition of the peer group of the dropouts: Figure 2 depicts that 80.77 percent of the respondents replied that their school-going peers are in better condition than they are. The rest 19.23 percent replied that they do not have any type of communication with their former classmates.

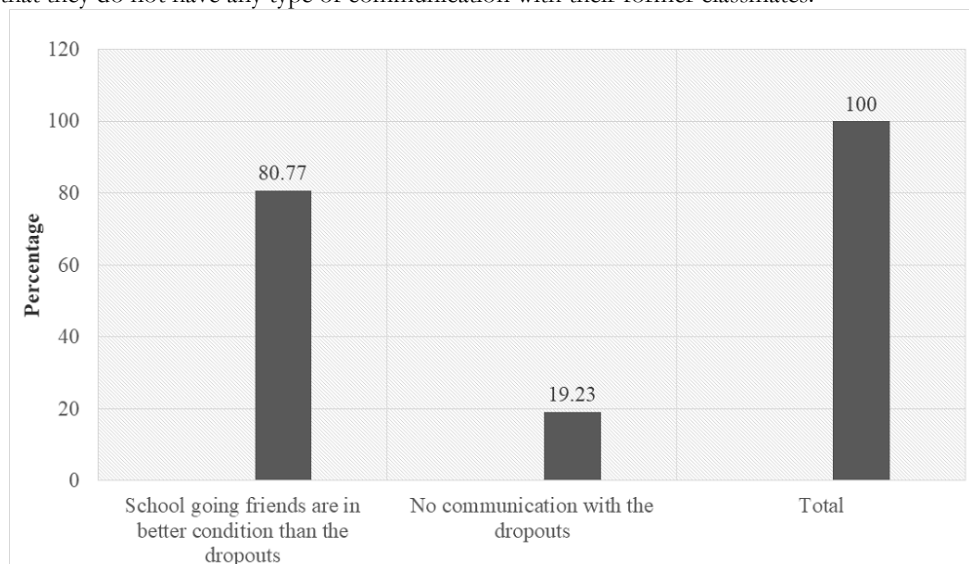


Figure 2. Current condition of the peer group of the dropouts (Source: Field Survey 2019)

This study makes a comparison between the dropouts and their former classmates who are still studying. When the respondents were asked about the current condition of their former classmates, the participants said that their school-going classmates are in a comparatively better position based on social status, social acceptance, dignity, etc than they are now. The study found that 42 among 52 dropouts have communication with their former classmates and all of them admitted that their former classmates who are still studying are in better condition than them.

A participant affirmed, *“Obviously my school-going friends get much respect in society. They do not have to tolerate scolding from others. However, I have to tolerate admonishment almost all day. They do not have to carry any tension in their mind. Nevertheless, I have to. They have a mentionable identity, but I have not. As they are students, they have special admissibility, but I do not.”*

Ten of the respondents could not interpret it, as they do not have any communication with their former classmates.

A respondent asserted, *“I do not have any sort of communication with them. However, I think they are supposed to be in a better position as they are students. They are not laborers or lower class service providers like me.”*

School-going friends’ manners towards the dropouts: Table 7 shows that 53.85 percent of the dropouts said that their school-going friends do not behave with them as friendly as previous while 26.92 percent of them said that they get friendly behavior as previous from their former classmates who are still studying. 19.23 percent of the respondents did not have any type of communication with their former classmates.

Table 7. School going friends’ manners toward the dropouts (Source: Field Survey 2019)

| School going friends’ manners toward the dropouts | Frequency | Percentage of the respondents |
|---|-----------|-------------------------------|
| School-going friends do not behave toward them as friendly as in previous | 28 | 53.85 |
| School-going friends behave well as previous with the dropouts | 14 | 26.92 |
| No Communication | 10 | 19.23 |
| Total | 52 | 100 |

The dropouts were asked whether their school-going friends treat the dropouts as friendly as in previous when both of them were classmates. In the reply to this question, 28 of the 52 dropouts said that they are not treated as friendly as before by their school-going friends. Some of the participants alleged that their former classmates often tried to avoid them.

A dropout shared his experience saying, *“Once I saw one of my school-going friends while I was coming back home from work. I smiled at him and I was about to address him by his name. Conversely, he pretended as if he had not seen me. Therefore, I abstained from calling him. It hurts me.”*

It is seen that dropouts are considering themselves inferior in the society, as they are not doing prestigious jobs. As they left school earlier, they couldn’t learn even a good mannerism. So, they felt shy when they intend to communicate with others who are studying now.

Another participant said, *“One day, I went out of my home for a walk. I found some of my school-going friends gossiping. I noticed that they were trying to avoid me. One of them said that they had been busy. It was completely unexpected to me as we were used to passing times together when I was a student.”*

Fourteen dropouts answered this question positively and said that their school-going friends treat them as friendly as before.

One of them said, *“One day I was coming back home from work. I was not even dressed well. Suddenly, I noticed some of my school-going friends coming from my front side. I pretended as if I had not seen them. They appeared in front of me and addressed me smilingly. They hugged and talked to me with smiling faces. It was a pleasant moment for me.”*

Dropouts always try to skip their old friends with whom they studied once. They fear going to good places for entertainment or other purposes as they have remorse for not continuing school.

Another said, *“One day I was taking my lunch at a restaurant. I noticed some of my school-going friends entering the restaurant. They noticed me and sat beside me. We had our lunch together. I found no change in their behavior.”*

The other 10 dropouts could not answer this question, as they do not have any communication with their school-going friends.

Liabile entity for dropping out: Figure 3 discloses that 59.61 percent of the respondents convicted themselves for being dropped out while 30.77 percent mentioned that their family members were responsible for their dropout cases. The other 9.62 percent blamed their society and social system for this happening.

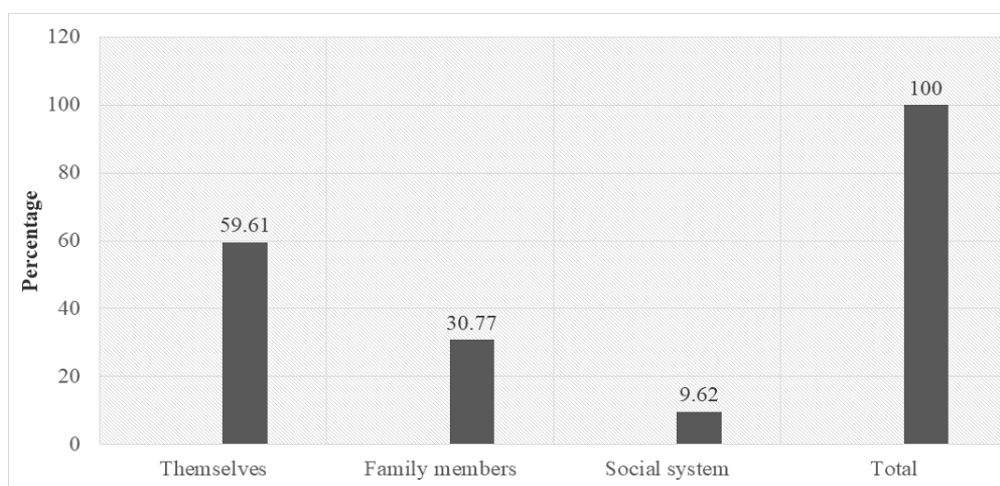


Figure 3. Liabile entity for dropping out (Source: Field Survey 2019)

While conducting this study, the respondents were asked to mention the responsible entity behind their dropout. A total of 31 dropouts (59.61 percent) imputed themselves for their dropout and believed that giving up study was their wrong decision.

One of the dropouts said, *“I do not blame anyone but myself for my dropout case. My parents and other family members tried their best to ensure education for me. Nevertheless, I did not listen to them. I left school by my own decision as I was interested in sports and other things.”*

Another asserted, *“Definitely it is I who am to be blamed for my dropout. In addition, I am very asbamed of it. I should have been conscious of choosing friends during my school life. I was a victim of various addictions and gradually went astray.”*

Sixteen dropouts (30.77 percent) alleged their family members especially their parents were responsible for their dropout cases.

A homemaker among the respondents said, *“After promoting to Class-IX, I noticed my parents became very busy in searching for a groom for me. I requested them not to do that, as I want to continue my study. However, they did not pay heed to me. Finally, I had to accept their decision. After my marriage, I had to give up my study considering various circumstances.”*

Another participant alleged, *“My parents often told me that I should focus on doing something by which we can gain financial solvency. One of my neighbors is a home help and she bears the educational expenditure of her school-going child. It is a matter of regret that my parents wanted me as a wage earner to help the family rather than sending me to school.”*

The rest five participants (9.62 percent) inculpated the social system as the responsible entity for their dropout. They also blamed the state for being failed to ensure education as a basic need.

A girl among the dropouts alleged, *“When I was facing sexual harassment while going to and coming back from school. My neighbors and surroundings started saying to my parents that they should get me married off as soon as possible. Nevertheless, they could have helped me continue my study. Besides, our social system did not favor me. Our society cannot ensure security for the school-going girls.”*

Discussion

The research found that the secondary school dropouts in the Khulna district mostly happen before the students have appeared in the JSC exam in eighth grade. According to UNICEF, the dropout rate reaches the top in Grade VIII as 14.6 percent of students give up school in this stage (UNICEF Bangladesh, n.d.). On the contrary, a study demonstrates that a tendency to drop out starts at a slower pace of 9-10 percent at Grade VI, increases slowly to Grade IX, and finishes with 60-70 percent at Grade X in the rural area of Bangladesh (Ahmed et al., 2010). Besides, the overall drop-out scenario of older children of both sexes is also much higher when compared to younger children.

This study identifies multiple underlying factors responsible for students' dropout but financial inconsistency is the key reason for dropping out as around three-fifths of the dropouts gave up their studies due to it. Their parents could not bear the expenditure of their children's schooling. Amongst the dropouts, some of them were de-touched from education to support their family financially. According to research, A large number of high school pupils are dropping out to contribute to their family's income. (Achieve Virtual Education Academy, 2021). They did not want to create extra pressure on their family to bear their study cost; rather they focused on bringing economic solvency to the family. Sabates et al. (2012) claimed that age and gender, together with financial restraints, for example, lack of household income and school expenses, as the chief predictors of dropping out. The government should take specific initiatives to alleviate poverty and reduce the poverty gap. Grants or scholarships should be provided for the poor and bright students. With increased expenses in the education system as well as the increase in living expenses poor people faced difficulties in receiving education, and granting scholarships to them could aid them in receiving education (Alam, 2020).

A good portion of students (11.54%) were unable to receive private tuition and dropped out because of their schoolteachers' coaching business. Some students faced high difficulty in some specific subjects, especially English and Mathematics, and never found those subjects easy. They were unable to bear the cost of private tutoring to minimize the difficulties they faced with their course curriculum. As a result, they decided to stop their study. A study on 432 dropouts in some Indian schools also discloses that besides financial constraints, incapability to take private tuition and inability to take the load of the curriculum is the notable reasons behind dropping out (Chugh, 2011). Often some teachers do not take proper care of their students and do not provide essential course materials. In some cases, the teachers themselves do not understand how to connect the lessons to real life. As a result, students have a high chance to leave school.

A significant amount of students (11.54%) gave up their studies because of the effect of bad company. Some of them engaged in smoking, mobile gaming, drug addiction, social media addiction, smartphone addiction, and other malpractices because of the negative influence of their acquaintances. The parents should take care of their children carefully so that they can pick good companions.

This study finds that around one-tenth of the students stopped their studies because of their parents' negligence in taking care of them properly. This kind of negligence makes the students disengage from learning. These guardians failed to keep their children on the right track, as most of the parents were not

educated enough. Hunt (2008) pointed out that parents' educational background, especially the mother's education level influences girls' schooling. In another study, Zaman (2014) finds that parental negligence in taking care of their children's education, lack of academic support from the family members, responsibility to take care of younger siblings in absence of parents at home, engagement in income-generating activities to support families, persuasion from friends to leave school to hanker after job, punishment from the teachers, early marriage and drug addiction compels the students to discontinue their school. Guardian-Teacher meetings should be held regularly as these gatherings provide opportunities for the academic staff to build relations with the parents of the students, deliver school and classroom-related updates, and other information about students' overall performance.

This study also endorses that many students derailed from education because of early marriage as 7.69 percent of the respondents dropped out of school because of early marriage and premature affairs. Even some of them got married at a premature age as well. This study found three factors that work much to accelerate girls' early marriage, which causes dropping out. These are- eve-teasing or sexual harassment and disturbances by some local boys, considering marriage proposals for school-going female children in that stage, and stereotype perceptions and beliefs of some parents on female education. Ahmed et al. (2010) also find that village girls become the victim of dropping out because of early marriage, engagement in household chores, and lack of recognition for female education in society. Child marriage is one of the key reasons behind dropping out according to a study in 2016 which states that one in five children dropped out of school because of it (Hasnat, 2017). Sekine and Hodgkin (2017) found that married female students in Nepal are 10 times more likely to drop out than unmarried female pupils. Research indicates a strong link between high school accomplishments and child weddings in Bangladesh, Nepal, and India (Population Council for UNICEF ROSA, 2019). The government should create awareness among the parents about their children's education, especially the necessity of female education, and the risks and laws regarding early marriage.

This study also reveals a miserable current condition of the dropped-out students as around one-tenth of the dropouts are now engaged in unproductive activities. It is a matter of great concern that some students are doing nothing and passing their time idly and there is a high possibility for them to be derailed and be involved in wrongdoings. They can get involved in various kinds of criminal activities and can get addicted to drugs as well. They can be targeted and used for different illegal and dangerous activities by different criminal and terrorist groups. However, among the participants of the study 29 percent of the dropouts became wage earners, 27 percent of dropouts became a homemaker, and about 17 percent of the dropouts got involved in the family business around after giving up study.

An interesting finding came out from the study that around three-fifths of the dropouts want to come back to their studies again in the future if they get proper facilities. Molla (2007) suggested strengthening the technical and vocational education subsystem to bring the dropouts back to education.

The rest of the dropouts (38.46%) did not have any intention to come back to school. Some of them considered education as a burden, some of them felt difficulties in their course curriculum, some dropouts alleged poor teaching quality in schools, and the other dropouts have an aversion towards education, as they were more interested in engagement in games and sports, using social media, using smartphones, gossiping, etc. They complained that some of the teachers did not teach properly in the class and encouraged the students to go to their coaching center for private tutoring. As some of the students were not capable of paying extra money for private tuition, they lost their attraction to study. Therefore, teachers of educational institutions are also responsible for students' dropping out in some cases, which is a matter of concern.

While exploring the emotional state of the dropouts, most of the respondents (59.62%) feel worse and suffer from frustration due to their dropout issues, some of them used to get angry with themselves for being dropped out as they forwent study due to their wrong decision, and some of them often expressed their anger towards their family members. Dropped-out students' emotional state might persuade them to do something better in the future if they are guided properly.

Around 54 percent of the dropouts admitted that they are not treated well by their school-going friends. Sometimes they were neglected and misbehaved by their friends who were once an inseparable part of daily life.

This study also identifies that the majority of the dropouts admitted that giving up their study was not the right decision. The rest of the dropouts blamed family, social systems, and the state for failing to ensure education for them.

Implications for Practice and Policy

Nowadays, education is considered one kind of investment around the world. Education is the force that is dynamic for a nation to make a healthy economy. It makes and enhances prospects and bestows societies with a well-educated and competent workforce. There is no doubt that the number of dropout students every year in Bangladesh includes many talented and promising ones as well. If this situation continues, it will not bring anything good to our country.

No sole reasons are responsible for being dropped out of school are nicely stated to all of us. To mitigate this big trouble, we need to take some measures that will minimize the rate of shedding out the dropout rate in Bangladesh. Various pragmatic moves ought to be taken by the concerned authority to make it dematerialized-

Softening the financial inconsistency of the students is necessary as economic hardship is responsible for dropping out. The government should take specific initiatives to alleviate poverty and reduce the poverty gap, as financial vulnerability is the prime cause of dropout. Grants or scholarships should be provided for the poor and bright students in this regard.

Stopping early marriage by implementing the law is required as child marriage is the major reason for girls' dropping out cases.

There should be complaint boxes in every school so that the students can submit their objections against all kinds of illegal and immoral acts in the school and can draw the attention of the concerned authority. The sexual harassment cell of every school must be functional so that no student especially a girl becomes a victim of sexual harassment.

Addressing various social, economic, political, and environmental limitations of school dropout and taking proper steps is essential so that schoolgoers do not lose their interest in schooling.

Discouraging school teachers not to operate any coaching center and motivating them in providing quality teaching in the classroom is necessary to minimize dropping out. The school authorities should be strict with the schoolteachers so that they cannot persuade the students to admit into their coaching center or to take private tutoring. The government should increase the salary of all the teachers for a better livelihood.

Basic physical facilities like a well-equipped building, water, electricity, study materials, computer, laboratory, and other daily necessities should be ensured at the educational institutions properly to minimize the number of school dropouts.

Keeping children away from drug addiction is a must so that they can pay full attention to study. Guardians should not tolerate any inappropriate activity of their children rather they should try to convince and teach their children to differentiate between right and wrong.

The Ministry of Education should take proper steps to monitor the secondary schools to reduce corruption, mismanagement, and absenteeism of teachers and students. A built-in committee ought to be made by parents, local administration officials, teachers, and neighborhood representatives to monitor these matters.

New schools ought to be set up considering the boom rate of population and quality teachers should be recruited. The teacher-student ratio needs to be maintained for quality education.

The government or the concerned authorities should be more careful in recruiting skilled teachers who can present difficult topics easily to the students and make the classes enjoyable for the students. The government and school authorities should provide all the teachers with sufficient training and teaching materials.

The cutting-edge scholarship program has some difficulties to meet the desires of remote area students. These problems ought to be addressed at once and more stipends ought to be awarded to the children. It is desired that stipends be given to those who certainly need them.

School-feeding programs have to be implemented in far-off areas.

Guardian-Teacher meetings should be held regularly as these gatherings provide opportunities for the academic staff to build relations with the parents of the students, deliver school and classroom-related updates, and other information about students' overall performance.

Limitations

This study is conducted in only the Khulna district so there is a huge chance to conduct further research on a massive scale area. Due to time and financial constraints, the sample size was small. More insights may be found if further research will be conducted considering primary, secondary, and higher secondary level students.

Due to the COVID-19 pandemic, a large portion of the labor force lost their jobs, pushing them under the poverty line due to the pandemic. The long closure of educational institutions due to the pandemic compelled the newly poor families to send their children working. As a result, dropouts increased drastically. Further research can be conducted on it and the consequences, in this case, may differ from this study where data were collected before the pandemic.

Conclusion

Education is one of the most important factors in producing human resources to achieve development. Therefore, the government must ensure proper education for all. Particularly in Bangladesh, dropout is a big challenge for ensuring proper education. From the birth of the nation, besides enrollment in schools, dropout had been a major issue in achieving quality education. Though there is a remarkable achievement in students' enrollment in elementary education, dropping out is still a big headache like before in secondary education. This problem must be solved as soon as possible, otherwise, a large number of our population will remain far away from education, and desired development of the nation will remain out of our sight. As financial insolvency has appeared as the key reason for dropout and most of the dropout cases take place in poor families or communities and there are a few problems that are not connected to financial issues, so financial assistance is necessary for the insolvent students of the high schools. However, a positive sign comes out from the study, as a significant number of dropouts want to come back to school and receive their education. It is very much needed to provide support and assistance to them. The process of decreasing the dropout rate from the secondary level should be accelerated for the progress of Bangladesh and to ensure quality education. Our government should pay heed to reducing notable dropouts countrywide. The study will help the government, and the stakeholders take various steps to reduce the dropout rate at the secondary level in Bangladesh, and future researchers will be able to find a way to improve the education system of Bangladesh.

Acknowledgement

Gratitude goes to all the respondents who took part in the survey and gave their valuable responses. The authors are also thankful for the school authorities and all others who directly or indirectly contributed to conducting this study.

Conflicts of interest

The authors declared that there is no potential conflict of interest to publish this article.

Author contributions

Md. Sumon Sheikh: Field research, data acquisition, data analysis, writing: original draft; Mamunor Rashid: Supervision, writing: original draft, data analysis; Md. Mahdi-Al-Muhtasim Nibir: Data analysis, writing: original draft, reviewing and editing; Md. Fajlay Rabbi: Resources, conceptual frame working, writing: original paper, data analysis, reviewing, editing, corresponding to editor and reviewers

References

- Achieve Virtual Education Academy. (2021, September 23). *Teens Increasingly Leaving High School to Support Families*. <https://achievevirtual.org/blog/parent-resources/increasing-number-of-teens-leaving-high-school-to-support-families/>
- Ahmed, S.G., Rahman, M.M., & Pal, M. (2010). *Dropout Rate in Secondary Level Education in Bangladesh*. Dhaka: The University Press Limited (UPL).
- Alam, A. (2021, January 5). Tackling student dropouts. *The Daily Observer*. Retrieved 13 September 2021, from <https://www.observerbd.com/details.php?id=292694>.
- Alam, M. G. (2020, June). *Why scholarship is so important for students in India*. The Times of India. <https://timesofindia.indiatimes.com/readersblog/educationnews/why-scholarship-is-so-important-for-students-in-india-21135/>
- Bala, N. (2014, August 21). *The 3 Biggest Reasons That India's Girls Drop Out Of School*. <https://aif.org/the-3-biggest-reasons-that-indias-girls-drop-out-of-school/>
- Banu, A. (2011). Causes of Dropout of Female Students in Primary and Secondary Level in the Socioeconomic and Cultural Contexts of Bangladesh. *Journal of Psychosocial Research*, 6(1), 113.
- Battin-Pearson, S., Newcomb, M. D., Abbott, R. D., Hill, K. G., Catalano, R. F., & Hawkins, J. D. (2000b). Predictors of early high school dropout: A test of five theories. *Journal of Educational Psychology*, 92(3), 568–582.
- Chirtes, G. (2010). A Case Study into the Causes of School Dropout. *Acta Didactica Napocensia*, 3(4), 25–34.
- Chugh, S. (2011). *Dropout in Secondary Education: A Study of Children Living in Slums of Delhi* [Ebook]. National University of Educational Planning and Administration. Retrieved 14 September 2021, from https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Dropout+in+Secondary+Education%3A+A+Study+of+Children+Living+in+Slums+of+Delhi&btnG=.
- De Witte, K., Cabus, S., Thyssen, G., Groot, W., & van Den Brink, H. M. (2013). A critical review of the literature on school dropout. *Educational Research Review*, 10, 13-28.
- Eitle, D. (2010). General strain theory, persistence, and desistance among young adult males. *Journal of Criminal Justice*, 38(6), 1113–1121.
- Gabriela, C. (2010). A Case Study into the Causes of School Dropout. *Acta Didactica Napocensia*, 3, 1-10.
- Gubbels, J., van der Put, C. E., & Assink, M. (2019). Risk Factors for School Absenteeism and Dropout: A Meta-Analytic Review. *Journal of Youth and Adolescence*, 48(9), 1637–1667.
- Hasnat, M. A. (2017, September 8). School enrollment high but dropouts even higher. *Dhaka Tribune*. <https://www.dhakatribune.com/bangladesh/education/2017/09/08/school-enrollment-high-dropouts-even-higher>.

- Sheikh et al., (2022). Exploring the underlying factors of dropping out at Secondary-Level Schools in Khulna, Bangladesh. *Khulna University Studies*, Volume 19 (1): 26-42
- Hunt, F. (2008). Dropping Out from School: A Cross Country Review of the Literature. *Create Pathways to Access. Research Monograph, No. 16*. University of Sussex. <http://sro.sussex.ac.uk/1864/>.
- Latif, A., Choudhary, A. I., & Hammayun, A. A. (2015). Economic effects of student dropouts: A comparative study. *Journal of Global Economics*.
- Mohsin, Q. A., Aslam, M. and Bashir, F. (2004). Causes of School Dropouts at the Secondary Level in the Barani Areas of Punjab (A Case Study of Rawalpindi District). *Journal of Applied Sciences*, 4: 155-158.
- Molla, S. A. (2007). Addressing the dropout problem. *The Daily Star*. <https://www.thedailystar.net/news-detail-12163>
- Monahan, K. C., Steinberg, L., & Cauffman, E. (2009). Affiliation with antisocial peers, susceptibility to peer influence, and antisocial behavior during the transition to adulthood. *Developmental Psychology*, 45(6), 1520–1530.
- Nagendra, S. S. (2013). What are the reasons for the high dropout rate among school-going children in India? <https://www.quora.com/What-are-the-reasons-for-the-high-dropout-rate-among-school-going-children-in-India>
- Population Council for UNICEF ROSA. (2019). *Child marriage, adolescent pregnancy and school dropout in South Asia*. UNICEF. <https://www.unicef.org/rosa/reports/child-marriage-adolescent-pregnancy-and-school-dropout-south-asia>
- Ramirez, A. L., & Carpenter, D. I. C. K. (2008). Solving the drop-out puzzle: strategies for success. *Principal Matters*, (76). <https://search.informit.org/doi/10.3316/aeipt.174570>
- Sabates, R., Hossain, A., Lewin, K.M. (2012). School dropout in Bangladesh: Insights using panel data. *International Journal of Educational Development* 33(3):225–232.
- Sagenmüller, I. (2014). Student Retention: 8 reasons people drop out of higher education. <https://www.uplanner.com/en-us/blog/student-retention-8-reasons-people-drop-out-of-higher-education>
- Sarker, I. N. M. and Hossin, A. M. (2014). Economic Effect of School Dropout in Bangladesh. <http://www.ijiet.org/show-110-1380-1.html>
- Sekine, K., & Hodgkin, M. E. (2017). Effect of child marriage on girls' school dropout in Nepal: Analysis of data from the Multiple Indicator Cluster Survey 2014. *PLoS One*, 12(7), e0180176. <https://doi.org/10.1371/journal.pone.0180176>
- Smita, M. K., Rabbi, M. F., & Mohammad, S. (2020). Reasons behind Dropping out of Slum Children from Non-formal School in Dhaka. *Jurnal Iqra': Kajian Ilmu Pendidikan*, 5(2), 14-29.
- UNICEF Bangladesh (n.d.). *Education for adolescents*. <https://www.unicef.org/bangladesh/en/more-opportunities-early-learning/education-adolescents>
- UNICEF Bangladesh. (2021). Bangladesh Education Fact Sheets 2020: *Analysis for learning and equity using Bangladesh MICS 2019*. https://data.unicef.org/wp-content/uploads/2021/05/Bangladesh-Education-Fact-Sheets_V7.pdf
- United Nations (n.d.). Retrieved 9 September 2021, from <https://sdgs.un.org/goals/goal4>
- Yamamoto, Y., & Holloway, S. D. (2010). Parental Expectations and Children's Academic Performance in Sociocultural Context. *Educational Psychology Review*, 22(3), 189–214.
- Zaman, M. M. (2014). *Dropout at Primary and Secondary Level A Challenge to Ensure Rights to Education for the Government of Bangladesh*, [Master's Dissertation, Institute of Government Studies (IGS), BRAC University], Dhaka, Bangladesh. <https://www.semanticscholar.org/paper/Dropout-at-primary-and-secondary-level-%3A-a-to-to-of-Zaman/19e06b2d8e0d3ad7033e0eccb436e4f3454a4bf3>



GROWTH COMPARISON OF MONO AND MIXED-SEX GIANT FRESHWATER PRAWN (*MACROBRACHIUM ROSENBERGII*, DE MAN) AND STOCKING OPTIMIZATION OF MALE MONOSEX FARMING

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KUS: 21/14: 210921

Manuscript submitted: September 21, 2021

Accepted: January 17, 2022

Abstract

Most often male freshwater Prawn (*Macrobrachium rosenbergii*) exhibits higher growth compared to the female counterpart. The current study has been conducted to evaluate the production performance and the survival rate of mono-sex male freshwater prawn culture compared to mono-sex female and mixed-sex culture. Conjointly the study also appraises the production competence of mono-sex male *M. rosenbergii* at different stocking densities. The experiment was conducted in two different phases. The first experiment comprised of three treatments, *viz.* mono sex male (T₁), mono sex Female (T₂) and both male & female (T₃) with the same stocking density (3 ind/m²) and maintaining the sex ratio 100% male and female for T₁ and T₂, and 50:50 ratio for T₃. The second experiment was conducted with all-male prawn (100% male) with three different stockings densities (i.e. 1, 2 and 3 ind/m² successively as D₁, D₂ and D₃). The results showed that in the first experiment, mono-sex males performed better growth, survival and production than mono-sex females and mixed-sex populations. In the second experiment, the highest individual growth was found to be 57.81±0.12 g in D₁, 52.22±0.14 g in D₂ and 40.97±0.1g in D₃. Similarly, D₁ showed the highest survival compared to D₂ and D₃. In contrast, the highest production (888.05±9.05kg/ha) was found in D₂, followed by D₃ (826±42.07kg/ha) and D₁ (496.18±34.86kg/ha). Hence, this research suggests practicing mono-sex male *M. rosenbergii* culture at stocking of 2/m² for accomplishing maximum profits.

Keywords: Mono-sex, stocking density, growth, survival, production performance, aquaculture

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DOI: <https://doi.org/10.53808/KUS.2022.19.01.2114-ls>

Introduction

Prawn culture is now one of the leading global aquaculture sectors contributing source of food and nutrition (Islam et al., 2008; Kutty, 2005; Paul et al., 2016). This sector is contributing to the economy of Bangladesh due to its extensive culture. Bangladesh is blessed with a suitable agro-climatic condition, and fresh, marine and brackish water for prawn culture (Ahmed et al., 2008; Azad et al., 2009; Wahab et al., 2012). Among 24 freshwater prawn species of Bangladesh, Giant Freshwater Prawn *Macrobrachium rosenbergii* is the most economically important species (Ahmed et al., 2008; Akand & Hasan, 1992). Due to the wide geographical distribution, this species is widely cultured in India, Bangladesh, China, Thailand and Taiwan (Islam et al., 2008; Kutty, 2005; Michael Bernard New, 2005; Paul et al., 2016).

Recently, the culture area of *M. rosenbergii* occupied 1,48,093 ha and this area is increasing rapidly over time (Ghosh et al., 2016). Although, the prawn culture occupies a large area, the target production is still poor (e.g. 713 kg/ha) compared to other neighboring countries (Ghosh et al., 2016), such as Thailand 2338 kg/ha (Vicki, 2007), Vietnam 1000–1500 kg/ha (Ridmontri, 2002), China 1500 kg/ha (Weimin & Xianping, 2002) and India 600–1000 kg/ha (Raizada et al., 2005). In Bangladesh still, prawn is cultured through an extensive and traditional culture system at low stocking density, and mostly in gher and rice fields with other finfish species (Ahmed et al., 2010; Hasanuzzaman et al., 2011). The culture of mono-sex fish and shellfish populations is advantageous in growth and production. On the other hand, stocking density in the culture is another major factor affecting the production, growth, and survival of prawn (Azad et al., 2009; Hutchings & Villarreal, 1996).

Today, the climatic change and other anthropogenic activities are changing the distribution and availability of some natural broodstock, thereby prawn aquaculture decreasing over the decades (Ali, 1999; Woodward et al., 2010). Hence, significant changes in the structure and composition of the prawn industry of the country are observed. In the integrated culture of prawn and finfish, intra-species competition and cannibalism of prawn lead to higher mortality, therefore, tumbling the prawn production (Ahmed et al., 2010; Hasanuzzaman et al., 2011). So, people are now changing their plan to single-species culture with higher stocking densities for higher production.

In Bangladesh, several studies have been found on the optimization of stocking density of several aquaculture species for achieving maximum yield (Chakraborty et al., 2006; Paul et al., 2016; Rahman et al., 2005). We have huge prawn farming area mostly practice traditional culture with other carp species, therefore, the overall production is lower compared to other Asian countries. The lower production might be due to lack of suitable production technology, poor stocking practices, socioeconomic and environmental issues (Ahmed et al., 2008; Azad et al., 2009; Hossain & Chakraborty, 2017; Kunda et al., 2008). Due to the traditional method of cultivation, many species are cultivated simultaneously by overlooking the stocking density which does not give the desired results of prawn production. Moreover, studies have shown that male species of prawn grows faster and are become larger in size than females. So, it is necessary to focus monoculture of prawn as well as to intensify the culture system with different stocking densities to get higher production. This study aimed to investigate the growth comparison of mono and mixed-sex giant freshwater prawn and the production performance of mono-sex male at different stocking densities.

Materials and Methods

Experimental setup

This experiment was conducted in pond complex II at Fisheries and Marine Resource Technology Discipline of Khulna University, Bangladesh. The culture period was divided into two distinct phases and the culture duration of each phase was 210 days (including 60 days nursing and 150 days culture period) from June to December in two consecutive years. Due to the late rain, pump related problems in the culture facility and lack of seed, we could not avoid the winter season. Both the experiments were carried out in nine experimental

ponds (40 m² of each). The first phase was intended with three treatments, *viz.* mono sex male (T₁), mono sex female (T₂) and both male and female (T₃). The stocking density was kept 3 juvenile/m², as Hasanuzzaman et al. (2011) and references therein reported that the traditional stocking density of prawn culture in Bangladesh varies between 1-4 PL/m². In the second experiment, the mono-sex male prawn was cultured at three different stocking densities, such as 1/m² (D₁), 2/m² (D₂) and 3 juvenile/m² (D₃). Each of the experiment was conducted in triplicate.

Pond Preparation and management

The experimental ponds were dewatered with a pump and dried under sunlight for two weeks to allow exhumation on the bottom mud. The pond bottom and dike were renovated by digging, repairing and removing unwanted aquatic weeds and fauna. The pond bottom was disinfected by liming at 250 kg/ha (Quick lime CaCO₃). After pouring the water, the ponds were fertilized with urea and Triple Super Phosphate (TSP) at the rate of 25 and 12.5 kg/ha respectively. The water level of the ponds was raised to 1.5 m before stocking. The total area of the ponds was fenced with a fine-meshed nylon net to protect the experimental area from unwanted dwellers.

PL nursing and stocking

The post larva (PL) of *M. rosenbergii* was collected from a commercial hatchery of Rupsha, Khulna. All the PLs were reared in the nursery pond for 60 days with a stocking density of 25 PL/m². After 60 days of nursing, the juveniles (1.74±45 g) were sorted by sex through hand segregation and stocked in the grow-out ponds at the stocking density of 3 ind/m² and maintaining the sex ratio 100% male and female for T₁ and T₂, and 50:50 ratio for T₃. In the second experiment, mono-sex male juveniles (1.77±34 g) were stocked in the grow-out ponds at the rate of 1/m², 2/m² and 3 juvenile/m² which was within the range (1-4/m²) of traditional culture practice in Bangladesh (Hasanuzzaman et al., 2011). After nursing period, sex was identified by manual observations and 100% mono-sex male juvenile prawn was stocked in the grow out ponds. We were careful to set the stocking density of mono-sex male prawn as they show cannibalistic behavior and compete for shelter.

Food and Feeding management

In the nursery ponds, the larvae were fed with a commercial Saudi-Bangla Nursery Feed having 35 % protein level with a feeding frequency of 3 times/day. Feed was given according to body weight and the age of the prawn (Table 1). The prawns in the grow-out ponds were fed with SABINCO supplementary quality pellet feed containing 30% protein, and the feed was given at 10-3% of the average prawn's body weight.

Table 1. Feeding rate administered at prawn nursery ponds.

| Week | Rate of feeding (for 100 PL) g per each administration | Week | Rate of feeding (for 100 PL) g per each administration |
|-----------------|---|------------------|---|
| 1 st | 63 | 6 th | 232 |
| 2 nd | 88 | 7 th | 262 |
| 3 rd | 128 | 8 th | 296 |
| 4 th | 162 | 9 th | 330 |
| 5 th | 188 | 10 th | 350 |

Water quality Parameter measurement

Basic water quality parameters were measured fortnightly in the water chemistry laboratory of Fisheries and Marine Resource Technology Discipline at Khulna University. Salinity was measured by Refractometer (ATAGO CO. LTD, Japan, Master- T 2312, Salinity range 0–100 ppt), Digital Thermometer (DIGITAL

THERMOMETER, made in China, model no WT-2, Temperature range –20 –80°C) was used to measure temperature. pH was measured by using pH meter (HACH, Sension 3, USA). Transparency was measured by Scheci dice and dissolved oxygen was measured by DO meter (PDO-519, made in Taiwan, Lutron). Water parameters were taken and measured at every fifteen days interval throughout the culture period.

Data collection and growth monitoring

Sampling was done fortnightly and thirty individuals were taken from each pond for the measurement of length and weight. Hand cast net were used to catch the fishes during sampling and immediately after catching, fishes were places in sampling box and measured length weight very carefully. Bodyweight was recorded by electric balance to the nearest 0.001 g accuracy and length was recorded as cm by a cm scale. At the end of the experiment, all the ponds were dewatered by a water pump and all the prawn was harvested completely to determine the production and survival rate.

$$\text{Survival (\%)} = \frac{N_t}{N_0} \times 100\%$$

Where N_t is the number of prawns at the end of the experiment and N_0 the initial number of prawns.

$$\text{Average weight gain (WG)} = W_t - W_0$$

In which W_t is the final body weight and W_0 the initial body weight of prawn.

$$\text{Daily weight gain (DWG) (g/day)} = (W_t - W_0)/t$$

In which W_t is the final body weight and W_0 the initial body weight of prawn, and t is the duration of the growth interval.

$$\text{Specific growth rate (SGR)} = \frac{\ln(W_t) - \ln(W_0)}{t} \times 100$$

In which W_t is the final body weight and W_0 the initial bodyweight of the prawn, and t is the duration of the experiment in days.

$$\text{Feed conversion ratio (FCR)} = \text{Total amount of feed given (g)}/\text{Weight gain (g)}$$

Statistical analysis

One-way analysis of variance (ANOVA) was used after being confirmed the homoscedasticity of variances (Levene's test) and normality of the data distribution (Shapiro-Wilk test) to determine the significant difference of growth and survival between the treatments. When there were significant differences ($P < 0.05$), the Tukey-HSD test was done to show the comparison between the treatments. All the statistical analyses were performed using SPSS 25.0.

Results

Growth performance in experiment 1

In the first experiment, mono-sex male, mono-sex female and mixed-sex prawn were cultured at the same stocking density (3 ind/m²). The results showed that mono-sex male has a higher mean body weight at the end of the culture period than mixed-sex and mono-sex female (Figure 1).

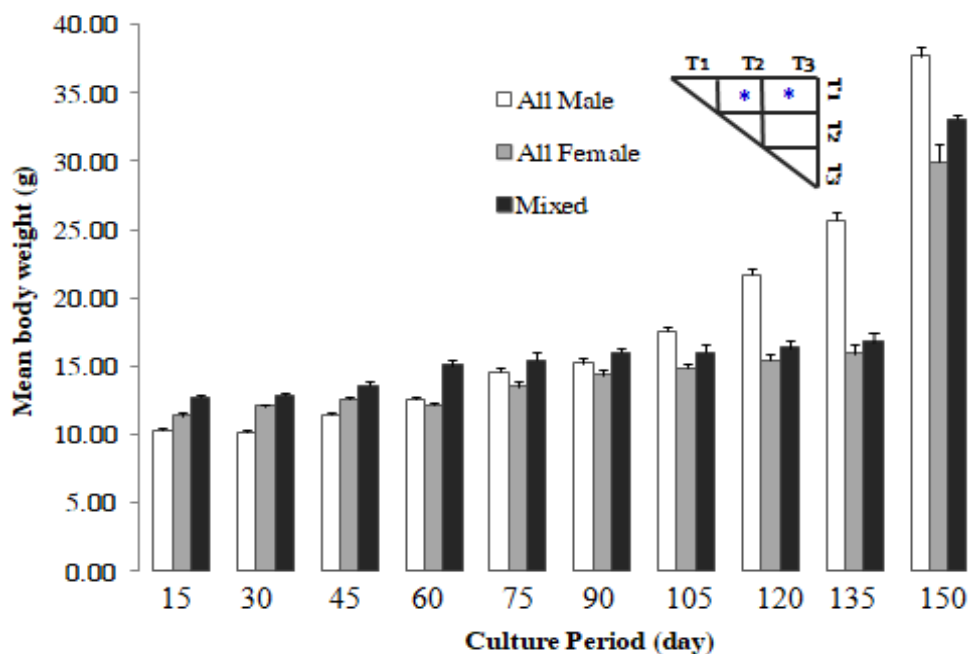


Figure 1. The bodyweight of mono-sex male, mono-sex female and the mixed-sex prawn revealed by fortnightly sampling. Error bars represent the standard deviation of thirty individuals. Mean values significantly different from each other are noted by asterisk (*) (One-way ANOVA, $P < 0.05$).

The mono-sex male treatment group was found to have higher individual final weight in T₁ (38.83 ± 3.6 g), followed by T₃ (33.07 ± 5.8 g) and T₂ (28.33 ± 3.9 g). Similarly, the highest weight gain and gross production were found in T₁, followed by T₃ and T₂ ($P < 0.05$) (Table 2).

Table 2. Production performance and feed utilization (mean \pm standard deviation) of mono-sex male, mono-sex female and mix-sex prawn after 150 days of culture. Different superscript letters in the same row indicate significant differences between the treatments (One-way ANOVA, $P < 0.05$).

| Growth parameters | T ₁ | T ₂ | T ₃ |
|--------------------------|---------------------|---------------------|---------------------|
| | (Mono-sex male) | (Mono-sex Female) | (Mixed Sex) |
| Initial Weight (g) | 1.74 ± 45^a | 1.74 ± 45^a | 1.74 ± 45^a |
| Final Weight (g) | 38.83 ± 3.6^a | 28.33 ± 3.9^b | 33.07 ± 5.8^c |
| Weight Gain (g) | 37.09 ± 9.04^a | 26.59 ± 11.37^b | 31.33 ± 14.21^c |
| DWG (g/day) | 0.25 ± 0.05^a | 0.18 ± 0.06^a | 0.21 ± 0.05^a |
| (%) SGR | 2.07 ± 0.03^a | 1.86 ± 0.02^a | 1.96 ± 0.02^a |
| FCR | 1.35 ± 0.04^a | 1.57 ± 0.02^a | 1.28 ± 0.02^a |
| Survival rate (%) | 67.78 ± 5.9^a | 64.72 ± 0.96^a | 63.05 ± 2.17^a |
| Gross Production (kg/ha) | 789.61 ± 85.6^a | 550.14 ± 44.2^b | 625.51 ± 22.8^b |

SGR=Specific growth Rate, DWG=Daily Weight Gain, FCR= Feed Conversion ratio

Growth performance in experiment 2

In the second experiment, final weight, weight gain, daily growth rate and gross production were found to be higher in D₁ and D₂ compared to D₃. In contrast, the results showed better survival in D₁ and D₂, compared to D₃ ($P < 0.05$).

Table 3. Production performance (mean \pm standard deviation) of mono-sex male prawn at three different stocking densities (D₁=1/m², D₂=2/m², D₃=3/m²) after 150 days of culture. Different superscript letters indicate the significant difference between the treatments (One-way ANOVA, $P < 0.05$).

| Growth parameters | D ₁ | D ₂ | D ₃ |
|--------------------------|---------------------------------|--------------------------------|-------------------------------|
| Initial weight (g) | 6.44 \pm 0.32 ^a | 5.29 \pm 0.58 ^b | 4.56 \pm 0.54 ^b |
| Final weight (g) | 57.81 \pm 0.93 ^a | 55.22 \pm 1.13 ^a | 40.97 \pm 0.77 ^c |
| Weight gain (g) | 51.37 \pm 0.86 ^a | 46.93 \pm 0.56 ^b | 36.4 \pm 1.13 ^c |
| DWG (g/day) | 0.34 \pm 0.01 ^a | 0.31 \pm 0.00 ^a | 0.24 \pm 0.01 ^b |
| (%) SGR | 1.46 \pm 0.03 ^a | 1.52 \pm 0.05 ^a | 1.47 \pm 0.08 ^a |
| Survival rate (%) | 85.83 \pm 3.05 ^b | 80.41 \pm 3.15 ^b | 67.22 \pm 3.05 ^a |
| Gross production (kg/ha) | 496.18 \pm 34.86 ^a | 888.05 \pm 9.05 ^a | 826 \pm 42.07 ^b |

Water quality parameter

In the present study, important water quality parameters, like pH, temperature, dissolved oxygen (DO), transparency and salinity were monitored (Table 4). All the water quality parameters were within the acceptable range for freshwater prawn culture.

Table 4. Water quality parameters (mean \pm standard deviation) in the culture ponds during culture period of the experiment

| Month | Days | pH | DO (ppm) | Salinity (ppt) | Temperature (°C) | Transparency (cm) |
|-----------|-------------------------|-----------------|-----------------|-----------------|------------------|-------------------|
| July | 1 st 15 days | 7.72 \pm 0.12 | 5.82 \pm 0.12 | 0.33 \pm 0.24 | 31.10 \pm 1.10 | 21.50 \pm 0.24 |
| | 2 nd 15 days | 7.75 \pm 0.12 | 5.60 \pm 0.19 | 0.50 \pm 0.00 | 30.94 \pm 1.00 | 21.33 \pm 0.47 |
| August | 1 st 15 days | 7.72 \pm 0.07 | 5.40 \pm 0.00 | 0.50 \pm 0.00 | 30.41 \pm 0.55 | 26.33 \pm 0.00 |
| | 2 nd 15 days | 7.87 \pm 0.05 | 5.42 \pm 0.07 | 0.42 \pm 0.12 | 30.41 \pm 0.49 | 26.00 \pm 0.47 |
| September | 1 st 15 days | 7.67 \pm 0.05 | 5.10 \pm 0.19 | 0.42 \pm 0.12 | 31.14 \pm 0.64 | 27.00 \pm 1.89 |
| | 2 nd 15 days | 7.65 \pm 0.12 | 5.03 \pm 0.24 | 0.33 \pm 0.24 | 31.11 \pm 0.59 | 27.83 \pm 0.24 |
| October | 1 st 15 days | 7.65 \pm 0.07 | 4.57 \pm 0.38 | 0.92 \pm 0.59 | 28.06 \pm 4.33 | 27.17 \pm 0.24 |
| | 2 nd 15 days | 7.75 \pm 0.02 | 4.75 \pm 0.31 | 0.83 \pm 0.47 | 28.44 \pm 4.07 | 25.83 \pm 0.24 |
| November | 1 st 15 days | 7.63 \pm 0.09 | 3.96 \pm 0.20 | 2.33 \pm 0.60 | 20.07 \pm 1.33 | 27.67 \pm 1.73 |
| | 2 nd 15 days | 7.60 \pm 0.09 | 3.90 \pm 0.15 | 2.44 \pm 0.42 | 19.91 \pm 1.09 | 27.78 \pm 1.50 |

Discussion

Like other crustaceans, the growth and physiology of *M. rosenbergii* are influenced by many factors, including environmental factors, sex and sexual maturity, stocking density, cellular metabolism, size and feeding habits (Aflalo et al., 2012; Hirose et al., 2013; Whiteley, 2011). In experiment 1, ponds stocked with all-male prawns produced numerically superior results compared to all females and mixed-sex. So, the culture of the all-male population produces a significantly higher marketable yield than an all-female or mixed-sex culture (Mohanta, 2000; New et al., 2000; Rungsin et al., 2006). Today, mono-sex male or female population of fish species is

grown from the concept of diverting breeding energy to increase body mass (Nair et al., 2006), whereas sexual dimorphism causes reduced growth of the female mono-sex population. Apparently, upon attaining sexual maturity, females start to divert much of their energy intake to ovarian maturation compared to growth, whereas males continue to grow at the same rate (Ling, 1969).

In Prawn culture, Stocking density plays a significant role in survival, growth, population structure and production (Azad et al., 2021). There is significant relationship between the growth rate and the stocking density of Prawn, because suitable stocking density facilitates best food utilizations, thus accelerate highest growth maintaining healthy pond environment (Azad et al., 2021; Ghosh et al., 2016). Sometime high stocking density negatively impact on the production because of the competitions of food and shelter arising, risk of disease outbreak consequence higher mortality and poor growth of prawn. Probably, due to the same effects in combination with shelter competition, cannibalism and male morphotype caused a lower survival of prawn at higher stocking densities (Azad et al., 2019, 2021; Hossain & Chakraborty, 2017). Comparing to our neighboring country, in India the stocking density of *M. rosenbergii* varies from 2 to 3/m² in mixed culture and 1–2/m² in all male monoculture (Nair & Salin, 2012). Whereas in Bangladesh, it varies from 2 to 3/m², and 2/m² has been recommended as the most profitable density (Asaduzzaman et al., 2009; Azad et al., 2021; Ghosh et al., 2016). In the first experiment, several growth parameters, such as final weight, weight gain, and gross production were found higher in mono-sex male prawn culture compared to mono-sex female and mixed-sex populations (Table 2). The results also showed that mixed-sex culture showed better performance than mono-sex female might be due to the higher growth rate of male counterparts or due to the sexual homogeneity in the community. Similarly, faster growth and higher weight of male prawn was found by Aflalo et al. (2006). They reported that higher growth and production characteristics of male prawn might give more economic opportunity in prawn culture. Hence, we conducted the second experiment for finding a suitable stocking density to achieve higher production from a mono-sex male prawn culture. The suitable marketable size of prawn varies 45 to 60g and its gain this commercial size within 6 to 8 months culture period (Azad et al., 2019; Ghosh et al., 2016; Hasanuzzaman et al., 2011).

In the second experiment, higher weight gain, final weight, daily weight gain, and survival rate of the mono-sex male population at the stocking density 1 and 2 individuals per m² were might be high due to the less competition among the individuals on space and food. Baysa & Whangchai, (2007) obtained significantly ($P < 0.05$) higher growth performance, survival and production of prawns stocked at 25 ind/m² density than at 50/m² density in case of intensive culture. In their study, lower production was obtained in the case of 50/m² stocking density due to extremely high stocking density that might lead the individuals to have serious competition among them. Siddiqui et al. (1997) evaluated the effects of stocking density and mono-sex culture on growth, survival, yield and feed conversion ratio of freshwater prawn (*Macrobrachium rosenbergii*) at densities of 5, 10, 15 and 20 prawns/m² in triplicate concrete tanks in Saudi Arabia. They reported that the mean body weight decreased with the increasing density, being highest at 5 prawns/m² (29.6 g) and lowest at 20 prawns/m² (17.4 g). An on-farm trial with 4 different treatments including 3, 6, 8 and 10 PL/m² in Mekong Delta, Vietnam for one year provided that the growth performance for the treatments 3, 6 and 8 PL/m² were significantly higher than that of treatment 10 PL/m² (Phuong et al., 2008).

Higher survival of prawn in D₁ might be due to the proper utilization of supplemented feed, and better pond quality. A feeding try was used to measure the feed consumption. On the other hand, a higher mortality rate is observed at higher stocking density due to the higher male competition. Probably, increased density might create pressure on the dominant males which revealed a higher survival through balanced social interaction (Banu et al., 2016).

The effect of stocking densities on growth and production also experimented on a wide range of fish and crustacean species. Almost similar patterns of results were obtained from the experiments conducted so far including polyculture of prawn and carps (Ranjeet & Madhusoodana Kurup, 2002) white shrimp,

Penaeusvannamei (Araneda et al., 2008) black sea turbot, *Psetta maxima*(Aksungur et al., 2007); mullet, *Mugil platanus* (Sampaio et al., 2001). In most cases, the growth performance and survival were higher at lower stocking densities, but the production and profitability depend on stocking density where the most production may come from the optimized higher stocking density.

The water quality parameters were recorded within the suitable range as mentioned for the nursery and grow-out cultivation of freshwater prawns. The water quality parameters did not significantly vary among the treatments which might be due to change stocking density of prawn as reported in other studies (Azad et al., 2019, 2021; Ghosh et al., 2016). In the present experiment, the water temperature range was 16-27 °C (Table 4) which was tolerable for prawn (not optimum for biological activities) as the optimum range of water temperature for aquatic animals is 25-30 °C (Passy, 2007). The lower water temperature was attributed due to the winter season and this might lead to the comparatively lower growth performance of the prawns. Standard water transparency in a prawn culture pond should be between 25-35 cm (Nandlal & Pickering, 2006). In the present experiment, the values ranged between 19-34 cm (Table 4) that were compatible with the standard value with little variation. In the present experiment, the pH range was found to be 7.4-8 (Table 4) throughout the experimental period. The suitable pH range for fishes, crustaceans and other aquatic organisms is 6.5-8 (Ramesh & Anbu, 1996).

One of the most important factors to indicate the water quality is DO which is essential for the respiration of every organism. The optimum range of DO for fish, crustaceans and other aquatic animals is 5-8 ppm (Ragothaman & Trivedy, 2002). In both of the experiments, the DO levels were within the suitable ranges varied between 5.8 and 6.6 mg/L (Table 4).

Still, there is a dearth of information on the suitable stocking density of giant freshwater prawn (*Macrobrachium rosenbergii*) culture for ensuring better production and profitability. The findings of this research work would be useful by getting better stocking density for sustainable prawn aquaculture. We suggest further studies should be conducted on intensifying mono-sex male prawn production through ecological approaches for maximum production and economic efficiency.

Conclusion

This study supports that mono-sex male has a higher mean body weight as compared to mixed-sex and mono-sex female. Besides, our study shows the maintenance of stocking density 2 prawns/m² in mono-sex male culture for better growth performance and production. As *M. rosenbergii* is a prime and promising aquaculture species in the tropical and sub-tropical areas, the culture of mono-sex male prawn will be interested in the farmers. However, special attention must be given to producing mono-sex male PL of prawn in large quantities to meet the increasing demand of prawn farmers. Otherwise, a negative impact will interfere with the natural population balance in male-female availability.

Acknowledgement

The authors are grateful to the Bangladesh Bureau of Education Information & Statistics (BANBEIS), Ministry of Education of Government of the People's Republic of Bangladesh USDA for financial support to conduct the research.

Conflict of interest

The authors declared no conflict of interest in producing this manuscript.

Author contributions

Shikder Saiful Islam: Field research, data acquisition, data analysis, project administration, writing: original draft, , writing: review and editing; Md Rony Golder: Writing: original draft, data analysis; Joyanta Bir: Data

analysis, writing: original draft, writing: review and editing; Saroj Kumar Mistry: Field research and data collection; Md. Nure Alam Siddique: Field research and data collection; Md. Rayhan Ali: Resources, writing: review and editing; Wasim Sabbir: Supervision, writing: review and editing; Md. Abul Kalam Azad: Field research and data collection; Khandaker Anisul Huq: Fund acquisition, supervision, project administration, writing: reviewing and editing.

References

- Aflalo, Eli D, Raju, D. V. S. N., Bommi, N. A., Verghese, J. T., Samraj, T. Y. C., Hulata, G., Ovadia, O., & Sagi, A. (2012). Toward a sustainable production of genetically improved all-male prawn (*Macrobrachium rosenbergii*): evaluation of production traits and obtaining neo-females in three Indian strains. *Aquaculture*, 338, 197–207.
- Aflalo, Elihu D, Hoang, T. T. T., Nguyen, V. H., Lam, Q., Nguyen, D. M., Trinh, Q. S., Raviv, S., & Sagi, A. (2006). A novel two-step procedure for mass production of all-male populations of the giant freshwater prawn *Macrobrachium rosenbergii*. *Aquaculture*, 256(1–4), 468–478.
- Ahmed, N., Ahammed, F., & Van Brakel, M. (2008). An economic analysis of freshwater prawn, *macrobrachium rosenbergii*, farming in Mymensingh, Bangladesh. *Journal of the World Aquaculture Society*, 39(1), 37–50.
- Ahmed, N., Allison, E. H., & Muir, J. F. (2010). Rice fields to prawn farms: a blue revolution in southwest Bangladesh? *Aquaculture International*, 18(4), 555–574.
- Ahmed, N., Demaine, H., & Muir, J. F. (2008). Freshwater prawn farming in Bangladesh: history, present status and future prospects. *Aquaculture Research*, 39(8), 806–819.
- Akand, A. M., & Hasan, M. R. (1992). Status of freshwater prawn (*Macrobrachium* spp.) culture in Bangladesh. *Freshwater Prawns* (Ed. by EG Silas), 33–41.
- Aksungur, N., Aksungur, M., Akbulut, B., & Kutlu, İ. (2007). Effects of stocking density on growth performance, survival and food conversion ratio of Turbot (*Psetta maxima*) in the net cages on the southeastern coast of the Black Sea. *Turkish Journal of Fisheries and Aquatic Sciences*, 7(2), 147–152.
- Ali, A. (1999). Climate change impacts and adaptation assessment in Bangladesh. *Climate Research*, 12(2–3), 109–116.
- Araneda, M., Pérez, E. P., & Gasca-Leyva, E. (2008). White shrimp *Penaeus vannamei* culture in freshwater at three densities: condition state based on length and weight. *Aquaculture*, 283(1–4), 13–18.
- Asaduzzaman, M., Wahab, M. A., Verdegem, M. C. J., Mondal, M. N., & Azim, M. E. (2009). Effects of stocking density of freshwater prawn *Macrobrachium rosenbergii* and addition of different levels of tilapia *Oreochromis niloticus* on production in C/N controlled periphyton based system. *Aquaculture*, 286(1–2), 72–79.
- Azad, A. K., Jensen, K. R., & Lin, C. K. (2009). Coastal aquaculture development in Bangladesh: unsustainable and sustainable experiences. *Environmental Management*, 44(4), 800–809.
- Azad, M. A. K., Islam, S. S., Amin, M. N., Ghosh, A. K., Hasan, K. R., Bir, J., Banu, G. R., & Huq, K. A. (2021). Production and economics of probiotics treated *Macrobrachium rosenbergii* at different stocking densities. *Animal Feed Science and Technology*, 282(June 2020), 115125.
- Azad, M. A. K., Islam, S. S., Sithi, I. N., Ghosh, A. K., Banu, G. R., Bir, J., & Huq, K. A. (2019). Effect of probiotics on immune competence of giant freshwater prawn *Macrobrachium rosenbergii*. *Aquaculture Research*, 50(2), 644–657.

- Banu, M. R., Christianus, A., Siraj, S. S., Ikhsan, N. F. M., & Rajace, A. H. (2016). Effects of stocking density on growth performance and survival of three male morphotypes in all-male culture of *Macrobrachium rosenbergii* (De Man). *Iranian Journal of Fisheries Sciences*, 15(2), 738–750.
- Baysa, R. P., & Whangchai, N. (2007). Effect of culture season and stocking density on growth and production of giant freshwater prawn (*Macrobrachium rosenbergii* de Man) raised in northern Thailand. *Maejo International Journal of Science and Technology*, 1(02), 216–221.
- Chakraborty, B. K., Miah, M. I., Mirza, M. J. A., & Habib, M. A. B. (2006). Rearing and nursing of endangered sarpunti, *Puntius sarana* (Ham.) with tree supplementary feeds. *Journal of Asiatic Society of Bangladesh* 32(1), 33–41.
- Ghosh, A. K., Bir, J., Azad, M. A. K., Hasanuzzaman, A. F. M., Islam, M. S., & Huq, K. A. (2016). Impact of commercial probiotics application on growth and production of giant fresh water prawn (*Macrobrachium rosenbergii* De Man, 1879). *Aquaculture Reports*, 4, 112–117.
- Hasanuzzaman, A. F. M., Rahman, M. A., & Islam, S. S. (2011). Practice and Economics of Freshwater Prawn Farming in Seasonally Saline Rice Field in Bangladesh. *Mesopotamian Journal of Marine Science*, 26(1), 69–78.
- Hirose, G. L., Fransozo, V., Tropea, C., López-Greco, L. S., & Negreiros-Fransozo, M. L. (2013). Comparison of body size, relative growth and size at onset sexual maturity of *Uca uruguayensis* (Crustacea: Decapoda: Ocypodidae) from different latitudes in the south-western Atlantic. *Journal of the Marine Biological Association of the United Kingdom*, 93(3), 781–788.
- Hossain, M. M., & Chakraborty, S. C. (2017). Growth and economic analysis of freshwater prawn, *Macrobrachium rosenbergii* (de Man), produced with feeds substituting sunflower cake for fish meal, soya bean meal and mustard oil cake. *Aquaculture Research*, 48(10), 5418–5429.
- Hutchings, R. W., & Villarreal, H. (1996). Biología y Cultivo de la langosta de agua dulce *Cherax quadricarinatus*. *Manual de Production. Navimar S.A, Guayaquil, Ecuador*, 500pp.
- Islam, M. S., Huq, K. A., & Rahman, M. A. (2008). Polyculture of Thai pangus (*Pangasius hypophthalmus*, Sauvage 1878) with carps and prawn: a new approach in polyculture technology regarding growth performance and economic return. *Aquaculture Research*, 39(15), 1620–1627.
- Kunda, M., Dewan, S., Uddin, M. J., Karim, M., Kabir, S., & Uddin, M. S. (2008). Length-weight relationship, condition factor and relative condition factor of *Macrobrachium rosenbergii* in rice fields. *Asian Fisheries Science*, 21(4), 451–456.
- Kutty, M. N. (2005). Towards sustainable freshwater prawn aquaculture—lessons from shrimp farming, with special reference to India. *Aquaculture Research*, 36(3), 255–263.
- Ling, S. W. (1969). The general biology and development of *Macrobrachium rosenbergii* (de Man). *FAO Fish Rep.*, 57, 589–606.
- Mohanakumaran Nair, C., Salin, K. R., Raju, M. S., & Sebastian, M. (2006). Economic analysis of monosex culture of giant freshwater prawn (*Macrobrachium rosenbergii* De Man): a case study. *Aquaculture Research*, 37(9), 949–954.
- Mohanta, K. N. (2000). Development of giant freshwater prawn broodstock. *Naga, the ICLARM Quarterly*, 23(3), 18–20.
- Nair, C. M., & Salin, K. R. (2012). Current status and prospects of farming the giant river prawn *Macrobrachium rosenbergii* (De Man) and the monsoon river prawn *Macrobrachium malcolmsonii* (H.M. Edwards) in India. *Aquaculture Research*, 43(7), 999–1014.

- Islam et al. (2022). Growth comparison of mono and mixed-sex giant freshwater prawn (*Macrobrachium rosenbergii*, De man) and stocking optimization of male monosex farming. *Khulna University Studies* Volume 19(1): 43-54
- Nandlal, S., & Pickering, T. (2006). Freshwater prawn *Macrobrachium rosenbergii* farming in Pacific Island countries-Volume II: Grow-out in ponds. *Noumea, New Caledonia: Secretariat of the Pacific Community*, 31.
- New, Michael B, Singholka, S., & Kutty, M. N. (2000). Prawn capture fisheries and enhancement. *Freshwater Prawn Culture: The Farming of Macrobrachium Rosenbergii*. Blackwell Science, Oxford, 411–428.
- New, Michael Bernard. (2005). Freshwater prawn farming: global status, recent research and a glance at the future. *Aquaculture Research*, 36(3), 210–230.
- Passy, S. I. (2007). Diatom ecological guilds display distinct and predictable behavior along nutrient and disturbance gradients in running waters. *Aquatic Botany*, 86(2), 171–178.
- Paul, P., Rahman, A., Hossain, M. M., Islam, S., Mondal, S., & Haq, M. (2016). Effect of stocking density on the growth and production of freshwater prawn (*Macrobrachium rosenbergii*). *International Journal of Aquaculture and Fishery Sciences*, 6(1), 77–86.
- Phuong, N. T., Hai, T. N., & Trung, Q. N. (2008). Effects of stocking density of giant freshwater prawn (*Macrobrachium rosenbergii*) on productivity and profitability of rice–prawn alternative culture system. *Scientific Journal of Can Tho University, Specific Issue on Aquaculture and Fisheries*, 2, 96–105.
- Ragothaman, G., & Trivedy, R. K. (2002). *Aquatic Ecology: A Text Book* (1st ed.). Agrobios.
- Rahman, M. A., Mazid, M. A., Rahman, M. R., Khan, M. N., Hossain, M. A., & Hussain, M. G. (2005). Effect of stocking density on survival and growth of critically endangered mahseer, Tor putitora (Hamilton), in nursery ponds. *Aquaculture*, 249(1–4), 275–284.
- Raizada, S., Chadha, N. K., Javed, H., Ali, M., Singh, I. J., Kumar, S., & Kumar, A. (2005). Monoculture of giant freshwater prawn, *Macrobrachium rosenbergii* in inland saline ecosystem. *Journal of Aquaculture in the Tropics*, 20(1), 45–56.
- Ramesh, R., & Anbu, M. (1996). *Chemical methods for environmental analysis: water and sediment*. Macmillan India.
- Ranjeet, K., & Madhusoodana Kurup, B. (2002). Management strategies associating batch-graded and size-graded postlarvae can reduce heterogeneous individual growth in *Macrobrachium rosenbergii* (de Man). *Aquaculture Research*, 33(15), 1221–1231.
- Ridmontri, C. (2002). Agifish doubles freshwater shrimp fry production. *Asian Aquaculture Magazine March/April*, 18–20.
- Rungsin, W., Paankhao, N., & Na-Nakorn, U. (2006). Production of all-male stock by neofemale technology of the Thai strain of freshwater prawn, *Macrobrachium rosenbergii*. *Aquaculture*, 259(1–4), 88–94.
- Sampaio, L. A. N. de, Ferreira, A. H. F., & Tesser, M. B. (2001). Effect of stocking density on laboratory rearing of mullet fingerlings, *Mugil platanus* (Günther, 1880). *Acta Scientiarum*, 23(2), 471–475.
- Siddiqui, A. Q., Al-Hafedh, Y. S., Al-Harbi, A. H., & Ali, S. A. (1997). Effects of stocking density and monosex culture of freshwater prawn *Macrobrachium rosenbergii* on growth and production in concrete tanks in Saudi Arabia. *Journal of the World Aquaculture Society*, 28(1), 106–112.
- Vicki, S. S. (2007). *Social, economic and production characteristics of freshwater prawn *Macrobrachium rosenbergii* culture in Thailand*. MS thesis, School of Natural Resources and Environment, University of Michigan.
- Wahab, M. A., Ahmad-Al-Nahid, S., Ahmed, N., Haque, M. M., & Karim, M. (2012). Current status and prospects of farming the giant river prawn *Macrobrachium rosenbergii* (De Man) in Bangladesh. *Aquaculture Research*, 43(7), 970–983.
- Weimin, M., & Xianping, G. (2002). Freshwater prawn culture in China: an overview. *Aquaculture Asia*, 7(1), 9–12.

- Whiteley, N. M. (2011). Physiological and ecological responses of crustaceans to ocean acidification. *Marine Ecology Progress Series*, 430, 257–271.
- Woodward, G., Perkins, D. M., & Brown, L. E. (2010). Climate change and freshwater ecosystems: impacts across multiple levels of organization. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 365(1549), 2093–2106.



SPATIAL DISTRIBUTION AND THE ASSESSMENT OF POND WATER SUITABILITY FOR AQUACULTURE IN THE SONADANGA AND KOTWALI THANAS OF KHULNA CITY CORPORATION

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KUS: 22/05: 170122

Manuscript submitted: January 17, 2022

Accepted: May 21, 2022

Abstract

In Bangladesh, aquaculture has become an extensive practice, and over 12% of the population is involved in it. It is well-recognized that water quality determines the metabolic and physiological activities of fishes and negatively affects fish production. However, both groundwater and surface water resources in many places are affected by various pollutants. This research was conducted to assess the suitability of pond water for aquaculture in Sonadanga and Kotwali thanas in Khulna City Corporation Area of Bangladesh using spatial distribution. For doing this, samples from 23 fish cultivated ponds in those two thanas were collected for analyzing the basic physical and chemical parameters. Results revealed that only the pH of the ponds was in a favorable range (8.03 to 7.37) for aquaculture, but other water quality parameters like electrical conductivity (EC), total suspended solids (TSS), total dissolved solids (TDS), dissolved oxygen (DO), calcium (Ca^{2+}), magnesium (Mg^{2+}), water hardness (WH), total iron (Fe^{2+} and Fe^{3+}), sodium (Na^+), chloride (Cl), bicarbonate (HCO_3^-), nitrate (NO_3^-), phosphate (PO_4^{3-}), and sulfate (SO_4^{2-}) were present in excessive concentrations. The Pearson correlation among these parameters were found to be significant. Although, the water bodies in both thanas were unsuitable for fish farming, the Kotwali thana had more degraded ponds compared to the Sonadanga thana. It is recommended that the local administration should undertake necessary actions to improve the suitability of aquaculture and to conserve these water bodies in the area.

Keywords: Aquaculture; spatial distribution; Khulna City Corporation; pond water quality

Introduction

Water pollution is a common problem for fish farming in many parts of the world. Water bodies are polluted due to the haphazard dumping of the untreated industrial effluents from different industries and anthropogenic sources containing toxic pesticides, metals (Hatje *et al.*, 1998). Therefore, there is a crying need for monitoring of the water quality around the world. If the water resources could be protected from pollution, it would possibly help in sustaining the population of the world. Most of the water bodies are now disappeared because of pollution and encroachment (Yogendra and Puttiah, 2008). Fishes are quite sensitive to toxicity in water as their metabolic activities depend on the water quality of the ponds. Ignoring water quality parameters is a major cause for reducing the productivity in fishery industries, which in turn, leads to losses to the aquaculture industry of a country. Unfortunately, water quality is an overlooked aspect of pond

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DOI: <https://doi.org/10.53808/KUS.2022.19.01.2205-ls>

management until it starts affecting fish production. Therefore, quality water, should be ensured for the growth and development of fish (Hu, 1995).

The fisheries sectors of Bangladesh play a major role in the socio-economic development as it contributes approximately 3.50% to the national Gross Domestic Product (GDP) and 25.72% to the agricultural GDP (BER, 2019), and more than 12% of the total population are directly or indirectly depends on aquaculture and fisheries for their livelihoods. Total production of fish in Bangladesh has increased by six times in last three decades. Freshwater fish farming has become an extensive practice in Bangladesh nowadays (Azim, *et al.*, 2012).

The fisheries resources in Bangladesh are categorized into marine fisheries and inland fisheries. Inland aquaculture covers around 4.71 million ha and has been subcategorized into two sub-sectors – inland culture and inland capture. Inland culture system covers 0.82 million ha and includes fisheries in ponds, ditches, baors, prawn farms, or seasonal cultured water bodies. On the other hand, inland capture covers 3.89 million ha and comprises estuaries, lakes, and rivers (DoF, 2019). Total area converge by ponds in Bangladesh has been increased by 1.54% in 2018-2019 compared to at in 2017-2018. The annual fish production of inland water bodies was highest in Chattogram Division (712643 metric tons) followed by the Khulna division (679838 metric tons) during the fiscal year 2018-2019 (DoF, 2019).

Good quality water is essential for higher fish production (Boyd and McNevin, 2015). Since the aquatic environment controls the health of the fishes, the water quality should be suitable for fish farming (Rahman, 1992). However, the surface water bodies in Bangladesh are being polluted in various ways (Islam *et al.*, 2009). Therefore, it is emphasized that the water quality of ponds should fit the requirements of the cultured fishes to ensure optimal growth. The aim of this study is to create spatial distribution maps of different water quality parameters and to assess the suitability of ponds for aquaculture in Sonadanga and Kotwali thanas of Khulna City Corporation.

Methodology

Study area and sample collection

This study was conducted in the Southern region of the Khulna City Corporation (KCC) area. The total population and the area of the KCC are respectively 770498 and 18889 sq. km. The city corporation consists of five thanas – i) Khan Jahan Ali, ii) Daulatpur, iii) Khalishpur, iv) Sonadanga, and v) Kotwali. Sonadanga and Kotwali thanas were selected as our study areas because these two areas have the highest population density of 26524 per km² and 20437 per km², respectively. Also, Sonadanga and Kotwali thanas are relatively developed and more industrialized than other thanas in the City Corporation Area. Water samples with three replications (two from the corners and one from the center) were collected from 23 fish cultivated ponds located in this locality during March (2019). The study area, along with central sampling points is shown in Figure 1. Very few of these ponds are used for fish farming where farmers cultivate native carps, like *Catla catla* and *Labeo rohita*, as well as exotic carps, like silver carp and grass carp. However, they did not follow any specific brands for feeding.

Plastic water bottles were prepared by rinsing with distilled water and HCL (1:1) for sterilization. At the sampling spots, the bottles were washed three times thoroughly by the pond water. Every sample was collected at the depth of 2 feet from the water surface. The bottle was filled with the sample water and capped tightly leaving no space for air to cause any transformation in the chemical compounds or biological activities. The temperature of the ponds located in the region was around 28±2 °C. Immediately after sampling, the presence of fecal coliforms was analyzed. After that, the samples were preserved in the refrigerator at 8°C for further analyses and to minimize biological activities.

Laboratory analyses

Total Dissolved Solids (TDS) and Total Suspended Solids (TSS): A specific amount (50 ml) of water sample was filtered using WN-42 filter paper and the filtered water was taken to a beaker. Both the filter paper and the beaker were oven-dried for 24 hours at 105^o. The weight of this filtered paper was subtracted from the blanked filter paper to achieve the TSS and the weight of the dried beaker was subtracted from an empty beaker to achieve TDS.

Acidity/Alkalinity (pH): The pH of the water samples was determined by using a pH meter (HANNA, pH 211).

Electrical Conductivity (EC): EC of the water samples was determined by using a conductivity meter (HANNA EC214).

Bicarbonates (HCO₃⁻): Bicarbonates were determined by the titrimetric method. (Jackson, 1973).

Chloride (Cl⁻): The chloride ions were determined by using the titrimetric method with standard AgNO₃ solution. (Jackson, 1973).

Nitrate (NO₃⁻): Nitrate content was determined by following the steam-distillation method (using Devarda's alloy). (Bremner and Keeney, 1965).

Phosphate (PO₄³⁻): The phosphate of the water samples was determined using the Vanadomolybdo phosphoric acid (yellow color) method with spectroscopy (APEL, PD-303 UV) (Jackson, 1967).

Sulfate (SO₄²⁻): The sulfate was determined by turbidimetric method with spectrophotometer (APEL, PD-303 UV) at 420 nm wavelength. (Hunt, 1980).

Calcium (Ca²⁺), Magnesium (Mg²⁺) and Water Hardness: Calcium and magnesium were determined by titrimetric method given by Schwarzenbach *et al.*, (1946). From the water samples, the calcium ions were determined first. To determine the magnesium content, calcium and magnesium were determined together and the value of calcium ion was subtracted from the value of calcium + magnesium. Water hardness of the water samples was determined by using the following equation (Eq. 1) (Freeze and Cherry, 1979):

$$\text{Water hardness} = 2.5 \times [\text{Ca}^{2+}] + 4.1 \times [\text{Mg}^{2+}] \quad (\text{Eq. 1})$$

Iron (Fe): Total iron content (both Fe²⁺ and Fe³⁺) of the water samples was determined by using hydroxyl amine hydrochloride (HAH) reducing agent and colorimetric method with spectrophotometer (APEL, PD-303 UV) at 510 nm wavelength.

Sodium (Na⁺): The sodium ions were determined by the flame photometer (JENWAY, PFP7).

Spatial Distribution

Spatial distribution is a technique that is used to predict the values at the unsampled locations from the sampled locations. There are two types of interpolation techniques – geostatistical and deterministic. Geostatistical techniques, such as Kriging, conduct a statistical analysis to predict the values of unknown sites, while deterministic technique, such as Inverse Distance Weighting (IDW), is a technique for multivariate interpolation using the known values to predict the unknown values. We used ArcGIS 10.4.1 to create spatial distribution maps of the study area by following IDW interpolation method.

Inverse Distance Weighting (IDW): IDW is a popular deterministic interpolation method for studying spatial variation. This method assumes that the connection and resemblance among several contiguous points is approximate to the gap between the points. The following equation (Eq. 2) is used in IDW to determine the value of an unknown point –

$$Z(x_0) = \frac{\sum_{i=1}^n \frac{z_i}{h_{ij}^p}}{\sum_{i=1}^n \frac{1}{h_{ij}^p}} \quad (\text{Eq. 2})$$

Here, $Z(x_i)$ is the predicted value of an unknown point, n is the value of the total sampling data, x_i is the data value at i th point, h_{ij} is the distance between sampled data and predicted value, and β is weighting power.

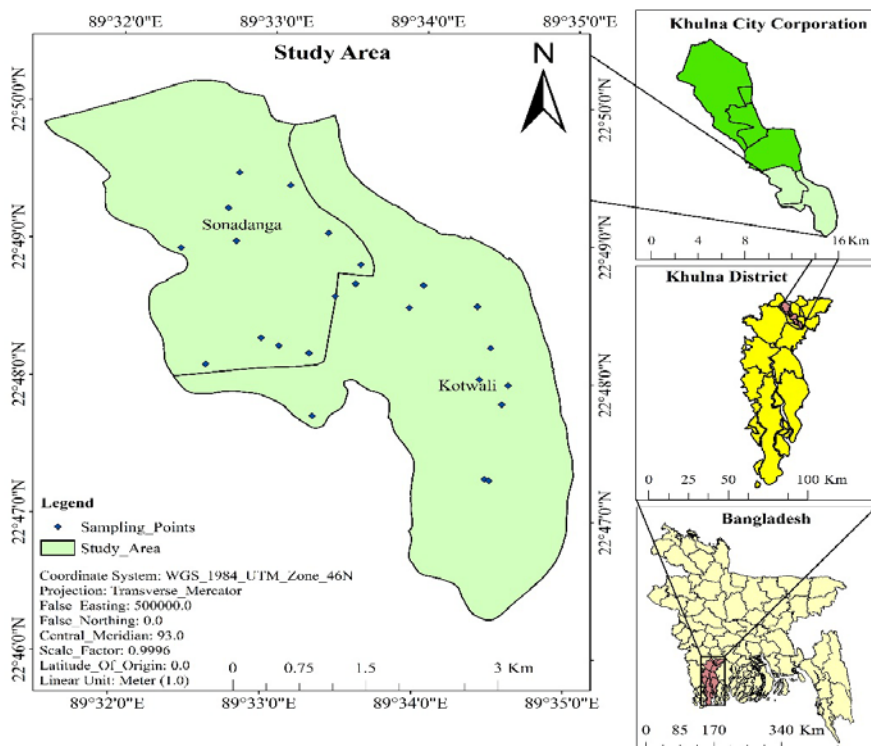


Figure 1. Study area and sampling points.

Results and Discussion

Spatial distribution of different water quality parameters of Sonadanga and Kotwali thanas in Khulna city corporation area is presented in Figure 2, Figure 3 and Figure 4. The pH of the water bodies ranges from 8.03 to 7.37 (Figure 2a), while the EC value is found between 1.3 dS/m and 0.3 dS/m (Figure 2b). The concentration of TSS and TDS of the study area ranges from 1600 mg/l to 400 mg/l (Figure 2c) and from 1696 mg/l to 400 mg/l (Figure 2d), respectively. Though the pH value indicates that the study area has a favorable pH range for growing a wide variety of fish species as the optimum pH range for aquaculture is 6.5 to 9 (Boyd *et al.*, 2016), EC is too high. TSS decreases the DO level of the water by absorbing more heat compared to the water molecules. The suspended particles then transfer the heat to the water molecules by conduction, which increases the temperature of the water, and warmer water bodies cannot hold the dissolved oxygen as effectively as the cold water bodies can do (Hickin, 1995). TDS increases the water density and decreases the solubility of gases.

The concentration of DO varies between 7 mg/l and 2 mg/l (Figure 2e). Different fish species have different DO requirements, and it changes with the activities and sizes of the fishes (Mallya 2007). For instance, the optimum DO requirement for Channel Catfish is 3 mg/l, but it falls below 1 mg/l for Tilapia fish (Boyd and Hanson, 2010). Fishes grow best when the concentration of DO is above 5 mg/l, and as the level of DO falls below 5 mg/l, the fishes start compensating for the reduced DO status through a series of physiological and behavioral changes, and < 1 mg/l level can be lethal (Swingle, 1969).

In the study area, the calcium (Figure 2f) and magnesium (Figure 3a) concentrations ranged from 460 mg/l to 80 mg/l and 263 mg/l to 0.02 mg/l, respectively, and the water hardness (Figure 3b) was found between 2226 mg/l and 299 mg/l. Luo *et al.*, (2016) and Alavi and Cosson (2006) found that total hardness of >480 mg/l has an adverse effect on the fertilization of certain fish species by inhibiting sperm mobility. Also, larval abnormality has been observed in African catfish when the hardness level exceeds 200 mg/l (Spade and Bristow, 1999). A higher concentration of calcium and magnesium can also cause low fertilization (Lahnsteiner, 2014).

Total Fe concentration of the study area was found between 9.1 mg/l and 0.79 mg/l (Figure 3c). Fe content can reduce production and interstitial space that may smother aquatic animals (USEPA, 1976). USEPA in 1976 set up a Fe criterion to protect aquatic lives and established a chronic value of 1 mg/l, which is underproductive of the sensitive fish species (Cadmus *et al.*, 2018). Following the similar methodology of USEPA (1976), Stephan *et al.* (1985) established another Fe criterion by using single-species toxicity and set the chronic value to 0.499 mg/l. However, Linton *et al.*, (2007) suggested that for the sensitive species, the chronic value should be reduced to 0.251 mg/l. According to the criterion, it can be stated that Fe concentration in our study area is very high for aquaculture.

Figure 3d and Figure 3e indicate the spatial distribution of Na⁺ and Cl⁻ in the study area, where the highest concentration of Na⁺ and Cl⁻ was 700 mg/l and 7998 mg/l and the lowest concentration was 175 mg/l and 806 mg/l, respectively. Chloride can burn the fish's gills and kill the nitrifying bacteria present in the water bodies. The toxicity of chloride depends on the fish species, temperature, duration of the exposure, and other conditions. El-Bouhy *et al.*, (2006) found that *Xiphophorus helleri* and *Cyprinus carpio* varieties exposed to respectively 1.375 mg/l and 2.4425 mg/l for 96 hours showed restlessness, abnormal swimming behavior, lower respiratory rate, congested gill tissues, fade coloration, etc.

Figure 3f represents the spatial distribution of HCO₃⁻ in the study area and reveals that the concentration of HCO₃⁻ ranged between 671 mg/l and 122 mg/l. NO₃⁻ is another nitrogenous compound that is toxic to the fishes even in a small concentration. Nitrate ranged between 98 mg/l and 39 mg/l (Figure 4a). High nitrate level leads to the rapid growth of unwanted lives and the reduction of dissolved oxygen. Fishes exposed to a higher nitrate concentration may have decreased hemoglobin concentration because nitrate converts hemoglobin into methemoglobin that reduces the transportation of oxygen in aquatic animals (Sampaio *et al.*, 2006).

Figure 4b and Figure 4c reveal the concentration (mg/l) of PO₄³⁻ and SO₄²⁻ in our study area. The highest value of PO₄³⁻ and SO₄²⁻ was found 176 mg/l and 51 mg/l, while the lowest value was 137 mg/l and 24 mg/l, correspondingly. Although phosphate doesn't have any direct toxic effects on fish species, it can degrade the water quality of an aquatic ecosystem by causing eutrophication, which reduces dissolved oxygen in the water and causes aquatic organisms to die (Kim *et al.*, 2013). On the other hand, SO₄²⁻ showed a negative correlation with pH and a positive correlation with TDS. Higher concentration of sulfate can be toxic to the freshwater aquatic lives. The province of British Columbia demonstrated the sulfate value of 100 mg/l for the protection of aquatic lives in freshwater. Sulfate toxicity is, however, dependent on the water hardness as the toxicity decreases with the increase in water hardness (Elphick *et al.*, 2011). In our research, we found that the pond water had a high value of water hardness (minimum 299 mg/l). Therefore, we can assume that the sulfate concentration in the study area does not pose a threat to fish farming.

Land use systems and human activities are mainly responsible for causing pollution to the surface and subsurface water bodies. Each of the studied ponds was located near different land use patterns (e.g. industries, schools, settlements, agricultural lands, restaurants. etc.). The predicted interpolation maps indicated the region where water pollution was high. This study revealed that the water bodies located in relatively industrialized areas (e.g. north and southwest of Sonadanga thana and east of Kotwali thana) were more polluted than less developed areas (e.g. south of Kotwali thana).

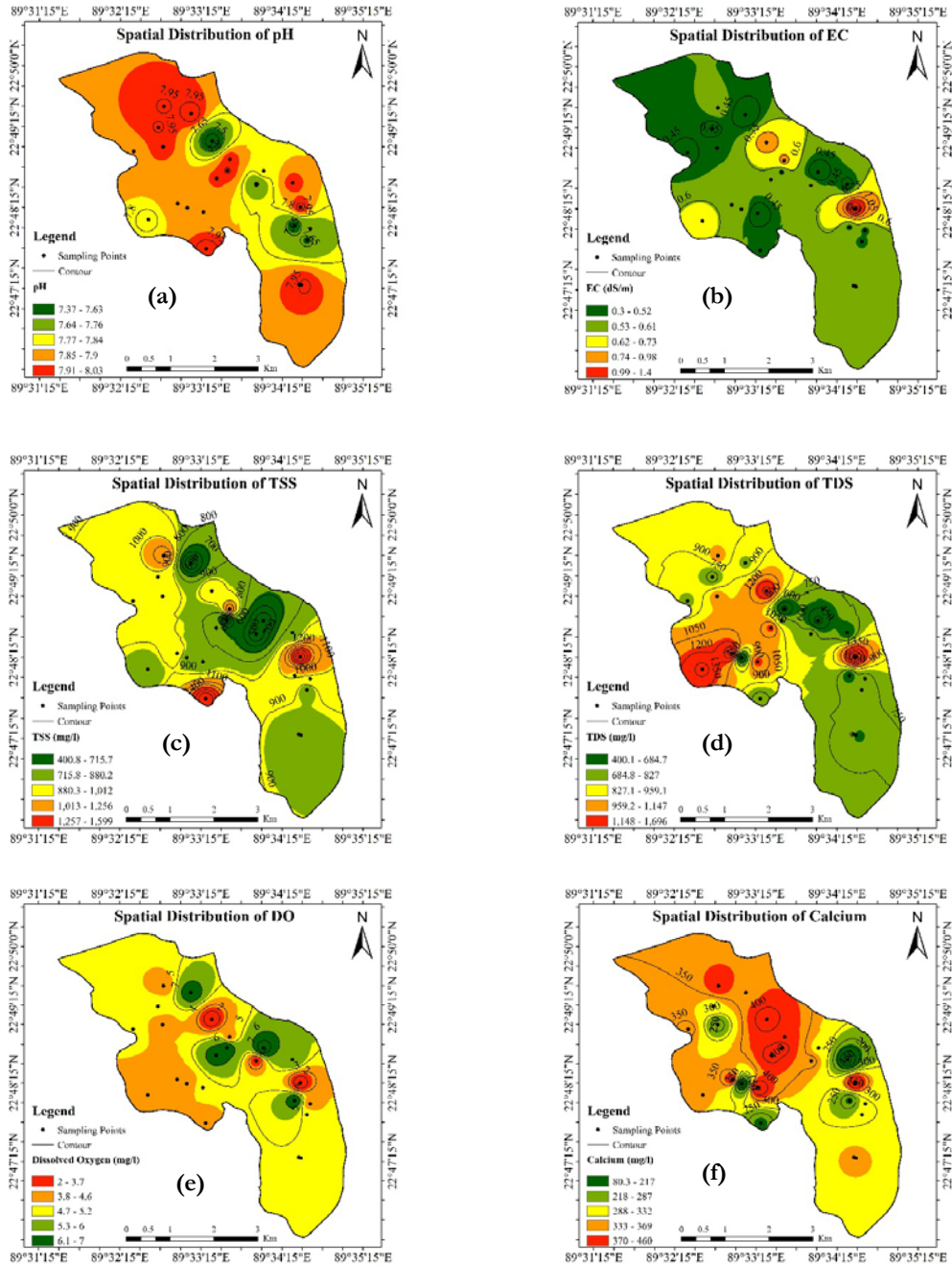


Figure 2. Spatial distribution of a) pH, b) Electrical conductivity (EC), c) Total suspended solids (TSS), d) Total dissolved solids (TDS), e) Dissolved oxygen (DO), and f) Calcium (Ca) in Sonadanga and Kotwali Thanas in Khulna city corporation

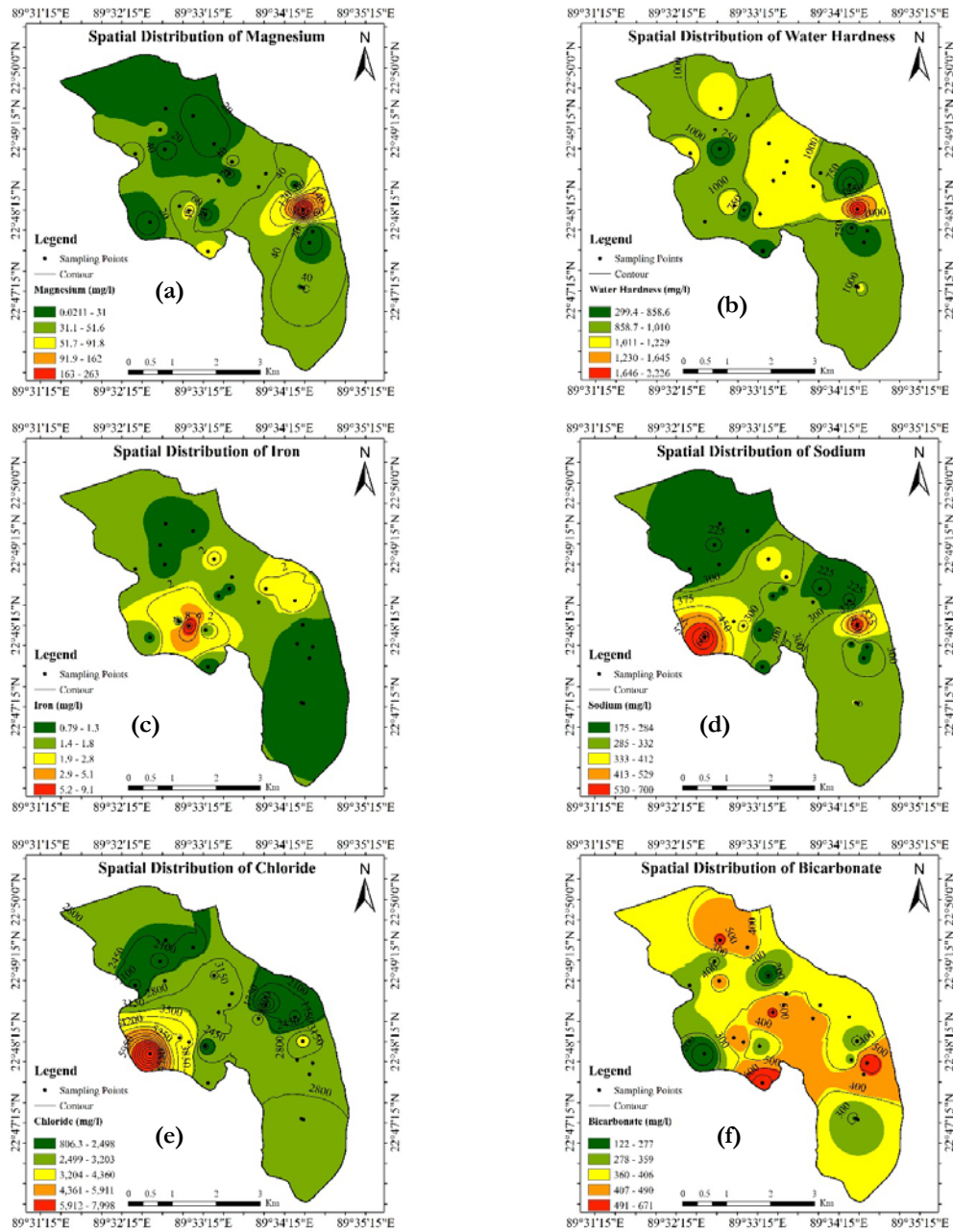


Figure 3. Spatial distribution of a) Magnesium (Mg), b) Water Hardness (WH), c) Iron (Fe), d) Sodium (Na), e) Chloride (Cl), and f) Bicarbonate (HCO₃⁻) in Sonadanga and Kotwali Thanas in Khulna city corporation

The correlation matrix (Figure 5) reveals that pH was negatively correlated with sulfate ($p < 0.001$) and nitrate ($p < 0.001$), and nitrate and sulfate had a significant correlation at $p < 0.01$ with each other. EC was positively correlated with TSS ($p < 0.01$), TDS ($p < 0.01$), Mg ($p < 0.001$), water hardness ($p < 0.001$), Na ($p < 0.001$), and Cl ($p < 0.05$), but negatively correlated with DO ($p < 0.001$). DO also showed a negative correlation with TSS ($p < 0.01$) and TDS ($p < 0.05$). Water hardness, which is considered an important factor for aquaculture, had a positive correlation with calcium ($p < 0.001$), magnesium ($p < 0.001$), sodium ($p < 0.05$) and TDS ($p < 0.01$). Sodium also showed a positive correlation with Cl ($p < 0.001$), Mg ($p < 0.05$), and TDS ($p < 0.01$) and negative correlation with DO ($p < 0.01$) and bicarbonate ($p < 0.05$).

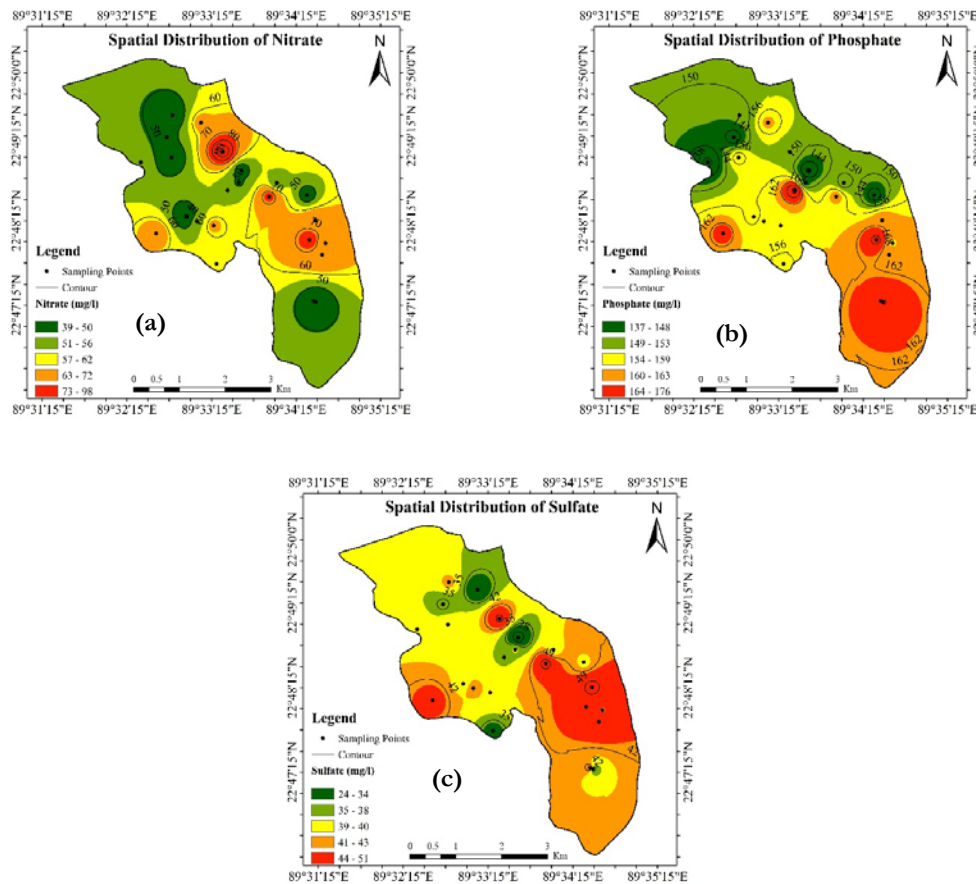


Figure 4. Spatial distribution of a) Nitrate (NO_3^-), b) Phosphate (PO_4^{3-}), and c) Sulfate (SO_4^{2-}) in Sonadanga and Kotwali Thanas in Khulna city corporation.

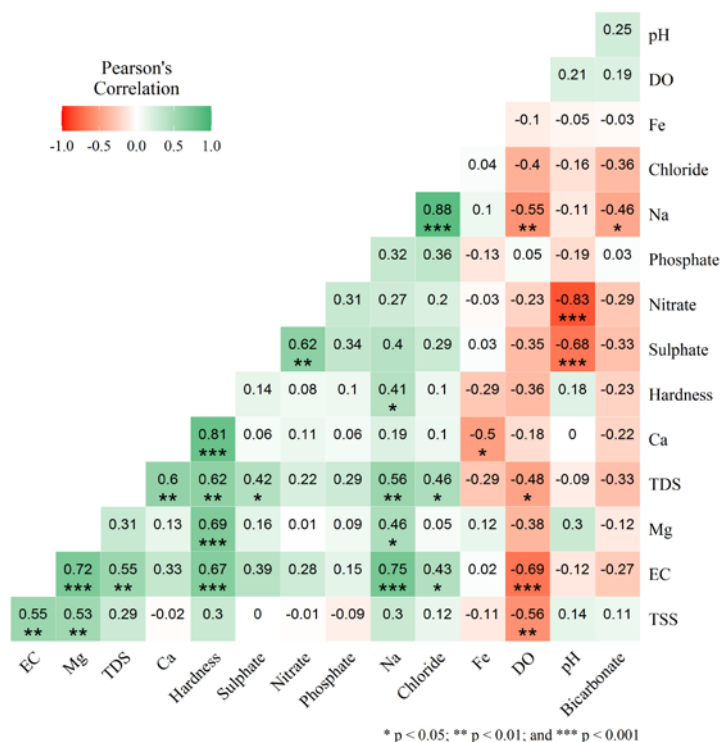


Figure 5. Pearson correlation matrix of different water quality parameters.

Conclusion

Bangladesh has huge water resources by nature, but these resources are being continuously polluted by human activities. Most of the ponds in urban areas are either polluted or filled up for settlements or industrialization. The study indicated that the ponds located in the comparatively developed thanas (Sonadanga and Kotwali) of Khulna City Corporation area were not suitable for fish farming because most of the water quality parameters, except pH and sulfate, were not in a favorable range for fish cultivation. We recommend that actions should be taken to improve the water quality of the ponds located in the study area not only for socio-economic benefits and fish production but also for conserving the water bodies to ensure better environmental health.

References

- Alavi, S.M.H., Cosson, J. 2006. Sperm motility in fishes. (II) Effects of ions and osmolality: a review. *Cell Biology International*, 30(1): 1-14. <https://doi.org/10.1016/j.cellbi.2005.06.004>
- Azim, M.A., Islam, M.R., Hossain, M.B., Minar, M.H. 2012. Seasonal Variations in the Proximate Composition of Gangetic Sillago, *Sillaginopsis panijus* (Perciformes: Sillaginidae). *Middle-East Journal of Scientific Research*, 11 (5): 559-562.
- BER. 2019. Bangladesh Economic Review 2018-19. Economic Adviser's Wing, Finance Division, Ministry of Finance, Government of the People's Republic of Bangladesh.
- Boyd C.E., Tucker, C.S., Somiridhivej, B. 2016. Alkalinity and hardness: critical but elusive concepts in aquaculture. *Journal of World Aquaculture Society*, 47(1): 6-41. <https://doi.org/10.1111/jwas.12241>

- Siddique S., Shoumik B. A. A & Kibria K. Q. (2022). Spatial Distribution and the Assessment of Pond Water Suitability for Aquaculture in the Sonadanga and Kotwali Thanas of Khulna City Corporation. *Khulna University Studies*, Volume 19(1): 55-65
- Boyd, C.E., McNevin, A.A. 2015. Aquaculture, resource use and the environment. John Wiley and Sons, Inc. New Jersey. pp: 366.
- Boyd, C.E., Hanson, T. 2010. Dissolved-oxygen concentrations in pond aquaculture. Accessed on 3-11-2021. Available at: https://www.researchgate.net/publication/281309202_Dissolved-oxygen_concentration_in_pond_aquaculture
- Bremner, J.M., Keeney, D.R. 1965. Steam distillation methods for determination of ammonium, nitrate and nitrite. *Analytica Chimica Acta*, 32: 485-495. [https://doi.org/10.1016/S0003-2670\(00\)88973-4](https://doi.org/10.1016/S0003-2670(00)88973-4)
- Cadmus, P., Brinkman, S.F., May, M.K. 2018. Chronic Toxicity of Ferric Iron for North American Aquatic Organisms: Derivation of a Chronic Water Quality Criterion Using Single Species and Mesocosm Data. *Archives of Environmental Contamination and Toxicology*, 74(4): 605-615. <https://dx.doi.org/10.1007/s00244-018-0505-2>
- DoF, 2019. *Yearbook of Fisheries Statistics of Bangladesh, 2018-19*. Fisheries Resources Survey System (FRSS). Department of Fisheries, Bangladesh: Ministry of Fisheries and Livestock, 2019. Volume 36: 135p.
- El-Bouhy, Z.M., Saleh, G.A., El-Nobi, G., Reda, R.M. 2006. Study on the Effect of Chlorine on Health and Growth of Some Ornamental Fishes. *Zagazig Veterinary Journal*, 34(2): 164-172.
- Elphick, J.R., Davies, M., Gilron, G., Canaria, E.C., Lo, B., Bailey, H.C. 2011. An aquatic toxicological evaluation of sulfate: The case for considering hardness as a modifying factor in setting water quality guidelines. *Environmental Toxicology and Chemistry*, 30(1): 247-253. <https://doi.org/10.1002/etc.363>
- Freeze, A.R., Cherry J.A. 1979. Groundwater. Prentice Hall Inc. New Jersey. pp: 13-73.
- Hatje, V.E.D. and Bidone, J.L. 1998. Maddock, Estimation of the natural and anthropogenic components of heavy metal fluxes in fresh water Sinos river, Rio Grande do Sul state, South Brazil. *Environmental Technology*, 19: 483-487.
- Hickin, E.J. 1995. Hydraulic geometry and channel scour, Fraser River, British Columbia, Canada. pp: 155-167. *In: Hickin, E.J. (Ed.), River Geomorphology*. Wiley, UK.
- Hu, H.Y. 1995. *Aquaculture Survey*. Beijing: China Agricultural Press.
- Hunt, J. 1980. Determination of total sulfur in small amounts of plant material. *Analyst*, 105: 83-83.
- Islam, M.S., Mahmud, M.S., Chowdhury, N., Shamsad, S.Z.K.M. 2009. Water and sediment quality of Fay's Lake, Chittagong. *Dhaka University Journal of Biological Sciences*, 18: 147-158.
- Jackson, M.L. 1973. Soil Chemical Analysis: Advanced Course. Prentice Hall of India Private Limited, New Delhi.
- Jackson, M.L. 1967. Soil Chemical Analysis. 2nd edition. Prentice Hall of India Private Limited, New Delhi.
- Kim, E., Yoo, S., Ro, H.Y., Han, H.J., Baek, Y.W., Eom, I.C., Kom, H.M., Kim, P., Choi, K. 2013. Aquatic Toxicity Assessment of Phosphate Compounds. *Environmental Health and Toxicology*, 28: e2013002. <https://dx.doi.org/10.5620/2Feht.2013.28.e2013002>
- Lahnsteiner, F. 2014. The effect of K⁺, Ca²⁺, and Mg²⁺ on sperm motility in the perch, *Perca fluviatilis*. *Fish Physiology and Biochemistry*, 40(2): 469-480. <https://doi.org/10.1007/s10695-013-9858-7>
- Linton, T.K., Pachego, M.A., McIntyre, D.O., Clement, W.H., Goodrich-Mahoney, J. 2007. J. Development of bioassessment-based benchmarks for iron. *Environmental Toxicology and Chemistry*, 26: 1291-1298. <https://doi.org/10.1897/06-431.1>
- Luo, S., Wu, B., Xiong, X., Wang J. 2016. Effects of total hardness and calcium:magnesium ratio of water during early stages of rare Minnows (*Gobiocypris rarus*). *Comparative Medicine*, 66(3): 181-187.
- Mallya, Y.J. 2007. The effects of dissolved oxygen on fish growth in aquaculture. The United Nations University Fisheries Training Programme, Final Project.

- Rahman, M. S. 1992. Water quality management in aquaculture. BRAC Prokashana, Bangladesh. pp: 84
- Sampaio, L.A., Pissetti, T.L., Morena, M. 2006. Acute toxicity of nitrate in larvae of the marine kingfish *Odontesthes argentinensis* (Teleostei, Atherinopsidae). *Rural Science*, 36(3): 10008-1010.
- Schwarzenbach, G., Biedermann, W., Bangerter, F. 1946. New, Simple Titration Methods for Determining the Hardness of Water. *Helvetica Chimica Acta*, 29: 811-829.
- Spade, S., Bristow, B. 1999. Effects of increasing water hardness on egg diameter and hatch rates of striped bass eggs. *North American Journal of Aquaculture*, 61(3): 263-265. [https://doi.org/10.1577/1548-8454\(1999\)061<0263:EOIWHO>2.0.CO;2](https://doi.org/10.1577/1548-8454(1999)061<0263:EOIWHO>2.0.CO;2)
- Stephan, C.E., Mount, D.I., Hansen, D.J., Gentile, J.R., Chapman, G.A., Brungs, W.A. 1985. Guidelines for deriving numerical standards for the protection of aquatic organisms and their uses. PB85-227049. Springfield.
- Swingle, H.S. 1969. Methods of analysis for waters, organic matter, and pond bottom soils used in fisheries research. Auburn University.
- USEPA. 1976. Quality criteria for water. PB263-943. Washington, DC.
- Yogendra, K. Puttaiah, E.T. 2008. Determination of Water Quality Index and Suitability of an Urban Waterbody in Shimoga Town, Karnataka. Proceeding of Taal 2007: The 21th World Lake Conference. pp: 342-346



ANTIOXIDANT ACTIVITY AND CAPACITY OF SILVER NANOPARTICLES BIOSYNTHESIS OF COMMON FRUITS AQUEOUS EXTRACTS OF THE SUNDARBAN FOREST

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KUS: 22/08: 060222

Manuscript submitted: February 6, 2022

Accepted: May 30, 2022

Abstract

Fruits provide numerous health-promoting polyphenols and antioxidants. The Sundarbans mangrove forest of Bangladesh produces various fruits, and off them ten to twelve are known to be consumed or used as an ingredient in food preparations. These fruits were used in this study to evaluate the total polyphenols (TPH) contents following the method of Folin-Ciocalteu's; and the antioxidant activity by measuring 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radicals scavenging, reducing power and total antioxidant capacity. Additionally, capacity of silver nanoparticles (AgNPs) biosynthesis of the fruits was determined spectrophotometrically. *Sonneratia apetala* fruit showed the highest TPH content (45.7 mg of gallic acid equivalent (GAE)/g powder). The fruit also showed the largest antioxidant activity attributed to the DPPH free radicals scavenging, reducing power, and total antioxidant capacity. Additionally, *S. apetala* fruit showed the highest capacity in the AgNPs biosynthesis (OD, 0.41; 10 mg powder/mL). *Avicennia officinalis*, *Ceriops decandra*, *Heritiera fomes*, and *S. apetala* fruits showed scavenging of 50% DPPH free radicals at 81, 34.7, 61.2, and 33.5 µg powder/mL, respectively. Contents of total polyphenols in these fruits displayed strong positive correlations with reducing power ($r^2 = 0.97$), total antioxidant capacity ($r^2 = 0.85$) and scavenging DPPH free radicals ($r^2 = 0.85$) whereas that for the AgNPs biosynthesis capacity was small ($r^2 = 0.32$). Thus, the aqueous extract of *S. apetala* fruit is the most potential in antioxidant activity and biosynthesis of AgNPs.

Keywords: Antioxidant, mangrove fruits, polyphenols, silver nanoparticles, the Sundarbans

Introduction

Mangrove forest, the Sundarbans is located on the shoreline of the Bay of Bengal in the south-western region of Bangladesh. The forest is composed of diversified flora and fauna that can grow in the juncture of land and sea with numerous stressful conditions such as muddy soil, high salinity, low nutrients, tidal inundation, plenty of sunlight. The world's mangroves cover about 15 million hectares of land in 100 different countries (FAO, 2003). However, mangrove plants produce a variety of secondary metabolites as defense molecules to adapt to these stressful conditions. The metabolites produced in palatable parts of mangrove plants might be free from

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DOI: <https://doi.org/10.53808/KUS.2022.19.01.2208-ls>

toxicity with untapped potentials in therapeutic applications. Various recipes are also prepared using mangrove fruits (Brown, 2006). Accordingly, several mangrove fruits produced in the Sundarbans can be processed and consumed. For an instance, *S. apetala* fruits are extensively consumed in cooked, sauce, pickle, toic etc. Hossain et al., (2013; 2016; 2017) reported the phytochemicals and bioactivities of *S. apetala* fruits. Chen et al., (2009) reported that *S. caseolaris* fruit is non-toxic and popularly consumed. *S. caseolaris* fruits are processed to prepare syrup, pudding and cakes (Brown, 2006; Abeywickrama & Jayasooriya, 2011) because of specific flavors, taste and soft texture.

Various diseases in humans are due to the lack of proper amount of phytochemicals in dietary substances. Dietary phytochemicals generate synergistic effects on health promotion. Among the phytochemicals, the leading molecules are antioxidants, which are involved greatly in preventing various diseases. Earlier reports showed anti-amylase, anti-glucosidase and anti-allergic effects of edible fruits in Bangladesh (Hossain et al., 2008). Also anti-hyperglycemic effects of (+)-catechins were also reported (Hossain et al., 2002). Therefore, it is important to identify potential mangrove fruit(s) as a source of antioxidants for maintaining the public health of coastal people. Moreover, antioxidants are reducing agents, enable them to give up their electrons, and therefore, are used for the biosynthesis of metallic nanoparticles such as silver, gold etc. Biosynthesized silver nanoparticles (AgNPs) showed superior effects to chemically synthesized ones (Ahmed et al., 2016). Tran et al., (2013) showed the uses AgNPs in different fields including environmental, chemical, agricultural and medicinal industries.

This study differs from the previous work of Hosen et al. (2020) in terms of using aqueous extracts of edible mangrove fruits for assaying antioxidant activity. The aqueous extracts were also used to evaluate the biosynthesis potentiality of AgNPs. Then, the relationships between total polyphenols content to antioxidant activity, and also to the ability in AgNPs biosynthesis of the fruits were elucidated.

Materials and Methods

Fruit samples

The mature fruits namely *Aegiceras corniculatum* (L.) Blanco. (black mangrove), *Avicennia officinalis* L. (gray mangrove), *Bruguiera gymnorrhiza* (L.) Lam. (oriental mangrove), *Ceriops decandra* (Griff.) Ding Hou (spurred mangrove), *Heritiera fomes* Buch.-Ham. (sunder), *Nypa fruticans* Wurmb. (nypa palm), *Phoenix paludosa* Roxb. (mangrove date palm), *Sarcobolus globosus* Wall. (sarcobolus), *Sonneratia apetala* Buch.-Ham. (mangrove apple), *S. caseolaris* (L.) Engl. (crabapple mangrove), and *Xylocarpus mekongensis* Pierre (cedar mangrove) were collected from the Sundarbans forest, Bangladesh, from July to September of 2017. After being cut into small pieces, each fruit was shade-dried and then ground into fine powder. The powder was stored tightly in a container at room temperature.

Extraction

Fine powder of each fruit (10 g) was extracted with distilled water (100 mL). The mixture was kept overnight at 30 °C, 150 rpm, and 20 h. The supernatant of the mixture was collected after centrifugation at 3000 rpm for 10 min. The prepared extract (supernatant) was stored at 4°C in a refrigerator.

Measurement of total polyphenol (TPH)

The quantity of total polyphenol (TPH) in the extracts of the fruits was measured following the method of Folin-Ciocalteu (Ough and Amerine, 1988). Diluted extract (1 mL) was added to 50% Folin-Ciocalteu's reagent (1 mL). Then the mixture was mixed with 1 mL sodium carbonate solution (10% w/v) and incubated at room temperature for 1 h. At 700 nm, the spectrophotometric measurement was done.

Determination of DPPH free radicals scavenging

The extract was mixed with 0.5 mL acetic acid buffer (0.5 M, pH 5.5). Then 1 mL of DPPH in ethanol (0.2 mM) and 1.5 mL ethanol aqueous solution (50%, v/v) were added (Blois, 1958). After mixing, the preparation was incubated at room temperature for 40 min in dark. The remaining DPPH was measured spectrophotometrically (Hach DR6000) at 517 nm.

Determination of the reducing power

The extracts were used to determine the reducing power as described (Oyaizu, 1986). Phosphate buffer (0.2 M, pH 6.6, 2.5 mL) and potassium ferricyanide solution (1%, 2.5 mL) were mixed with the extract. The mixture was incubated at 50°C, 20 min. Then the preparation was mixed with 2.5 mL trichloroacetic acid (10%). The supernatant (2.5 mL) was collected after centrifugation (650 g, 10 min), and mixed with 2.5 mL distilled water followed by 0.5 mL ferric chloride (1%). The spectrophotometric measurement was performed at 700 nm. Ascorbic acid was used as a positive control.

Measurement of total antioxidant capacity (TAC)

The antioxidant capacity of the extracts was measured as described (Prieto et al., 1999). For this, a reagent solution was prepared by mixing 28 mM sodium phosphate, 4 mM ammonium molybdate and 0.6 M sulfuric acid. The extract was added to the reagent solution and incubated for 90 min at 90°C. Then the mixture was cool down to room temperature, and optical density (OD) was examined at 695 nm. The TAC was expressed as mg equivalent of ascorbic acid (mg AAE/g powder) and gallic acid (mg GAE/g powder).

Biosynthesis of silver nanoparticles (AgNPs)

Silver nitrate (1 mM) solution was mixed with the extract and the volume was adjusted to 10 mL. Then the mixture was incubated at 30°C for 20 h at 150 rpm. The colour of the reaction mixture changed to yellowish-brown indicating the production of AgNPs (Lukman et al., 2011). Earlier report showed distinctive character of AgNPs at around 440 nm (Lee & Jun, 2019). Hence, the optical density (OD) of the mixture was taken at 440 nm using a spectrophotometer (Hach DR6000). Each experiment was carried out at least three times and the mean values were calculated.

Statistical analysis

The results were expressed as mean \pm SD where n = 3-5. Using SPSS, the analysis of variance (ANOVA) was performed to determine the statistical difference. Significant differences were considered when *P* values < 0.05.

Results and Discussion

Total polyphenols

The quantity of total polyphenols in the aqueous extracts of the fruits in the Sundarbans ranged from 3.1 to 45.7 mg of GAE/g powder (**Table 1**). Fruits of *S. apetala* showed the highest amount of polyphenols (45.7 mg of GAE/g powder) followed by *C. decandra* (40.7 mg of GAE/g powder) and *A. officinalis* (26.8 mg of GAE/g powder). Among the dietary bioactive components, polyphenols are the largest group that exert various health benefits. Scalbert and Williamson (2000) estimated around 1 g of polyphenols is consumed in a day from fruits, vegetables and beverages. These consumed polyphenols probably have synergistic effects both for physical and mental health. Health-promoting anti-microbial, anti-cancer, anti-diabetic, anti-aging and cardio-protective effects of polyphenols were reported (Pandey & Rizvi, 2009; Daglia, 2012). However among the

edible Bangladeshi fruits, non-mangrove fruit of *Emblia officinalis* showed the highest content of polyphenols (89 mg GAE/g powder) (Alam et al., 2021), which is larger than mangrove fruit of *S. apetala* (46 mg GAE/g powder).

Table 1. Total polyphenols, antioxidant activity and AgNPs biosynthesis of the fruits

| Fruits name | Polyphenol (mg GAE/g powder) | DPPH scavenging (% at 0.1 mg powder /mL) | Reducing power (OD) at 1 mg powder/mL | Total antioxidant capacity | | AgNPs (OD) at 10 mg powder/mL |
|------------------------|---------------------------------------|---|--|-------------------------------|-----------------------|-------------------------------------|
| | | | | mg GAE/g powder | mg AAE/g powder | |
| <i>A. corniculatum</i> | 18.3±0.9 ^f | 60.5±0.9 ^c | 0.29±0.03 ^c | 24.6±1.2 ^d | 9.5±0.4 ^d | 0.05±0.01 ^b |
| <i>A. officinalis</i> | 26.8±0.6 ^h | 77.8±0.9 ^d | 0.47±0.05 ^d | 22.9±0.5 ^d | 8.9±0.2 ^d | 0.02±0.01 ^a |
| <i>B. gymnorrhiza</i> | 5.7±0.1 ^b | 21.4±0.7 ^a | 0.13±0.01 ^b | 7.3±0.3 ^a | 2.8±0.1 ^a | 0.06±0.03 ^b |
| <i>C. decandra</i> | 40.7±0.7 ⁱ | 91.1±0.6 ^f | 0.79±0.02 ^e | 29.3±1.7 ^c | 11.3±0.6 ^c | 0.32±0.02 ^c |
| <i>H. fomes</i> | 22.4±0.6 ^g | 85.7±1.2 ^e | 0.47±0.01 ^d | 25.2±1.4 ^d | 9.7±0.5 ^d | 0.23±0.02 ^d |
| <i>N. fruticos</i> | 3.1±0.5 ^a | 24.4±0.3 ^a | 0.04±0.01 ^a | 8.3±0.7 ^b | 3.2±0.2 ^b | 0.11±0.01 ^c |
| <i>P. paludosa</i> | 15.4±0.7 ^e | 48.1±1.5 ^b | 0.26±0.01 ^c | 14.9±0.4 ^c | 5.8±0.2 ^c | 0.15±0.02 ^c |
| <i>S. globosus</i> | 6.2±0.2 ^b | 45.2±2.1 ^b | 0.21±0.02 ^c | 6.1±0.5 ^a | 2.3±0.2 ^a | 0.04±0.01 ^b |
| <i>S. apetala</i> | 45.7±0.9 ^j | 91.9±0.5 ^f | 0.92±0.04 ^f | 31.6±0.9 ^f | 12.2±0.3 ^f | 0.41±0.01 ^f |
| <i>S. caseolaris</i> | 12.1±0.8 ^d | 46.4±2.3 ^b | 0.21±0.01 ^c | 15.4±0.7 ^c | 5.9±0.3 ^c | 0.33±0.02 ^c |
| <i>X. mekongensis</i> | 9.2±0.8 ^c | 24.6±0.8 ^a | 0.09±0.01 ^a | 7.1±0.2 ^a | 2.7±0.1 ^a | 0.09±0.01 ^c |

Ascorbic acid equivalent, AAE; gallic acid equivalent, GAE; 2, 2-diphenyl-1-picrylhydrazyl, DPPH.

Values represent the mean±SD (n=3-5).

Values with different letters (a-j) within the same column differ significantly (P<0.05).

Antioxidant activity

Aqueous extracts of the mangrove fruits were used to determine the antioxidant activity following the scavenging DPPH free radical, reducing power and TAC (Table 1). At the dose of 0.1 mg powder/mL, the highest (92%) scavenging of DPPH radicals was shown by the fruit, *S. apetala* followed by *C. decandra* (91%), *H. fomes* (85.7%) and *A. officinalis* (77.8%) (Table 1). The increase of DPPH scavenging activity with increasing the concentration of *A. officinalis*, *C. decandra*, *H. fomes* and *S. apetala* were also studied (Figure 1) where positive control was ascorbic acid (AA). Depending on the concentration-dependent curves, the inhibitory concentrations 50 (IC₅₀) of *A. officinalis*, *C. decandra*, *H. fomes* and *S. apetala* fruits for DPPH radicals scavenging were calculated. Fruits of *S. apetala* showed the strongest DPPH scavenging activity with IC₅₀ 33.5 µg powder/mL followed by *C. decandra* (IC₅₀, 34.7 µg powder/mL), *H. fomes* (IC₅₀, 61.2 µg powder/mL), and *A. officinalis* (IC₅₀, 81 µg powder/mL) whereas standard ascorbic acid had IC₅₀ of 2.2 µg/mL. The IC₅₀ means the concentration of fruit (µg powder/mL) at which 50% of total DPPH free radicals is scavenged. Therefore, the smaller IC₅₀ value the larger scavenging of DPPH free radicals or antioxidant activity. It has been reported that the hydrogen donating ability of various biomolecules such as cysteine, ascorbic acid, glutathione, tocopherol, aromatic amines and polyhydroxy aromatic compounds reduce and decolorize DPPH (Blois, 1958).

The oxidized ferric iron (Fe^{3+}) is reduced to ferrous iron (Fe^{2+}) with the presence of antioxidant compounds. The potassium ferricyanide reduction method was followed to determine the reducing power of the fruits. It ranged from an optical density (OD) 0.92 to 0.04 at 1 mg powder/mL (Table 1). At that concentration, fruits of *S. apetala* demonstrated the highest reducing power (OD, 0.92) following *C. decandra* (OD, 0.79), and *H. fomes* (OD, 0.47). It is due to their high polyphenols contents, and hydrogen donating capacity as well. Table 1 showed the total antioxidant capacity (TAC) of the fruits as expressed in mg equivalent of ascorbic acid (AAE/g powder), and gallic acid (GAE/g powder). *S. apetala* fruits had the highest (31.6 mg GAE/g powder; 12.2 mg AAE/g powder) antioxidant capacity, which is followed by *C. decandra*. Reportedly, health benefits of dietary substances are associated with TAC. In addition, measurement of TAC is considered to assess diet quality as well as healthy eating because diets with high quality have larger dietary TAC (Salari-Moghaddam et al., 2022).

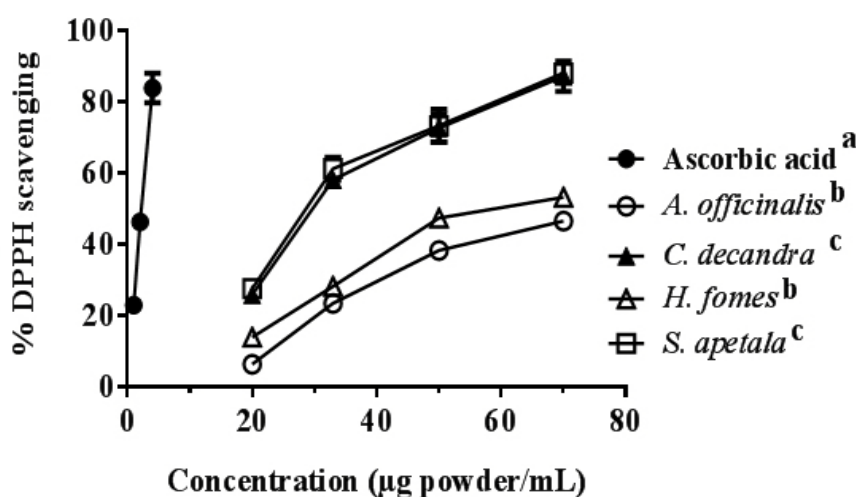


Figure 1. Concentration-dependent DPPH free radicals scavenging activity of the potential fruits.

Biosynthesis of silver nanoparticles (AgNPs)

The Ag^+ in the reaction mixture reduced to AgNPs, which turned the color to yellowish-brown because of surface plasmon resonance (SPR) excitation in metal nanoparticles (Rastogi & Arunachalam, 2011). The formation of yellowish-brown color of the reaction mixture was the indicator of the production of AgNPs. It was recorded by measuring the UV-VIS absorption spectra at 440 nm. Lee & Jun (2019) reported unique character of AgNPs at around 440 nm. The results were expressed in optical density (OD). Among the fruits, *S. apetala* had the highest biosynthesis potentiality of AgNPs (OD, 0.41) at 10 mg powder/mL followed by *S. caseolaris* (OD, 0.33), *C. decandra* (OD, 0.32), *H. fomes* (OD, 0.23) (Table 1). Since *S. apetala* fruit had high reducing power as well as antioxidant activity, it also showed the highest potentiality in the reduction of Ag^+ ions.

Pearson's correlation coefficient

In this study, the highest correlation ($r^2 = 0.97$) was observed between TPH and the reducing power of the fruits. Similar results were also reported for common fruits (Alam et al., 2021) and leafy vegetables (Hossain et al., 2015) in Bangladesh. The total polyphenol of the fruits also exhibited a strong correlation ($r^2 = 0.85$) with total antioxidant capacity, and also with DPPH radical scavenging ($r^2 = 0.82$) (Figure 2). Therefore, the

antioxidant activity of these fruits is highly dependent on the content of total polyphenols. The biosynthesis potential of AgNPs showed a small correlation with total polyphenols ($r^2 = 0.32$), and the reducing power ($r^2 = 0.44$) of the fruits. Hence, not the quantity but the specific type(s) of polyphenols in these fruits was involved in the reduction of Ag for the formation of AgNPs.

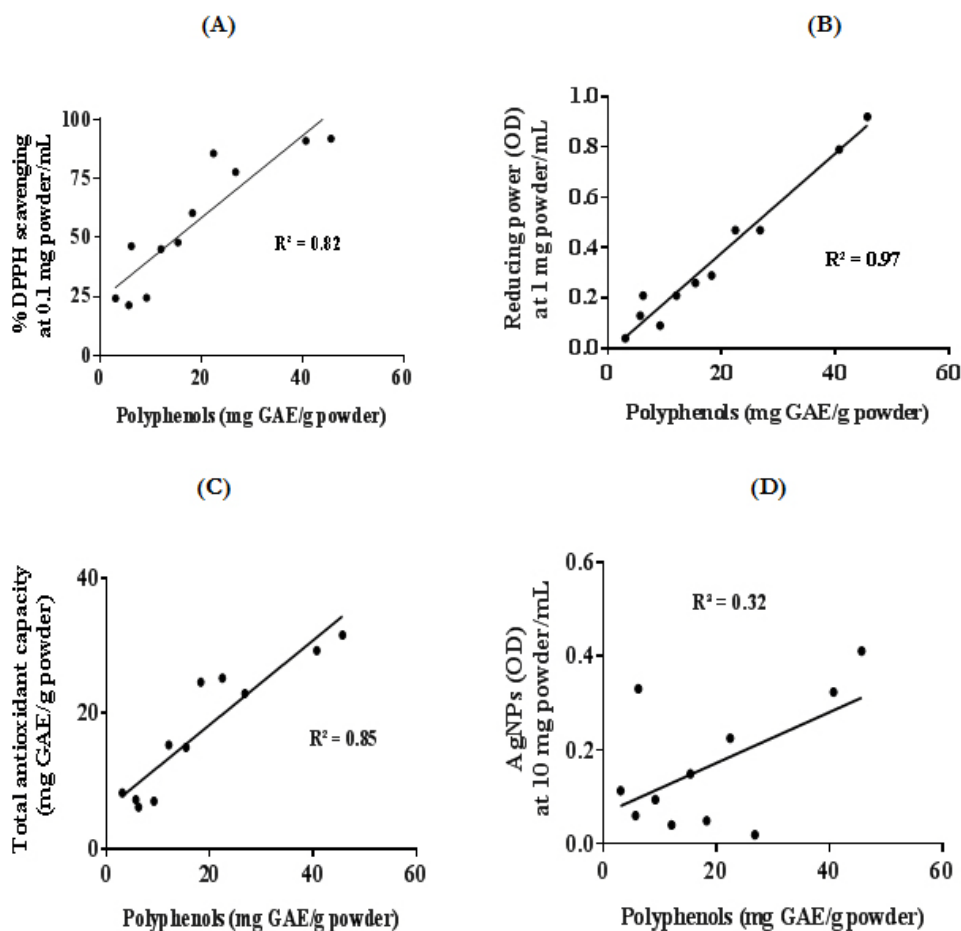


Figure 2. Pearson's correlation of total polyphenols to (A) DPPH scavenging, (B) reducing power, (C) total antioxidant capacity (mg GAE) and (D) AgNPs biosynthesis of the fruits. GAE, gallic acid equivalent.

Conclusion

The present research reveals the high polyphenols content and antioxidant activity of *S. apetala* fruits. The fruit is highly consumed in various forms among the coastal people of Bangladesh without showing any toxicity. Polyphenols as well as antioxidants are known to involve in preventing pathogenesis of various diseases in humans. Therefore, necessary steps should be taken to cultivate the fruit in the salinity prone areas of Bangladesh to promote public health and the environment. In addition, biocompatible AgNPs can be

produced through an eco-friendly, rapid and easy process using the aqueous extract of *S. apetala* fruit. The fruit has the potential to be exploited in nanobiotechnological usages in the future.

Acknowledgment

University Grants Commission of Bangladesh provided the financial support of the research work through grant no. 6(75)/Bio-36/2015, which is acknowledged thankfully.

Author disclosure statement

There is no conflict of interest among the authors.

References

- Hossain, S. J., Basar, M. H., Rokeya, B., Arif, K. M. T., Sultana, M. S., & Rahman, M. H. (2013). Evaluation of antioxidant, antidiabetic and antibacterial activities of the fruit of *Sonneratia apetala* (Buch.-Ham.). *Oriental Pharmacy and Experimental Medicine*, 13(2), 95–102. <https://doi.org/10.1007/s13596-012-0064-4>
- Abeywickrama, W., & Jayasooriya, M. (2011). Formulation and quality evaluation of cordial based on Kirala (*Sonneratia Caseolaris*) fruit. *Tropical Agricultural Research and Extension*, 13(1), 16-18. <https://doi.org/10.4038/tare.v13i1.3132>
- Ahmed, S., Ahmad, M., Swami, B. L., & Ikram, S. (2016). A review on plants extract mediated synthesis of silver nanoparticles for antimicrobial applications: A green expertise. *Journal of Advanced Research*, 7(1), 17–28. <https://doi.org/10.1016/j.jare.2015.02.007>
- Alam, H. I., Biswas, A., Hosen, M. Z., Islam, M. R., & Hossain, S. J. (2021). Antioxidant properties and potentiality of silver nanoparticles biosynthesis of thirty-five edible Bangladeshi fruits. *Bangladesh Journal of Botany*, 50(3), 445–451. <https://doi.org/10.3329/bjb.v50i3.55822>
- Blois, M. S. (1958). Antioxidant determinations by the use of a stable free radical. *Nature*, 181(4617), 1199–1200. <https://doi.org/10.1038/1811199a0>
- Brown, B. (2006). *Cooking with mangroves: 36 Indonesian mangrove recipes*. Mangrove Action Project- Indonesia, pp. 1-44.
- Chen, L., Zan, Q., Li, M., Shen, J., & Liao, W. (2009). Litter dynamics and forest structure of the introduced *Sonneratia caseolaris* mangrove forest in Shenzhen, China. *Estuarine, Coastal and Shelf Science*, 85(2), 241–246. <https://doi.org/10.1016/j.ecss.2009.08.007>
- Daglia, M. (2012). Polyphenols as antimicrobial agents. *Current Opinion in Biotechnology*, 23(2), 174–181. <https://doi.org/10.1016/j.copbio.2011.08.007>
- FAO. 2003. FAO's global estimate of mangroves. <http://www.fao.org/english/newsroom/news/2003/15020-en.html>. Accessed on 17 November 2014.
- Hosen, M. Z., Biswas, A., Islam, M. R., Nazrul, M., Bhuiyan, I., & Hossain, S. J. (2020). Comparison of physicochemical and antioxidant properties of edible fruits in the Sundarbans' mangrove forest, Bangladesh. *Bangladesh Journal of Botany*, 49(3), 671–678. <https://doi.org/10.3329/bjb.v49i3.50009>
- Hossain, S. J., Iftekharuzzaman, M., Haque, M. A., Saha, B., Moniruzzaman, M., Rahman, M. M., & Hossain, H. (2016). Nutrient compositions, antioxidant activity, and common phenolics of *Sonneratia apetala* (Buch.-Ham.) fruit. *International Journal of Food Properties*, 19(5), 1080–1092. <https://doi.org/10.1080/10942912.2015.1055361>
- Hossain, S. J., Islam, M. R., Pervin, T., Iftekharuzzaman, M., Hamdi, O., Mubassara, S., Saifuzzaman, M., & Shilpi, J. A. (2017). Antibacterial, anti-diarrhoeal, analgesic, cytotoxic activities, and GC-MS profiling

Khatun et al., (2022). Antioxidant activity and capacity of silver nanoparticles biosynthesis of common fruits aqueous extracts of the Sundarbans forest. *Khulna University Studies*, Volume 19(1): 66-73

- of *Sonneratia apetala* (Buch.-Ham.) seed. *Preventive Nutrition and Food Science*, 22(3), 157–165. <https://doi.org/10.3746/pnf.2017.22.3.157>
- Hossain, S. J., Kato, H., Aoshima, H., Yokoyama, T., Yamada, M., & Hara, Y. (2002). Polyphenol-induced inhibition of the response of Na⁺/Glucose cotransporter expressed in *Xenopus* oocytes. *Journal of Agricultural and Food Chemistry*, 50(18), 5215–5219. <https://doi.org/10.1021/jf020252e>
- Hossain, S. J., Sultana, M. S., Iftekhazzaman, M., Hossain, S. A., & Taleb, M. A. (2015). Antioxidant potential of common leafy vegetables in Bangladesh. *Bangladesh Journal of Botany*, 44(1), 51–57. <https://doi.org/10.3329/bjb.v44i1.22723>
- Hossain, S. J., Tsujijama, I., Takasugi, M., Islam, M. A., Biswas, R. S., & Aoshima, H. (2008). Total phenolic content, antioxidative, anti-amylase, anti-glucosidase, and antihistamine release activities of Bangladeshi fruits. *Food Science and Technology Research*, 14(3), 261–268. <https://doi.org/10.3136/fstr.14.261>
- Lee, S. H., & Jun, B.-H. (2019). Silver nanoparticles: synthesis and application for nanomedicine. *International Journal of Molecular Sciences*, 20, 865. doi:10.3390/ijms20040865
- Lukman, A. I., Gong, B., Marjo, C. E., Roessner, U., & Harris, A. T. (2011). Facile synthesis, stabilization, and anti-bacterial performance of discrete Ag nanoparticles using *Medicago sativa* seed exudates. *Journal of Colloid and Interface Science*, 353(2), 433–444. doi: 10.1016/j.jcis.2010.09.088.
- Ough, C. S., & Amerine, M. A. (1988). Methods for analysis of musts and wine. 2nd Edn., Wiley & Sons Inc., New York, USA, pp. 196-221. ISBN: 0471627577 978047 1627579
- Oyaizu, M. (1986). Studies on products of browning reaction. Antioxidative activities of products of browning reaction prepared from glucosamine. *The Japanese Journal of Nutrition and Dietetics*, 44(6), 307–315. <https://doi.org/10.5264/eiyogakuzashi.44.307>
- Pandey, K. B., & Rizvi, S. I. (2009). Plant polyphenols as dietary antioxidants in human health and disease. *Oxidative Medicine and Cellular Longevity*, 2(5), 270–278. <https://doi.org/10.4161/oxim.2.5.9498>
- Prieto, P., Pineda, M., & Aguilar, M. (1999). Spectrophotometric quantitation of antioxidant capacity through the formation of a phosphomolybdenum complex: specific application to the determination of vitamin E. *Analytical Biochemistry*, 269(2), 337–341. <https://doi.org/10.1006/abio.1999.4019>
- Rastogi, L., & Arunachalam, J. (2011). Sunlight based irradiation strategy for rapid green synthesis of highly stable silver nanoparticles using aqueous garlic (*Allium sativum*) extract and their antibacterial potential. *Material Chemistry and Physics*, 129(1-2), 558–563. <https://doi.org/10.1016/j.matchemphys.2011.04.068>
- Salari-Moghaddam, A., Nouri-Majd, S., Keshteli, A. H., Emami, F., Esmailzadeh, A., & Adibi, P. (2022). Association between dietary total antioxidant capacity and diet quality in adults. *Frontiers in Nutrition*, 9, 838752. doi: 10.3389/fnut.2022.838752
- Scalbert, A. & Williamson, G. (2000). Dietary intake and bioavailability of polyphenols. *The Journal of Nutrition*, 130(8), 2073S-2085S. <https://doi.org/10.1093/jn/130.8.2073s>
- Tran, Q. H., Nguyen, V. Q., & Le, A. T. (2013). Silver nanoparticles: synthesis, properties, toxicology, applications and perspectives. *Advances in Natural Sciences: Nanoscience and Nanotechnology*, 4(3), 033001. <https://doi.org/10.1088/2043-6262/4/3/033001>



FACTORS AFFECTING JOB STRESS AND IMPACT OF STRESS ON ABSENTEEISM: A STUDY ON THE BANKING SECTOR IN BANGLADESH

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KUS: 21/29: 291121

Manuscript submitted: November 29, 2021

Accepted: January 16, 2022

Abstract

The purpose of the study is to explore the factors affecting stress and the impact of stress on absenteeism in the public and private banking sector in Bangladesh. An attempt was also made to investigate how stress is related to absenteeism. The number of samples was 272. With help of the structured questionnaire data was collected. The research applied the confidence interval, univariate, bivariate, multivariate analysis and t-test analysis for analyzing the collected data. It is found that the degree of stress is high in this sector, and stress factors (workload, role characteristics, time pressure & deadline and non-work pressure) are positively related to employee absenteeism. Whereas it has also found that, stress level is almost same for male and female employees in the banking sector. This study is advantageous to human resource practitioners and managers in developing workplace strategies and in improving positive workplace outcomes from the workplace by reducing stress.

Keywords: Stress, workload, employee, bank, absenteeism

Introduction

Human resources play a vital role on the organizational performance, vis-à-vis, and the organizational performance also depends on humans (Felicio et al., 2014). But employees are unable to perform best because of stress which is becoming a challenging issue for the organizations. Various reasons work behind employees' stress (Kundaragi & Kadakol, 2015). Though there is no work without stress (Dhankar, 2015). Basically, employees working in the financial sector, exposed to great stress at work (Renukamurthy, 2017). In the banking sector, stress is becoming a major issue and matter of concern not only for employees but also for the organization (Jayashree, 2010) because stressors make people absent from the workplace (Brunner et al., 2019). Some factors are working behind the scenes as stress, and those factors are addressed as stressors (Akrani, 2011). However, stressors have an impact on absenteeism because of work-family issues (Kodagoda, 2010) and health-related issues (Malamardi et al., 2015) in the employees of the bank.

Stress is becoming a part and parcel of day-to-day life, and it is omnipresent and unavoidable in our lives (Emmanuel & Collins, 2016). In the case of stress, it affects people not only mentally but also physically (Kundaragi & Kadakol, 2015). During the time of investigation, it has been found that occupational stress in the banking sector is because of work overload, time management, feeling of inequality, job difficulty, lack of

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DOI: <https://doi.org/10.53808/KUS.2022.19.01.2129-m>

role authority, lack of acceptability and support, impatient customers, and stress due to technical problems. These various attributes are influenced by organizational stress (Jayashree, 2010). Yahaya et al. (2010) stressed out that occupational stress makes employees unsatisfied because it hurts employees to build the perception that they are intentionally leaving and absent from the workplace. Moreover, work stress has also linked with the performance (Islam et al., 2019). Managers in the organization faces high work stress (Islam et al., 2017). Along with this, nurses in the hospital also face occupational stress (Islam et al., 2021).

Rizwan et al. (2014) pointed out the stress-related factors, and those are: role conflict, role ambiguity, work overload, and work-family conflict. Akrani (2011) has mentioned thirteen causes of work-related stress, and those are concern for career, role ambiguity and conflict, rotating work shifts, occupational demands, work overload and under load, lack of participation in decision making, and social support, poor working conditions, absence of group cohesiveness, conflict in interpersonal and intergroup, and changes in the organization. Along with this Ahmed et al. (2017) pointed out some factors that contribute to job stress in the garments sector in Bangladesh. Consequently, stress has an impact on psychological health. Those are addressed like anxiety, fatigue, and depression, while headaches and gastrointestinal problems (Beehr & Newman, 1978). As a result of stress, employees lose their ability to carry out tasks, and it has a great impact not only on the working environment but also on the personal lives of employees (Sayed, 1985).

The relationship between stress and absenteeism has been the most concerning issue in the organization (Al Zadjali & Ibrahim, 2021). Stress impacts on the performance of the employee, quality of work, absenteeism, and turnover. Most of the stress related work is based on the banking sector (Al Zadjali & Ibrahim, 2021). Hendrix et al. (1994) conducted a study that was based on the stress-related factors and emphasized the effect of stress on gender. It is also obvious that stress factors vary for gender. In one study, Stevenson and Harper (2006) showed that women are facing more stress in the workplace.

This paper also illustrates the various stress-related theories. Many research studies have been conducted on the relationship between stress and absenteeism through different number of variables (four to five). This research illustrates the relationship between stressors (5 factors that are causing stress) and absenteeism on the public and private banks in Bangladesh. There is no such work available that broadly explains the degree of absenteeism in the organization between males and females because of stress. Therefore, the study is trying to find out the factors which affect stress and the impact of stress on absenteeism in the banking industry in Bangladesh. These also show the relationship between stressors and absenteeism. Finally, this study found the differences in opinion between males and females regarding absenteeism.

Theory and Literature Review

Stress

In 1936, the stress concept was first introduced by Hans Selye. People have defined stress in different ways. Ismail et al. (2009) defined that "stress" originates the Latin word "stingere", which indicates hardships. Stress is defined as "the pressure, force, or strain exerted upon a material object or person which resists these forces and attempts to maintain its original state" (Selye, 1956). People face stress when they move to the other side of something that is contradictory, especially to the external environment (Rizwan et al., 2014). Stress is the reaction of people and it is not wanted because it creates severe pressure upon them. Many key factors are working behind this, such as the work environment, workload, management support, etc. Workplace stress affects employees both physically and mentally (Logan & Ganster, 2005). Bashir & Ismail (2010) listed out eleven elements which are known as antecedents of stress, and those are- overloads, role ambiguity and conflict, responsibility, insufficient feedback, current episodic events, innovation, fast technological change, career development, participation, organizational environment, and structure.

Factors of Stress

Some factors are considered as most responsible for causing stress; these are workload, role characteristics, rotating work shifts, time pressure, and deadlines and non-work pressure.

1. Workload

Work Overload: Work overload occurs when it goes beyond the employees' capacity because of too much work (Margolis et al., 1974). In the banking sector, employees have to work excessive hours, which creates an overload. It is a source of stress. When employees take a small number of days off, it takes the immediate impact of other staff and it creates a workload (Bermingham, 2013). Work overload can be of two types (Bruggen, 2015). These are as follows:

Qualitative Work Overload: Qualitative work overload occurs when the job is complicated in nature and employees are unable to perform because it sometimes goes beyond their capacity.

Quantitative Work Overload: Quantitative work overload occurs when employees are under pressure to manage time. It means that employees need to perform many activities in a prescribed time. So, maintenance of time is a severe issue.

Role Overload: Bacharach et al., (1990) defined role overload as employees' need to complete a task within a specified timeframe, and the organization's demand that employees must complete the task effectively. The result of role overload turns into frustration and anger for the employee (Marini et al., 1995).

2. Role Characteristics

Role conflict is regarded as a stressor which occurs in the workplace when there is a conflict between personal values and job responsibilities, and it does not know what is done by them because work is not clearly defined. So, the irrational role is performed, and the expectations of roles vary from organization to organization (Van Sell et al., 1981). An individual has to fulfill the demands of supervisors and subordinates, though the demands are contradictory (Caplan and Jones, 1975).

Dyer & Quine (1998) explain that role ambiguity exists when an employee has an absence of information about work role, how the requirements of the works can be fulfilled, and a lack of available guidance to ensure that the role is being performed successfully. Jackson & Schuler (1985) illustrate that role ambiguity produces negative outcomes that reduce the confidence of employees and create a sense of anxiety, hopelessness, and depression.

Role stress is the combination of role ambiguity and conflict, and there is doubtfulness about authority, duties, how the work is to be done, whom to report, and the importance of the role which is carried by the employees (Hartline & Ferrell, 1996). Role stress differ from job, person, and situation. When the person is not satisfied with what they do, then they are not interested to do the task in the office, though the role stress has small consequences of the employees for instance habit (Boles et al., 2003).

3. Rotating Work Shift

Different work shifts create stress, and most of the employees want to work the morning shift rather than the night shift. It creates a problem when employees need to adjust their timing. It affects not only the personal lives but also the family lives of the employees (Akrani, 2011). Rotating work shifts happen mostly in the IT sector (Labidi et al., 2014). It creates conflicting constraints. The occurrence of conflicts is stressful and it hampers productivity. Work nature is a major determinant of employees' absences. Earlier studies show the absenteeism rate is higher when shifting is remaining in the industrial sector (Awan, 2013).

4. Time Pressure and Deadline

Bank employees are facing stress because they need to complete their work within a specific date and time, and also for long working hours. That is why an employee is unable to perform better (Svenson & Maule, 1993). The UK-based study indicated that a large portion of workers was unhappy because of the culture of the organization indicates to work overtime, workload, and have the pressure of attending meetings for the attainment of production targets and deadlines (Townley, 2000).

Table 1. Stress related theories

| Theory | Summery |
|--------------------------------|--|
| Social Exchange Theory | Social exchange theory is used to understand the behavior of individuals in the workplace (Homans, 1958), where prevailing is the ongoing relationship with the social network that generates the employee's responsibility in the workplace (Richard & Emerson, 1976). |
| Job Demand-Control Model (DCM) | Karasek (1979) mentioned that stress comes during the time of the learning process. In the case of job stress, it occurs when the expectations of the work are high and employees are not able to control the job. |
| Cognitive Theory | Cox (1987) mentioned the process of stress. Here, he also mentioned that when a person is in a stressful situation, then psychological changes occur in a human being. |
| Conservation of Resources | The main reason for stress is tension and a gap exists between what is done and expected. Hobfoll (1989) stated that resources for a job are connected with the working structure, organizational offering, task structures, and interpersonal relationships. |
| Job Characteristics Theory | Ganster and Schaubroeck (1991) pointed out that stressors indirectly affect human health and that there is a relationship between emotional and psychological responses and experiences at work. |
| The Cybernetic Theory | The sequential situation is taken into account between stress and stressor (Cummings and Cooper, 1998). |
| Role Stressors | Jex & Thomas (2003) pointed out the role stressors, for instance, role ambiguity, role overload, and role conflict, and they are used as an indicator of the behavior of the employee. |
| Control Theory | Spector (1998) illustrates the control theory, which indicates that people don't have the power to maintain their workload, enjoy independence, and schedule for work. |
| Family Stress | Patterson (2002) illustrates the family stress theory from the perspective of family resilience. |
| Cognitive Activation | Ursin & Eriksen (2004) discuss the theory of stress on cognitive activation. The responses to stress depend on the expectations and responses to the outcomes. |
| Leader-Member Exchange | The idea is based on social exchange and making a role. With the help of the Leader-member exchange theory, this shows the relationship with stress in the workplace, where the involvement of job and role conflict plays the mediating role (Lawrence & Kacmar, 2012). |

| | |
|------------------------|--|
| Minority Stress | Mayer (2003) introduced the minority of stressors that have a noticeable impact on health, especially the mental health and wellbeing of those people. |
| Person–Environment Fit | Based on the person-environment fit theory, stress does not only come from the environment and the person, rather it depends on the fitness of the worker within the characteristics of work and worker (French & Kahn, 2013). |

5. Non -Work Pressure

Stress happens because of family conflicts, life changes (divorce of husband or wife, illness of family members, death of a spouse or child, and so on (Cunradi et al., 2005). A family problem at home increases when work and family issues contradict each other because both are interrelated and interdependent and it affects the quality of life of employees (Sarantakos, 1996). Russo & Vitaliano (1995) mentioned that employees face a stressful situation in the workplace that turns into either chronic stress at home or other major life stressors. Workplace stressor creates chronic stress or following this stress is in connection with other major life stressors and it turns into employee absenteeism from the workplace.

Stress as a Factor of Absenteeism

The term "absenteeism" originates from the Latin word "absentia" (Mashonganyika, 2004). "Absenteeism occurs when an employee fails to report for the scheduled work (Schappi, 1988)". Nicholson (1993) argues that work-life factors and personal factors are responsible for workplace absenteeism, and this is taken into account in the organization when it creates complexity.

CIPD (Charter Institute of Personnel and Development, 2016), mentioned one of the most common reasons for an employee's absence for the long term, because of stress-related matters. Stress occurs when an employee's behavioral, psychological, and physiological responses are not reaching an equilibrium point, as a result of unfulfilled demand and tension (Palmer S, 1989).

Petrus and Kleiner (2003) described the importance of stress in our day-to-day life but it becomes risky when an employee faces a higher level of stress and its effect on individuals' daily activities. Based on the study, it has been found that stress in the workplace can be harmful and various factors accompany it:

1. To allow employees little control over a job because an employee does not know how the job is to perform while the employees' task is a demanding role in the organization.
2. The working environment is unsafe.

According to the CIPD HR practices in Ireland 2019 survey, 54% of respondents believe that stress is increasing, 44% believe that stress is a critical factor that leads to absenteeism in the organization, 20% of the organization claims that absenteeism is increasing in the last 12 months, 28% of respondents believe that ineffective management or leadership is also responsible for absenteeism, and 38% of employees believe that absenteeism is increasing.

Stress related illness which may cause absenteeism

Selye (1956) is known as the "father of stress research." He made a study of specific disease symptoms and signs. The patients had common things like that they don't have an appetite, they look tired, they are losing weight, and they have no mood to go to work. These symptoms expressed that they are just being sick. Stress-related illness happens because of negative stress or distress and it can affect the absenteeism of the workforce (Olofsson et al., 2003). Adams (1987) suggested that absenteeism was tied to stress-related illnesses in about 70% of the employees.

Work stress is linked with health related outcomes (Steinisch et al., 2013). Along with this job stress is associated with mental health of the employees (Rahman, 1989). The stressful situation happens when an employee realizes that he has been facing pressure because of handling more responsibility than their

recognition and handling this responsibility for a longer period without any interval so it impacts employees' mental, physical health and behavior (Health & Safety Executive, 2001). IBEC (2011) reported that the main cause of employee short absences in the organization was minor illness. Symptoms of minor illnesses include colds, migraines, flu, headaches, and stomach upset (Kinman, 2019). Harvey and Nicholson (1999) also said that minor illness influences absence.

Proposed Research Model

This model is illustrated on the basis of recent literature and is to deal with stress-related variables and absenteeism (Kim & Garman, 2003). The earlier research indicates that role stress is the reason for role conflict (Jackson & Schuler, 1985), and quantitative workload (Siswanto et al., 2019). The extra organizational variables are depicted as directly affecting life stress. In the previous research, it has pointed out that life stress comes from the family and spouse relationship (Frone et al., 1991) and financial problems (Greenberg & Valletutti, 1980). In a particular study, it has found that poor family-spouse relationships generally form marital difficulty, and because of that women are basically suffering from one side depression (Hendrix et al., 1994). Hill & Trist (1955) first suggested work-related stress results in absenteeism.

Earlier studies show that where shifts are practiced, a high rate of absenteeism is observed in the industrial sector (Kleiven et al., 1998). According to Rose (2003) time itself creates stress for the employees. The family problem at home increases the lack of matching of work-family issues because both are interrelated and interdependent that affects the quality of life of employees (Sarantakos, 1996).

Personal life stress sometimes comes from the unsettled demand of the environment, for instance, divorce, illness, and the death of family members (Aldwin, 2018). Rahe (1974) found that people who face high stress in the workplace are more illness prone than low-stress people. Johnson & Sarason (1979) mentioned that people face life stress because of diabetes, cardiac problems, pregnancy complications, birth complications, and tuberculosis. Workload, rotating work shifts, time pressure, and the deadline imposed by job stress (Akrani, 2011). The combination of both job stress and life stress makes the employee ill, which sometimes forces employees to be absent in the organization (Figure 1).

With the help of research model the study represents some hypothesis

- H₁ Role Characteristics has an impact on absenteeism.
- H₂ Workload has an impact on absenteeism.
- H₃ Rotating Work Shift has an impact on absenteeism.
- H₄ Time Pressure & Deadline has an impact on absenteeism.
- H₅ Non-Work Pressure has an impact on absenteeism.
- H₆ Gender differences have an impact on being absent from the workplace.

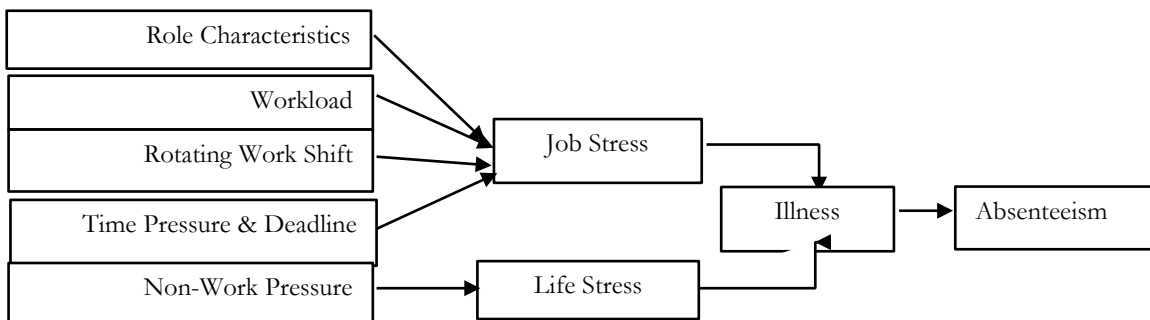


Figure 1. Conceptual Research Model

Table 2. Convergent validity indicators

| Workload Inter-Item Correlation Matrix | | | | | |
|---|-------|-------|-------|-------|-------|
| | WL1 | WL2 | WL3 | WL4 | WL5 |
| WL1 | 1.000 | -.013 | .163 | .204 | .265 |
| WL2 | -.013 | 1.000 | .236 | .225 | .027 |
| WL3 | .163 | .236 | 1.000 | .334 | .295 |
| WL4 | .204 | .225 | .334 | 1.000 | .405 |
| WL5 | .265 | .027 | .295 | .405 | 1.000 |

| Role characteristics Inter-Item Correlation Matrix | | | | | |
|---|-------|-------|-------|-------|-------|
| | RC1 | RC2 | RC3 | RC4 | RC5 |
| RC1 | 1.000 | .629 | .339 | .069 | .346 |
| RC2 | .629 | 1.000 | .470 | .218 | .352 |
| RC3 | .339 | .470 | 1.000 | .160 | .299 |
| RC4 | .069 | .218 | .160 | 1.000 | .249 |
| RC5 | .346 | .352 | .299 | .249 | 1.000 |

| | NPW1 | NPW2 | NPW3 | NPW4 | NPW5 |
|------|------|------|------|------|-------|
| NPW1 | 1 | .651 | .288 | .171 | 0.211 |
| NPW2 | .651 | 1 | .159 | .155 | 0.238 |
| NPW3 | .288 | .159 | 1 | .679 | 0.528 |
| NPW4 | .171 | .155 | .679 | 1 | 0.437 |
| NPW5 | .211 | .238 | .528 | .437 | 1 |

| Time pressure and deadline Inter-Item Correlation Matrix | | | | | |
|---|-------|-------|-------|-------|--|
| | TP1 | TP2 | TP3 | TP4 | |
| TP1 | 1.000 | .690 | .343 | .238 | |
| TP2 | .690 | 1.000 | .269 | .237 | |
| TP3 | .343 | .269 | 1.000 | -.018 | |
| TP4 | .238 | .237 | -.018 | 1.000 | |

| Rotating work shift Inter-Item Correlation Matrix | | | | |
|--|-------|-------|-------|--|
| | RW1 | RW2 | RW3 | |
| RW1 | 1.000 | .126 | .518 | |
| RW2 | .126 | 1.000 | .394 | |
| RW3 | .518 | .394 | 1.000 | |

Methodology

The study is quantitative in nature and descriptive research design where structured questionnaires have been used to fulfill the objectives of the research. The target population of the study is public and private banks in Bangladesh. According to CEIC (Census and Economic Information Center), they enlisted 1,807,784 employees working in the banking sector in Bangladesh (Ceicdata.com, 2018). A convenience sampling technique is used to select the sample of the respondents. Data are collected from people who are conveniently available (Sekaran & Bougie, 2019). For determination of sample size Kotrlík & Higgins (2001) formula was used.

$$n = \left[\frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \frac{[z^2 \times p(1-p)]}{e^2} \times N} \right]$$

The sample size is considered to be 272 for this survey on the basis of sample size formula. The questionnaire survey method is used for primary data collection. Data has been collected from different public and private bank employees in Dhaka and Khulna, Bangladesh.

To design the questionnaire, five-point Likert scale is used. The first section is used to collect the demographic information of the employees. The second section has six (6) different parts, designed with forty-seven statements. In order to measure the concept, pre-established items have been used. Five items are used to measure the workload, ten items are used to measure the role characteristics (Rizzo et al., 1970), nine items are used to illustrate the rotating work shift (Doty, 2011), four items measure time pressure and deadline (Matteson and Ivancevich's, 1987), fourteen items to assess the non-work pressure that results from non-work pressure (Stephens and Sommer, 1996). Five items are used to measure the absenteeism of bank employees (Wongchanwuth, 2009).

In analyzing the data Statistical Package for Social Sciences software 16.0 is used. Descriptive, inferential, and T-test analysis have been implemented on the data. Inferential analysis is used at the latter stage to identify correlation and regression among the variables and indicators.

Data Analysis and Findings

The reliability value of the data set is 0.804 which is above the suggested value of 0.70 and it is marked as good (Tavakol & Dennick, 2011). So it is cleared by the value shown by Cronbach's Alpha is the data used for this research is reliable (Table 2).

Carlson and Herdman (2012) convergent validity indicates that the indicators which is supposed to measure the identical construct and represents that which is related to each other. In this case correlation coefficient value is remaining between -1 to +1 which indicates positive or negative correlation.

In the case of discriminate validity test to test correlations exits from 0.0 to 1.0. These variables are low correlation with each other means so there is a good discriminate validity (Zait & Berteau, 2011).

Table 3. Discriminate validity indicators

| Items | Workload | Role Characteristics | Rotating work shift | Time pressure and deadline | Non-work pressure | Absenteeism |
|--------------------------|----------|----------------------|---------------------|----------------------------|-------------------|-------------|
| Workload | | | | | | |
| Role Characteristics | .282 | | | | | |
| Rotating work shift | .405 | .141 | | | | |
| Time pressure & deadline | .495 | .249 | .486 | | | |
| Non-work pressure | .285 | .276 | .489 | .607 | | |
| Absenteeism | .510 | .466 | .376 | .571 | .485 | |

* Correlation is significant at the 0.05 level (2-tailed).

Univariate Analysis and Findings

Univariate Analysis is descriptive in nature and data is illustrated in frequency and percentage.

Table 4. Univariate analysis of factor affecting stress

| Variables | Mean | Std. Deviation |
|----------------------------|------|----------------|
| Workload | 3.67 | .57 |
| Role Characteristics | 3.77 | .56 |
| Rotating work shift | 2.97 | .83 |
| Time Pressure and Deadline | 3.35 | .66 |
| No work Pressure | 3.46 | .65 |
| Absenteeism | 3.63 | .75 |

Workload: The mean workload is 3.67 (Table 4) which refer to the average number of respondents are agreeing about this matter. The standard deviation is .57 which means that the dispersion of respondents' answers is .59 above or below the mean.

Role characteristics: The mean of role characteristics is 3.8 which refer to the average respondents agreeing about this matter. The standard deviation is .56 which means that the dispersion of respondents' answers is .56 above or below the mean.

Rotating work shift: The mean of rotating work shift is 2.97 which refer to that average respondents are neutral about this matter. The standard deviation is .83 which means that the dispersion of respondents' answers is .83 above or below the mean.

Time pressure and deadline: The mean of time pressure and the deadline is 3.35 which refer to that average respondents are neutral about this matter. The standard deviation is .66 which means that the dispersion of respondents' answers is .66 above or below the mean.

Non-work pressure: The mean of non-work pressure is 3.46 which refer to that average respondents are neutral about this matter. The standard deviation is .65 which means that the dispersion of respondents' answers is .65 above or below the mean.

Absenteeism: The mean of absenteeism is 3.63 which refers to the average number of respondents who agree about this matter. The standard deviation is .75 which means that the dispersion of respondents' answers is .75 above or below the mean.

Bivariate Analysis and findings

The correlation between workload and absenteeism is 0.510, which indicates a moderately positive relationship within variables (Table 5). The correlation between role characteristics and absenteeism is 0.466, which indicates a weak positive relationship. The correlation between rotating work shift and absenteeism is 0.376, which indicates a weak positive relationship. The correlation between time pressure and deadline with absenteeism is 0.571, which indicates that there is a moderate positive relationship. The results show that the correlation between non-work pressures and absenteeism is 0.485 that is a weak positive relationship. The correlation coefficient is strategically significant when the value is less than 0.001. In this case, the P-value of all the factors (workload, role characteristics, rotating work shift, time pressure, and deadline, and non-work pressure) with absenteeism is significant at 0.000. So all are strategically significant (Table 5).

Table 5. Correlation between workload, role characteristics, rotating work shift, time pressure and deadlines, and non-work pressure with absenteeism

| | | Work load | Role Characteristics | Rotating work shift | Time pressure and deadline | Non-work pressure | Absenteeism |
|--------------------------|---------------------|-----------|----------------------|---------------------|----------------------------|-------------------|-------------|
| Workload | Pearson Correlation | 1 | | | | | |
| | P value | | | | | | |
| Role Characteristics | Pearson Correlation | .282** | 1 | | | | |
| | P value | .000 | | | | | |
| Rotating work shift | Pearson Correlation | .405** | .141* | 1 | | | |
| | P value | .000 | .020 | | | | |
| Time pressure & deadline | Pearson Correlation | .495** | .249** | .486** | 1 | | |
| | P value | .000 | .000 | .000 | | | |
| Non-work pressure | Pearson Correlation | .285** | .276** | .489** | .607** | 1 | |
| | P value | .000 | .000 | .000 | .000 | | |
| Absenteeism | Pearson Correlation | .510** | .466** | .376** | .571** | .485** | 1 |
| | P value | .000 | .000 | .000 | .000 | .000 | |

* Correlation is significant at the 0.05 level (2-tailed)

Multivariate Analysis and Findings

A multivariate data analysis technique is used to analyze more than one variable, and this analysis is known as regression analysis.

Table 6 shows that R square is 0.487, meaning that the predictor factors of stress can explain 48.7% of absenteeism.

Table 6. Model summary

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|------|----------|-------------------|----------------------------|
| 1 | .705 | .496 | .487 | .53947 |

Predictors: (Constant), Workload, Role characteristics, Rotating work shift, Time pressure and deadline, Non-work pressure.

Dependent Variable: Absenteeism

The regression results (Table 7) of this study indicates a significant positive relationship between workload and absenteeism, with an estimated value of 0.238 and (p 0.0001). According to these findings, workload accounts for 23.8% of absenteeism, followed by time pressure and deadline (27.2%), workload (23.8%), non-work pressure (16%), rotating work shift (2.9%). Workload in relation to employee absenteeism is .000, explaining that when a unit raise in workload would lead to an increase in employee absenteeism by a factor of 4.525.

Table 7. Impact of stress on absenteeism by linear regression model

| Model | Unstandardized Coefficients | Std. Error | Standardized Coefficients | t value | P value |
|----------------------------|-----------------------------|------------|---------------------------|---------|---------|
| (Constant) | -.720 | .286 | | -2.519 | .012 |
| Workload | .317 | .070 | .238 | 4.525 | .000 |
| Role Characteristics | .379 | .062 | .282 | 6.070 | .000 |
| Rotating work shift | .026 | .048 | .029 | .546 | .586 |
| Time Pressure and Deadline | .310 | .070 | .272 | 4.438 | .000 |
| Non-work Pressure | .186 | .068 | .160 | 2.743 | .006 |

The regression results of this study reveal a significant positive relationship between the role characteristics and absenteeism, with an estimated value of 0.282 and (p 0.0001). Based on the results, role characteristics contribute 28.2% to absenteeism, followed by Time pressure and deadlines (27.2%), Workload (23.8%), Non-work pressure (16%), and Rotating work shift (2.9%). Role characteristics in relation to employee absenteeism is .000, explaining that when a unit raises in role characteristics would lead to an increase in employee absenteeism by a factor of 6.070.

The regression results of this study showed no relation between rotating work shift and absenteeism, with an estimated value of .029 and p 0.586. Based on the analysis, a rotating work shift contributes 2.9% to absenteeism. Rotating work shift in relation to employee absenteeism is .000, explaining that when a unit raises in time pressure and deadlines would lead to an increase in employee absenteeism by .546.

The regression results of this study reveal a significant positive relationship between time pressure and deadline with absenteeism. The estimated value is .272 and (p 0.0001). From these results, time pressure and deadlines contribute 27.2% to absenteeism. Time pressure and deadlines in relation to employee absenteeism is .000, explaining that when a unit raises in time pressure and deadlines would lead to an increase in employee absenteeism by 4.438.

The regression results reveal a significant positive relationship between non-work pressure and absenteeism. The estimated value is .160 and (p 0.000). In this result, non-work pressure contributes to 27.2% absenteeism. The non-work pressure in relation to employee absenteeism is .000, explaining that when a unit raises in non-work pressure would lead to an increase in employee absenteeism by 2.743.

Gender differences in absenteeism

To find out any gender differences based on the dimension of the employee absent from the workplace, an independent t-test with a significance level of 0.05 was used in this study.

Table 8. Impact of gender on absenteeism

| Gender | Frequency | Mean | Std. Deviation | t value | P Value |
|------------------------------------|-----------|------|----------------|---------|---------|
| Employee absent from the workplace | Male | 192 | 1.4583 | 1.189 | .235 |
| | Female | 80 | 1.5375 | | |

Table 8 represented that the employees were absent from the workplace, and no gender differences were observed. When the P-value is less than 0.05 then indicates that the null hypothesis is not rejected. It indicates that male and female employees are facing absenteeism in the banking sector. The results are explored to validate H₆.

Conclusion

This prospective study is to explore the stress factors and the impact of stressors on absenteeism and found strategically significant relation to illness. Stress factors (workload, role characteristics, rotating work shift, time pressure, and deadlines) are positively related to employee absenteeism. There are no differences in the perception of gender on the matter of absence from the workplace. Therefore, the findings of this study support all hypotheses. The study is helpful for the banking sector of Bangladesh in tracking the stress factors and providing guidelines for managers to minimize stress. Managerial implications help the organization to minimize stress, therefore, senior management attitudes should be positive in this matter. If the authority uses job analysis data, the authority can identify the critical points in the workflow and can take effective measures to smooth the work activities. The study findings suggest that future research could be on the same topic but with a wider scope, such as covering other industries like telecommunications, university teachers, and multinational companies.

Acknowledgments

The research was done with the researchers' own self-funding support. We are thankful to those who have invested their valuable time to fill up the questionnaire. Along with this, special thanks go to the editor who put their valuable effort into making the research better.

References

- Adams, G. T. (1987). Preventive law trends and compensation payments for stress-disabled workers. *Work stress: Health care systems in the workplace*, 235-245.
- Ahmed, M., Rahman, M. Z., & Sogra, K. J. (2017). Factors Contributing To Job Stress of Garments Sector Manager in Bangladesh. *Developing Country Studies*, 7(2), 180-189.
- Akrani, G. (2011). What is stress? Meaning, definition, and causes of stress. *Industrial Psychology*. [Http://kalyan-city.blogspot.com](http://kalyan-city.blogspot.com). Retrieved October, 13, 2014.
- Al Zadjali, R. S., & Ibrahim, O. A. (2021). The impact of absenteeism in banking sector in Oman. *International Review of Management and Marketing*, 11(2), 23.
- Aldwin, C. M. (2018). The elders' life stress inventory: Egocentric and nonegocentric stress. In *Stress and coping in later-life families* (pp. 49-69). Taylor & Francis.
- Awan, W. A. (2013). Determinants of shift work impacting job satisfaction: A study on service sector organizations in Pakistan. *International Journal of Research in Business and Social Science*, 2(4), 49.
- Bacharach, S. B., Bamberger, P., & Conley, S. C. (1990). Work processes, role conflict, and role overload: The case of nurses and engineers in the public sector. *Work and Occupations*, 17(2), 199-228.
- Bashir, U., & Ismail Ramay, M. (2010). Impact of stress on employees' job performance: A study on banking sector of Pakistan. *International Journal of Marketing Studies*, 2(1), 122-126.
- Beehr, T. A., & Newman, J. E. (1978). Job stress, employee health, and organizational effectiveness: A facet analysis, model, and literature review. *Personnel psychology*, 31(4), 665-699.
- Bermingham, C. (2013). *Employee's understanding of workplace absenteeism and the investigation of stress as a contributing factor* (Doctoral dissertation, Dublin, National College of Ireland).
- Boles, J. S., Wood, J. A., & Johnson, J. (2003). Interrelationships of role conflict, role ambiguity, and work-family conflict with different facets of job satisfaction and the moderating effects of gender. *Journal of Personal Selling & Sales Management*, 23(2), 99-113.
- Bruggen, A. (2015). An empirical investigation of the relationship between workload and performance. *Management Decision*.

- Brunner, B., Igit, I., Keller, A. C., & Wieser, S. (2019). Who gains the most from improving working conditions? Health-related absenteeism and presenteeism due to stress at work. *The European Journal of Health Economics*, 20(8), 1165-1180.
- Caplan, R. D., & Jones, K. W. (1975). Effects of work load, role ambiguity, and type A personality on anxiety, depression, and heart rate. *Journal of Applied Psychology*, 60(6), 713.
- Carlson, K. D., & Herdman, A. O. (2012). Understanding the impact of convergent validity on research results. *Organizational Research Methods*, 15(1), 17-32.
- Cassel, J. (1974). Psychosocial processes and “stress”: Theoretical formulation. *International Journal of Health Services*, 4(3), 471-482.
- Ceicdata.com. (2018). *Bangladesh banking sector: Number of employee*; <https://www.ceicdata.com/en/bangladesh/banking-sector-number-of-employee>.
- Chartered Institute of Personnel Development (2016). *Absence management 2016*. https://www.cipd.co.uk/Images/absence-management_2016_tcm18-16360.pdf
- Cox, T. (1987). Stress, coping and problem solving. *Work & Stress*, 1(1), 5-14.
- Cummings, T. G., & Cooper, C. L. (1998). A cybernetic theory of organizational stress. *Theories of Organizational Stress*, 101-121.
- Cunradi, C. B., Greiner, B. A., Ragland, D. R., & Fisher, J. (2005). Alcohol, stress-related factors, and short-term absenteeism among urban transit operators. *Journal of Urban Health*, 82(1), 43-57.
- Dhankar, S. (2015). Occupational stress in banking sector. *International Journal of Applied Research*, 1(8), 132-135.
- Doty, P. A. (2011). Exploring the sleeping experiences of shiftwork nurses.
- Dyer, S., & Quine, L. (1998). Predictors of job satisfaction and burnout among the direct care staff of a community learning disability service. *Journal of Applied Research in Intellectual Disabilities*, 11(4), 320-332.
- Emmanuel, A. O., & Collins, A. (2016). Relationship between occupational stress and demographic variables: A study of employees in a commercial bank in Ghana. *British Journal of Applied Science & Technology*, 12(2), 1.
- Felício, J. A., Couto, E., & Caiado, J. (2014). Human capital, social capital and organizational performance. *Management Decision*.
- French, J. R. P., & Kahn, R. L. (2013). A programmatic approach to studying the industrial environment and mental health. *Industrial Organizations and Health*, 1, 20-73.
- Frone, M. R., Russell, M., & Cooper, M. L. (1991). Relationship of work and family stressors to psychological distress: The independent moderating influence of social support, mastery, active coping, and self-focused attention. *Journal of Social Behavior and personality*, 6(7), 227.
- Ganster, D. C., & Schaubroeck, J. (1991). Work stress and employee health. *Journal of management*, 17(2), 235-271.
- Greenberg, S. F., & Valletutti, P. J. (1980). *Stress and the helping professions*. Baltimore: PH Brookes.
- Hartline, M. D., & Ferrell, O. C. (1996). The management of customer-contact service employees: An empirical investigation. *Journal of Marketing*, 60(4), 52-70.
- Harvey, J., & Nicholson, N. (1999). Minor illness as a legitimate reason for absence. *Journal of Organizational Behavior*, 20(6), 979-993.
- Health and Safety Executive. (2001). *Tackling Work-related Stress: A Managers Guide to Improving and Maintaining Employee Health and Well-being*. HS (g) 218. HSE Books.

- Hendrix, W. H., Spencer, B. A., & Gibson, G. S. (1994). Organizational and extraorganizational factors affecting stress, employee well-being, and absenteeism for males and females. *Journal of Business and Psychology*, 9(2), 103-128.
- Hill, J. M. M., & Trist, E. L. (1955). Changes in accidents and other absences with length of service: A further study of their incidence and relation to each other in an iron and steel works. *Human Relations*, 8(2), 121-152.
- Hobfoll, S.E. (1989). Conservation of resources: a new attempt at conceptualizing stress. *American psychologist*, 44(3), p.513.
- Homans, G. C. (1958). Social behavior as exchange. *American Journal of Sociology*, 63(6), 597-606.
- IBEC. (2011). IBEC launches new report on absence levels at work. <http://blog.annualleave.com/?p=173>
- Islam, A., Jantan, H. B., Bashir, A., Masud, S., & Roy, B. (2017). Work stress among managers of business organizations in Bangladesh. *The International Journal Of Business & Management*, 5(10), 16-23.
- Islam, M. I., Alam, K. M. W., Keramat, S. A., Murshid, M. E., Haque, R., Kabir, E., & Khan, M. H. (2021). Working conditions and occupational stress among nurses in Bangladesh: a cross-sectional pilot study. *Journal of Public Health*, 1-9.
- Islam, N., Haque, P., Mubasshir, A., Sadi, M., & Sakib, S. (2019). The Effect of Work Stress on the Performance of Readymade Garment Workers in Bangladesh. *Available at SSRN 3411193*.
- Ismail, A., Yao, A., & Yunus, N. K. Y. (2009). Relationship between Occupational Stress and Job Satisfaction: An Empirical Study in Malaysia. *Romanian Economic Journal*, 12(34).
- Jackson, S. E., & Schuler, R. S. (1985). A meta-analysis and conceptual critique of research on role ambiguity and role conflict in work settings. *Organizational behavior and human decision processes*, 36(1), 16-78.
- Jayashree, R. (2010). Stress management with special reference to public sector bank employees in Chennai. *International Journal of Enterprise and Innovation Management Studies*, 1(3), 34-35.
- Jex, S. M., & Thomas, J. L. (2003). Relations between stressors and group perceptions: Main and mediating effects. *Work & Stress*, 17(2), 158-169.
- Johnson, J. H., & Sarason, I. G. (1979). *Moderator variables in life stress research*. Washington Univ Seattle Dept of Psychology.
- Karasek Jr, R. A. (1979). Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly*, 285-308.
- Kim, J., & Garman, E. T. (2003). Financial stress and absenteeism: An empirically derived model. *Financial Counseling and Planning*, 14(1), 31-42.
- Kinman, G. (2019). Sickness presenteeism at work: prevalence, costs and management.
- Kleiven, M., Bøggild, H., & Jeppesen, H. J. (1998). Shift work and sick leave. *Scandinavian Journal of Work, environment & health*, 128-133.
- Kodagoda, T. (2010). Work? Family stress of women managers: experience from banking sector in Sri Lanka. *International Journal of Management and Enterprise Development*, 9(2), 201-211.
- Kotrlík, J. W. K. J. W., & Higgins, C. C. H. C. C. (2001). Organizational research: Determining appropriate sample size in survey research appropriate sample size in survey research. *Information Technology, Learning, and Performance Journal*, 19(1), 43.
- Kundaragi, P. B., & Kadakol, A. M. (2015). Work stress of employee: A literature review. *International Journal of Advance Research and Innovative Ideas in Education*, 1(3), 18-23.

- Labidi, M., Mrad, M., Gharbi, A., & Louly, M. A. (2014). Scheduling IT staff at a bank: a mathematical programming approach. *The Scientific World Journal*, 2014.
- Lawrence, E. R., & Kacmar, K. M. (2012). Leader-member exchange and stress: The mediating role of job involvement and role conflict. *Journal of Behavioral and Applied Management*, 14(1), 39-52.
- Logan, M. S., & Ganster, D. C. (2005). An experimental evaluation of a control intervention to alleviate job-related stress. *Journal of Management*, 31(1), 90-107.
- Malamardi, S. N., Kamath, R., Tiwari, R., Nair, B. V. S., Chandrasekaran, V., & Phadnis, S. (2015). Occupational stress and health-related quality of life among public sector bank employees: A cross-sectional study in Mysore, Karnataka, India. *Indian Journal of Occupational and Environmental Medicine*, 19(3), 134.
- Margolis, B. L., Kroes, W. H., & Quinn, R. P. (1974). Job stress: An unlisted occupational hazard. *Journal of Occupational and Environmental Medicine*, 16(10), 659-661.
- Marini, I., Todd, J., & Slate, J. R. (1995). Occupational stress among mental health employees. *Journal of Rehabilitation Administration*, 19(2), 123-130.
- Mashonganyika, O. (2004). *The relationship between job satisfaction and absenteeism: a study of the shop floor workers in a motor manufacturing plant* (Doctoral dissertation, Rhodes University).
- Matteson, M. T., & Ivancevich, J. M. (1987). *Controlling work stress: Effective human resource and management strategies*. Jossey-Bass.
- Meyer, I. H. (2003). Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: conceptual issues and research evidence. *Psychological Bulletin*, 129(5), 674.
- Nicholson, N. (1993). Absence--There and Back Again. *Journal of Organizational Behavior*, 288-290.
- Olofsson, B., Bengtsson, C., & Brink, E. (2003). Absence of response: a study of nurses' experience of stress in the workplace. *Journal of Nursing Management*, 11(5), 351-358.
- Palmer, S. (1989). Occupational stress. *The Health and Safety Practitioner*, 7 8, 16-18.
- Patterson, J. M. (2002). Integrating family resilience and family stress theory. *Journal of marriage and family*, 64(2), 349-360.
- Pretrus, T., & Kleiner, B. H. (2003). New developments concerning workplace safety training: managing stress arising from work. *Management Research News*.
- Rahe, R. H. (1974). The pathway between subjects' recent life changes and their near-future illness reports: Representative results and methodological issues.
- Rahman, M. (1989). Job stress, satisfaction and mental health of factory workers in Bangladesh. *Work & Stress*, 3(2), 155-162.
- Renukamurthy, T. P. (2017). Stress among banking employee-A literature review. *International Journal of Research-Granthaalayah*, 5(1), 206-213.
- Richard, E., & Emerson, R. M. (1976). Social exchange theory. *Annual Review of Sociology*, 2(1), 335-362.
- Rizwan, M., Raza, M. A., Mateen, M. A., Tehseen, F., Farooq, M. S., Javed, A., & Javed, S. (2014). Investigating the causes of job stress: a study on banking sector of Bahawalpur, Pakistan. *International Journal of Learning and Development*, 4(2), 227.
- Rizwan, M., Waseem, A., & Bukhari, S. A. (2014). Antecedents of job stress and its impact on job performance and job satisfaction. *International Journal of Learning & Development*, 4(2), 187-203.
- Rizzo, J. R., House, R. J., & Lirtzman, S. I. (1970). Role conflict and ambiguity in complex organizations. *Administrative Science Quarterly*, 150-163.

- Rose, M. (2003). Good deal, bad deal? Job satisfaction in occupations. *Work, employment and society*, 17(3), 503-530.
- Russo, J., & Vitaliano, P. P. (1995). Life events, caregiver status, and distress. *Experimental Aging Research*, 21, 273-294.
- Sarantakos, S. (1996). *Modern Families*, South Yarra: MacMillan Education.
- Sayeed, O. B. (1985). Job stress and role making behavior: relationships between job stressors and role efficacy dimensions. *Managerial Psychology*, 6.
- Schappi, J. V. (1988). *Improving job attendance*. Bna Books.
- Sekaran, U., & Bougie, R. (2019). *Research methods for business: A skill building approach*. John Wiley & Sons.
- Selye, H. (1936). A syndrome produced by diverse nocuous agents. *Nature*, 138(3479), 32-32.
- Selye, H. (1956). *The stress of life*.
- Siswanto, S., Supriyanto, A., Ni'mah, U., Asnawi, N., & Wekke, I. (2019). Does a workload influence the performance of bank employees? *Management Science Letters*, 9(5), 639-650.
- Spector, P. E. (1998). A control theory of the job stress process. *Theories of organizational stress*, 153-169.
- Steinisch, M., Yusuf, R., Li, J., Rahman, O., Ashraf, H. M., Strümpell, C., & Loerbroks, A. (2013). Work stress: Its components and its association with self-reported health outcomes in a garment factory in Bangladesh—Findings from a cross-sectional study. *Health & place*, 24, 123-130.
- Stephens, G. K., & Sommer, S. M. (1996). The measurement of work to family conflict. *Educational and Psychological Measurement*, 56(3), 475-486.
- Stevenson, A., & Harper, S. (2006). Workplace stress and the student learning experience. *Quality Assurance in Education*.
- Svenson, O., & Maule, A. J. (Eds.). (1993). *Time pressure and stress in human judgment and decision making*. Springer Science & Business Media.
- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53.
- Townley, G. (2000). Long hours culture causing economy to suffer.
- Ursin, H., & Eriksen, H. R. (2004). The cognitive activation theory of stress. *Psychoneuroendocrinology*, 29(5), 567-592.
- Van Sell, M., Brief, A. P., & Schuler, R. S. (1981). Role conflict and role ambiguity: Integration of the literature and directions for future research. *Human Relations*, 34(1), 43-71.
- Wongchanwuth, N. (2009). A study of job satisfaction influence on absenteeism intention and turnover intention of bank employees.
- Yahaya, N., Yahaya, A., Tamyas, F. A., Ismail, J., & Jaalam, S. (2010). The Effect of various modes of occupational stress, job satisfaction, intention to leave and absenteeism companies commission of Malaysia. *Australian Journal of Basic and Applied Sciences*, 4(7), 1676-1684.
- Zait, A., & Berteau, P. S. P. E. (2011). Methods for testing discriminant validity. *Management & Marketing Journal*, 9(2), 217-224.



TRAVEL MODE CHOICE BEHAVIOR OF SCHOOL-GOING CHILDREN IN KHULNA CITY

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Manuscript submitted: November 30, 2021

Accepted: April 28, 2022

Abstract

School-going children's trips play an essential role in transport planning. The change in transport mode choice to school might look insignificant, but it contributes to a great extent to growing transportation. Children's mode choice behavior has dramatically shifted from active modes, mainly walking, to non-active modes over the last few years. This research analyzes the influential factors affecting travel mode choice for school travelers in Khulna City. A multinomial logit model was developed for school trip makers. The results show that majority of the children ride motorized rickshaws on school trips. With the increase in travel cost and travel time, the odds of choosing the selected mode decrease. The findings revealed that female children are more likely to choose a car over other modes of transportation than male students. Children from higher-income households are more likely to use a car than any other income group. Compared to children from higher-income backgrounds, those from lower-income families were significantly more likely to walk to and from school. Regarding parents' perceptions of traffic safety, if parents perceived their neighborhood to be safe for children, children were also more likely to walk to school. The findings of this research also show that active travel, e.g., walking, is associated with the environmental characteristics (walking and safe environment, heavy traffic volume) of walking routes. This information should be taken into account when policy-making and school plans to enhance the safety of children walking to and from school.

Keywords: Mode choice, school trips, multinomial logit, discrete choice, traffic safety, parental perception

Introduction

Mode choice behavior of travel plays a vital role in transportation planning and management. Travelers choose modes out of many available ways according to their travel purpose (van den Berg et al., 2020); (Ashalatha et al., 2013). Other research has shown that individual and household socio-economic characteristics have a decisive role in mode choice decisions. They identified that income, gender, vehicle ownership, and employment status are the most influencing factors in mode choice decisions (Miller et al., 2005). Modal choice behavior modeling has been predominantly on activity-travel based on adults. However, the modal choice of children to school now has been widely discussed in recent years. These discussions have primarily taken place in the Western context, owing to the increasing use of automobiles to transport children to and

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DOI: <https://doi.org/10.53808/KUS.2022.19.01.2142-et>

from school, as well as a decline in walking and cycling in these countries (Li & Zhao, 2015; McDonald, 2008). School travel mode behavior mainly depends on their parents. Parental escort decisions influence their children's travel mode while traveling to school (He & Giuliano, 2017). Researchers have found that several factors influence children's modal choice for school trips, such as distance to school, household car availability, safety and security, gender, and parent escort preferences (McDonald, 2008; McMillan, 2007).

Many studies have shown that school-going children's mode choice behavior has various influencing factors in recent years. They found that individual characteristics, children's socio-economic and travel-related variables, play a significant role in mode choice (Ewing et al., 2004; McMillan, 2007). Bhat & Sardesai (2006) found that income, gender, vehicle ownership, and employment status are the most influencing factors that strongly influence mode choice behavior. The change in travel mode to school may look insignificant to the extensive transportation system, but it represents a substantial amount of growing transportation (McMillan, 2007). The distance to school has been a significant component in the study of children's transport mode choice (van den Berg et al., 2020; Beck & Greenspan, 2008; McDonald, 2008). Children who travel longer distances are more likely to prefer motorized transportation, whereas those who travel small distances to school are more likely to walk or ride a bicycle (van den Berg et al., 2020; Ashalatha et al., 2013). McDonald and Aalborg (2009) conducted a study on the mode choice of school-going children in California. They found that distance to school plays a significant role in mode choice decision making where about 75% of the children living within half a mile of school travel there by walking or cycling, and only 18% of those living 1.5 miles from their school use different active modes.

Socio-economic characteristics play a significant role in mode choice decision-making. Because of the low income of the poor, people depend highly on non-motorized modes of transportation like walking and bicycling as their primary modes (Srinivasan & Rogers, 2005). Gender, age, family size, automobile ownership, and years of schooling all impact mode choice selections (Sarkar & Mallikarjuna, 2018). However, the low-income group primarily uses non-motorized modes, and public transportation is selected (Abane, 1993; Enam & Choudhury, 2011; Srinivasan et al., 2007; Tuan, 2015). A study conducted by Badri (2013) in UAE found that gender, level of study, number of cars owned, nationality, and the number of children in the family are the significant factors determining the mode choices to school.

According to a CDC study, children who live close to school do not walk or cycle in huge numbers; just 31% of children aged 5 to 15 who lived within a mile of school walked or biked (Centers for Disease Control and Prevention (CDC), 2002). Because of insufficient walking environments, children are less likely to walk or bike to school (Ewing et al., 2004). Also, school travelers are more likely to use private modes and motorized vehicles because of fewer walking environments. Residential location, neighborhood type, and urban land infrastructure play a vital role in determining the preferred mode choice for commuting (Frank et al., 2008; Pinjari et al., 2007; Wee et al., 2002). The literature identified that those children who don't need to cross major roads and have good walking facilities and safe sidewalks are more likely to walk or cycle to schools (Helbich, 2017). In his research, Johansson et al. (2006) concluded that mode choice depends on travel time and comfort, accessibility, and flexibility. They used a latent variable approach and found that flexibility, convenience, and pro-environment social factors affect an individual's mode choice. McMillan et al. (2006) investigated the gender difference in mode choice in California and found that 40% of the girls are less likely to walk or cycle to school than boys. Clifton et al. (2010) explored the gender differences in school travel behaviors. The authors discovered that females who lived in mixed-use areas were more likely to drive to school than children who lived in communities with well-connected streets and were more likely to have automobiles. Rahman & Shah (2018) investigated the existing travel patterns of school children in Dhaka city and found that travel time, distance traveled, and family income strongly correlates with mode choice behavior. They found out that most children (56.5 %) walk to school, while 18.5% drive and 17.5% take rickshaws on school trips. They also identified that children are more likely to walk to school for short-distance trips, so the distance to school plays a significant role in mode choice behavior. Khan et al. (2011) discovered that the majority of children (57%) use a car to travel to school in Dhaka city, while 29% use a

rickshaw and only 6% walk to school. The study area, Khulna city, is one of the largest cities in an urbanizing region in the southwest of Bangladesh. In Khulna city, the available modes of transportation are buses, easy bikes, motorized rickshaws, and three-wheelers. However, the city's road networks do not ensure smooth travel for a large number of people, resulting in traffic congestion in the city (Islam & Hasan, 2014). Also, narrow roads, parking on streets, limited parking, unauthorized roadside activities, and pedestrian movement increase congestion (Banik et al., 2009).

Few studies have examined the travel behavior of school travelers. No studies to date have examined the perception of traffic safety for determining mode choice in Bangladesh context. Therefore, the purpose of this study is to address the modal choice behavior of school-going children in Khulna city. Also, this study attempts to find out various factors which contribute to the choice of particular modes by trip makers and examine if parents' perception determines mode choice for school travelers.

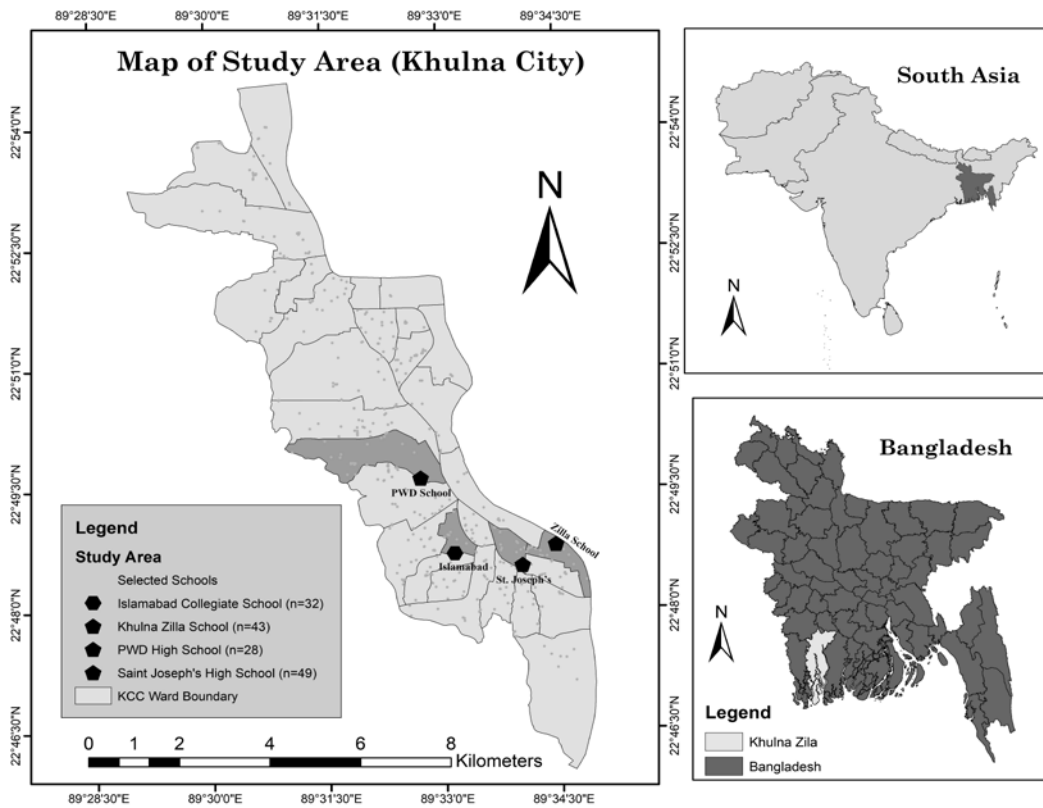


Figure 1. Map of the study area

Materials and Method

Study area

After Dhaka and Chittagong, Khulna is Bangladesh's third-largest city. Khulna city is in the southwest of Bangladesh, and it has an area of 59.57 square kilometers. According to United Nations (2014), Khulna has a population of 1.022 million. The study area comprises four schools in the Khulna city corporation area for this research. School travelers use a variety of modes of transportation in this area. The most popular modes of

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transportation are motorized rickshaws, easy bikes, private cars, walking, and motorcycles. Few children ride bicycles, public buses, and three-wheelers for school trips. As motorized rickshaws and easy bikes are the cheapest transportation, school travelers mostly use them, although they lack comfort, safety, and security. It is a matter of the fact that there is no school with its own bus service. So, children have to take private or shared transportation to get to school. During the school hour, traffic congestion is an ordinary matter because of the enormous traffic volume on the road. Four schools were selected: Khulna Zilla school, Saint Joseph High School, Islamabad Collegiate School, and PWD School for the data collection. These schools are at the city's core, where various groups of children use multiple modes of transportation to school.

Sampling and data collection

Four schools were chosen to get a sufficiently representative sample of a school population. The total population size in this study is the total number of students in the study area. There are around 5391 students in the four schools (Field Survey, 2020). An empirical formula given by Levy and Lemeshow (2008) was used to determine the sample size.

$$n = \frac{z^2 pq N}{e^2 (N - 1) + z^2 pq}$$

Where n = sample size for the finite population; N = population size. In this research accepted margin of error is 7%, and the confidence level is 92%, where the value of z is 1.75. So, the total number of respondents was 152, which is over 2% of the total population of the data set. For the survey, a random sampling technique was used to collect the data from the household.

Data was collected using a closed-ended questionnaire that included home, personal information, and travel information through a telephone interview. The sample population was purposefully kept limited to children in grades 4 through 7 to avoid behavioral variations caused by varying levels of cognitive ability and independence. And the parental survey was conducted to extract their perception of mode choice of school-going children, their household characteristics, and children's travel characteristics to school. Demographic information, household income, parent education, children's age, sex, and car ownership data were collected under socio-economic factors. In addition, travel-related information, including travel cost, preferred mode choice, travel time, comfort, and environmental factors such as access to the sidewalk, walking environment, and parental escort, were collected.

The multinomial logistic regression model

For mode choice modeling, Multinomial regression was applied for this research. The multinomial logit model is the simplest and most popular practical discrete choice model (Ashalatha et al., 2013). The user perceives the various alternatives as an independent. The random terms of every option have the same probability distribution (Domencich & McFadden, 1975). Mode choice behavior depends on many factors, such as socio-economic variables and demographic variables, and trip-related variables. So, these variables such as mode choice, travel cost, travel time, and income variable that influence mode choice behavior was used in MNL. R studio software has been used for discrete choice modeling because it is most famous for discrete mode choice modeling.

Multinomial logistic regression model fit

The maximum likelihood ratio estimates the multinomial logistic regression model for model fitting statistics (Garson, 2014). A logarithmic likelihood function, commonly known as the log-likelihood function, is required. The procedure is given below (Favero & Belfiore, 2019):

$$LL = \sum_{i=1}^n \sum_{m=0}^{M-1} \left[(Y_{im}) \cdot \ln \left(\frac{e^{Z_{im}}}{\sum_{m=0}^{M-1} e^{Z_{im}}} \right) \right]$$

The likelihood ratio can be deviance, model chi-square, or chi-square goodness of fit. Model significance is required for fitting the model. The likelihood-ratio test rejects the null hypothesis if the number is too low. In the null hypothesis for model fitting, the last model needs to be significant. For the goodness of fit, if the Pearson chi-square test of the significance level is above 0.05, we will accept the model (Favero & Belfiore, 2019). To compare the ultimate model with the null model, McFadden R² is used. The Equation is given below (McFadden, 1977):

$$R_{McFadden}^2 = 1 - \log(L_e) / \log(L_{null})$$

This ratio explains the total unexplained variability of the model. The total unexplained variability of 1 shows the total explained variability of the model.

Table 1. Description of the variable selected in modeling

| Variable | Description | References |
|---------------------|---|--|
| Child's age | Age of the trip maker | Sarkar & Mallikarjuna, 2018 Miller et al., 2005 |
| Vehicle ownership | Family vehicle ownership | Bhat & Sardesai, 2006 Miller et al., 2005 |
| Income | Monthly income of the household | Balcombe et al., 2004 Chen et al., 2008 |
| Household size | Family size of the trip maker | Dargay and Hanly, 2007 Kim and Ulfarsson, 2008 |
| Child's sex | Sex of the trip maker | Miller et al., 2005 Guliani et al., 2015 |
| Employment status | Occupation of the household head | Badri, 2013 Miller et al., 2005 |
| Parent education | Education level of the children's parent | Van Goeverden & De Boer, 2013 |
| Trip distance | Distance to school | Kim and Ulfarsson, 2008 Scheiner et al., 2019 McDonald & Aalborg, 2009 |
| Travel cost | Travel cost to the school | Ashalatha et al., 2013 |
| Travel time | Travel time to school | Ashalatha et al., 2013 |
| Escort decision | Parental escort children to school | Badri, 2013 |
| Comfort | The comfort of the trip maker regarding mode choice | Sarkar & Mallikarjuna, 2018 Johansson et al., 2006 |
| Security | Importance of security and safety regarding mode choice | Pirdavani et al., 2016 |
| Sidewalk | Availability of sidewalk to school | Helbich, 2017 Clifton et al., 2010 |
| Walking environment | Importance of walking environment regarding mode choice | Ewing et al., 2004 |
| Traffic safety | Importance of traffic safety regarding mode choice | Pirdavani et al., 2016 |

Selection of variables for the model

This research's primary aim focuses on identifying the most influencing variables that impact mode choice decision-making among school-going children in Khulna city. The selected variables for modeling in this research are shown in the following Table-1.

Table 2. Socio-demographic characteristics of the sample

| Variables | Frequencies (%) | Mean \pm SD | Range | Test statistics (p value) |
|-----------------------|-----------------|-----------------|-------|-------------------------------------|
| Age (years) | 151 | 12 \pm 1.09 | 6.0 | t (150) =134.94 (0.001) * |
| Sex | Male | 109 (72.2%) | | X ² (1) =29.72(0.001) * |
| | Female | 42 (27.8%) | | |
| Family size | 151 | 4.48 \pm 1.31 | 7.0 | t (150) = 41.81 (0.001) * |
| Home Ownership | Own | 55 (36.4%) | | X ² (1) =9.76 (0.02) ** |
| | Rent | 93 (61.6%) | | |
| Family Income | < 20,000 | 36 (23.8%) | | X ² (1) =85.26 (0.001) * |
| | 20,000-40,000 | 66 (43.7%) | | |
| | 40,000-60,000 | 20 (13.2%) | | |
| | > 60,000 | 13 (8.6%) | | |
| | Non-responded | 16 (10.6%) | | |
| Vehicle ownership | Car | 13 (8.65%) | | X ² (1) =43.62 (0.01)** |
| | Motorcycle | 41 (27.2%) | | |
| | Bicycle | 3 (2%) | | |
| | None | 57 (37.7%) | | |
| Sidewalk availability | Yes | 91(60.3%) | | X ² (1) =6.36 (0.015)** |
| | No | 60(39.7%) | | |
| School distance (Km) | 151 | 1.56 \pm 1.31 | 6.0 | t (150) =14.59 (0.001) * |

* Significant at 1% level, ** Significant at 5% level

Data Analysis

Table 2 shows the sociodemographic characteristics of the respondents. Figure 2 shows the age distribution percentage of the children in the sample. According to the data, the sample contains a higher proportion of children aged 11-13 years old and a lower proportion of children aged 9-10 to 14-15 years old.

Socio-economic characteristics are a significant factor for mode choice behavior. It plays a vital role in travelers' decision-making. For example, different researchers have found that family income is an influential factor in the mode choice model (Balcombe et al., 2004; Chen et al., 2008). Higher-income families are more likely to use motorized transportation, whereas lower-income families are more likely to walk. Vehicle ownership is also an essential factor for mode choice decision-making. People who have a vehicle are more likely to choose it for traveling. However, the survey data revealed that only around 6% of the respondents have a car, 27.2 % own a motorcycle, and only 2% own a bicycle. Mode choice behavior varies according to the sex of the travelers. Figure 3 shows the modal share for school-going children according to their gender. Male children mostly choose motorized rickshaws as a preferred mode; female children are more likely to choose walking as a travel mode for their school because of the short distance. About 40% of the female children walk, and only around 25% of males walk to school. On the other hand, 40% of the male students use a motorized rickshaw, whereas female mode choice for motorized rickshaw is below 25%. The reason is that female children do not want to ride because of their fear of safety. However, female mode share for car and the easy bike is higher than the male student.

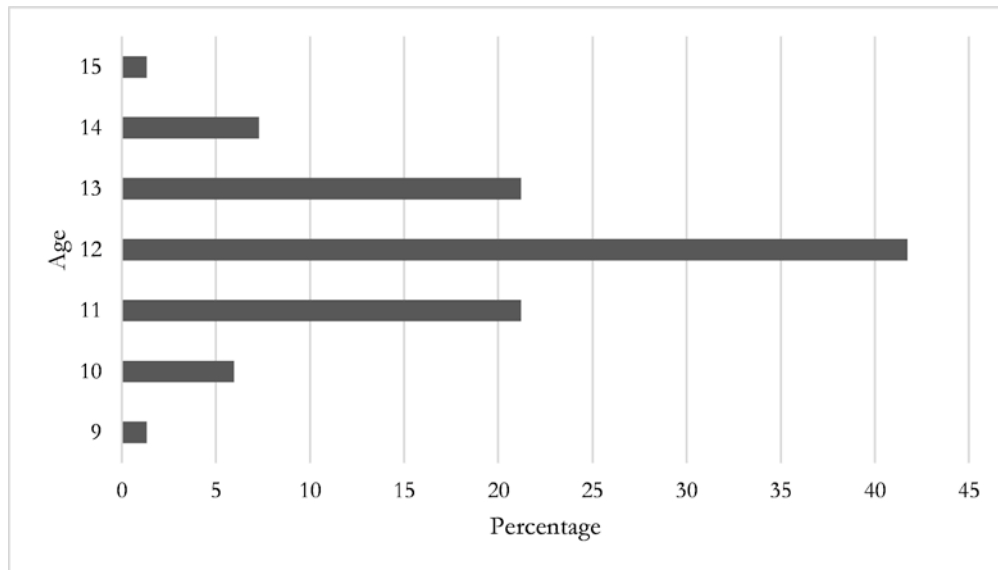


Figure 2. Age distribution of the children

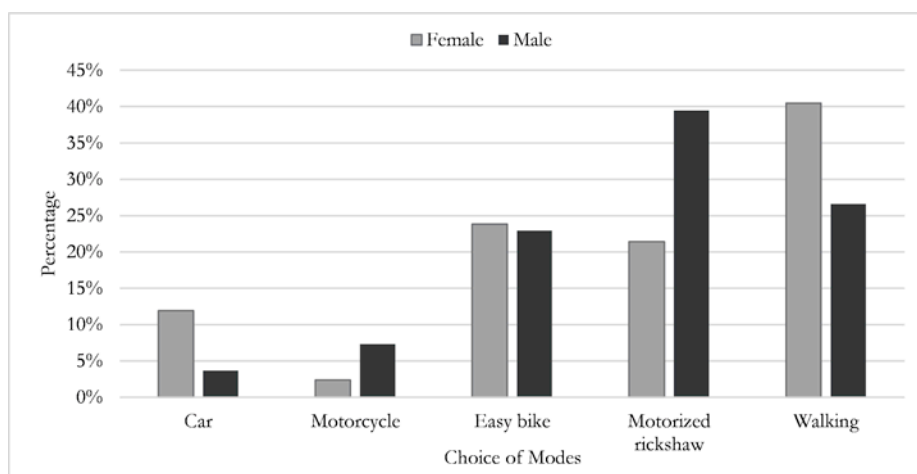


Figure 3. Modal share of the trip makers according to gender

Different income levels of the trip makers influence mode choice (Willumsen & Ortuzar, 2001). For this research, family income was categorized into five classes. Figure 4 represents children's mode choice and their family income level. The share of walking modes by low-income groups (less than 20,000) is more than other income groups. Trip makers in the lower-income class, less than 20,000, mostly walk to school. Children in high-income groups prefer mostly cars and walking for short-distance traveling.

Figure 5 shows the modal share of the children's trip to school. Motorized rickshaw has the most portion of the modal share of the children's trip to school which is 34% and then walking is the second most used mode having 31% of the whole sample followed by Easy bike. The share for personal vehicles (Motorcycle and Car) is equal, contributing about 6% each to the total modal share. The percentage of motorized transport is significant compared to non-motorized modes of transportation (e.g., walking).

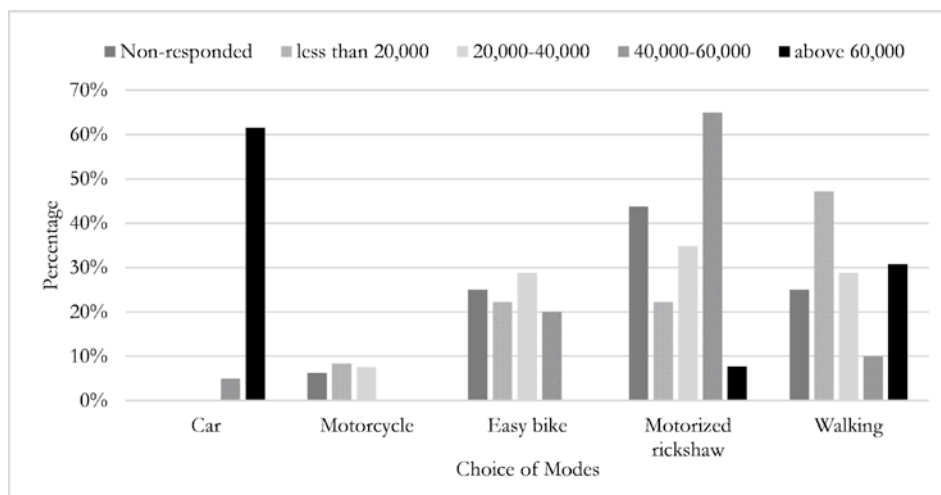


Figure 4. Modal choice according to household income group

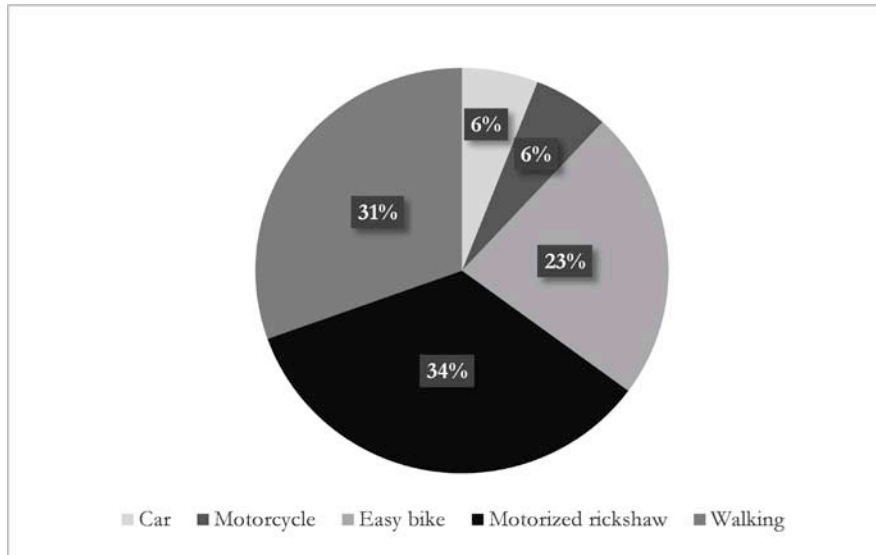


Figure 5. Modal share of the school trip makers

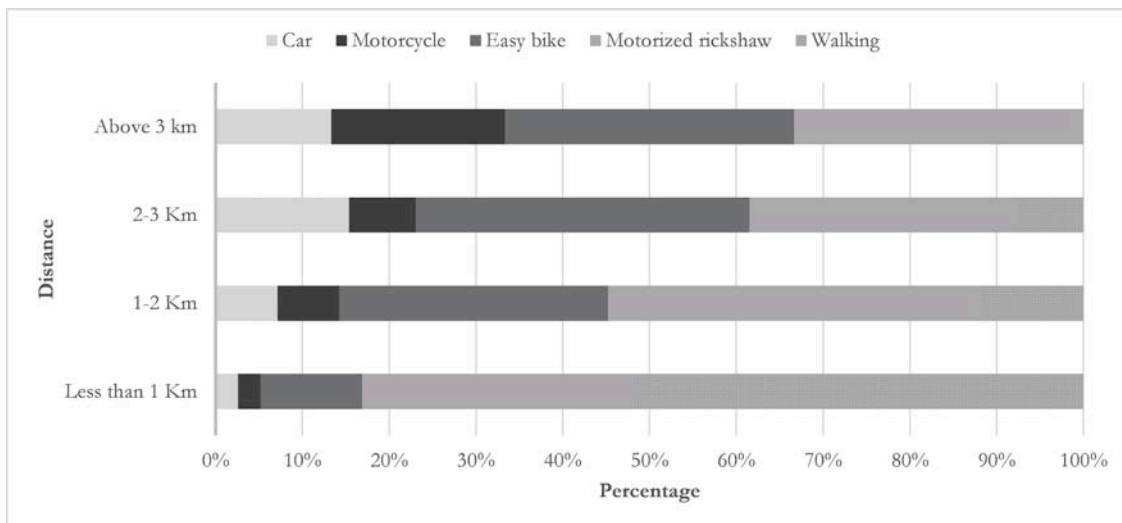


Figure 6. Mode share in respect to travel distance

Travel distance has a significant impact on mode selection decisions. Walking is a popular mode of transportation for school-age children who live within walking distance of their school. Figure 6 depicts the modal share regarding travel distance between home to school. Here, walking dominates the mode share for less than 1 km distance significantly; about 52% of the school trip are less than 1 km. However, above 1 km, motorized rickshaw and easy bike modal share are considerably higher than other modes. The percentage of motorcycles and cars increases proportionately with travel distance.

Results and Discussion

Model formulation

Formulation of a multinomial logit model for mode choice among school-going children in Khulna city has been done with the help of "RStudio". The final mode choice model has been developed using the "mlogit" package in the environment of "R" for better estimation and prediction of the model.

Choice set determination

Choice set determination means the selection of travel modes that are the elements of an individual's choice set. To reduce complication, we assume that all means of transportation are a subset of the individual's decision set. This research has selected five travel modes in the choice set

{Car, Motorcycle, Easy bike, Motorized rickshaw, Walking}

In the mode choice model, the dependent variable is travel mode choice. Independent variables are children's sex, income, parent education, vehicle ownership, travel distance, travel cost, traffic safety, comfort, and walking environment.

The motorized rickshaw was used as the reference level in this investigation. This is because motorized rickshaws have been prominent in the study area, and people of all income levels use it. So, a motorized rickshaw is more representative and appropriate as the reference level in this model.

Model fitting information

From the model, the pseudo R^2 value of the final model according to McFadden tests was 0.488, which is a method for calculating the explained variation in the model. Thus, based on the pseudo R^2 values, the model developed in the present study explains approximately 48% variation. Therefore, the model can be considered statistically significant.

Influencing factors of mode choice among school-going children

Personal and socio-economic influences

Children's sex plays a vital role in mode choice decision making. Male children have 7.26 times fewer chances of choosing a car than motorized rickshaws than female travelers. Female trip makers are more likely to select a car because a car is more comfortable, secure, and flexible than a Motorized rickshaw. In fact, parents are much more worried about the safety of their female children, and they are more likely to choose car over a Motorized rickshaw. For male children, the probability of choosing walking for a school trip is 1.2 times less likely than the female children. However, other modes of transportation such as Motorcycle and easy bikes haven't been found to have a statistically significant influence on children's sex. Age seemed to have no significant association with travel modes, possibly because all age groups used all modes.

Parent education impact is positive on car and negative on Easy Bike. It means if the value of the parent education increases by 1 unit, then the likelihood of choosing car would increase by 3.57 times compared to Motorized rickshaw (Table 3). On the other hand, the likelihood of choosing an Easybike would decrease by 0.66 times compared to Motorized rickshaw. As educated parents are more concerned about their children's health and traffic safety, they prefer to use car for distanced traveling. With the increasing of parent education, parents are less likely to choose walking mode for their children.

Family income has been one of the most prominent factors in choosing mode. Different researches have shown that high-income people use faster and more comfortable modes like private vehicles more often. However, the low-income group people mostly use non-motorized modes, and for distant traveling, public transportation is selected (Abane, 1993; Enam & Choudhury, 2011; Srinivasan et al., 2007; Tuan, 2015). In the case of the influence of family income of the children, the MNL regression model reveals that, compared to

the lower income group, the higher income group has 3.84 times more chances of choosing Car over Motorized rickshaw where the middle-income group has 1.95 times more probabilities of choosing car. Also, children of higher-income and middle-income groups are less likely to walk to school over Motorized rickshaws. The likelihood of selecting walking for middle-income children is 2.29 times less likely than for low-income group children. So, it can be concluded that higher-income people are more likely to use cars because they own a car.

Table 3. Variable influencing mode choice of school-going children (Motorized rickshaw as reference).

| Variables | Categories | Travel Modes | | | |
|--|---------------|--------------|-----------|------------|----------|
| | | Car | Easy Bike | Motorcycle | Walking |
| Travel time | | -0.287*** | | | |
| Travel cost | | -0.031*** | | | |
| Children Sex (Female = ref) | Male | -7.263** | 0.177 | 0.395 | -1.274* |
| Family Income (Low = ref) | Middle Income | 1.95 | -0.18 | 1.688 | -2.296** |
| | High Income | 3.844 | 0.3036 | 0.32 | -1.481 |
| Parent education | | 3.572** | -0.664*** | 0.268 | -0.208 |
| Walking Environment | | 0.091** | -0.481*** | -1.034** | 0.522** |
| Comfort | | 5.047*** | -1.1103 | -0.391 | -0.339 |
| Sidewalk Availability (No = ref) | Yes | 4.086 | -0.145 | 1.665* | 0.575 |
| Heavy traffic | | 3.871** | -0.292 | 0.567* | -0.536** |
| Live in Safe area | | -3.829* | -0.131 | -0.651 | 0.365* |
| Constant | | -49.105** | 10.078*** | -3.061 | 3.44 |
| Pseudo R ² (McFadden) = 0.488 | | | | | |

* Significant at 10% level, ** Significant at 5% level, *** Significant at 1% level

Travel related influences

Travel cost is a significant factor that influences travel mode choice. Travel costs depend on travel distance and according to different vehicles. Travel cost has a negative impact on alternatives. With the increment of 1 taka of cost, the probability of choosing that mode decreases by 0.03 times (Table 3). In other words, when travel cost increases, children are more likely to choose alternative modes of transport.

Travel time is a significant factor that influences travel mode choice. Travel time has a negative impact on alternatives. When travel time is increased by 1 minute, the probability of choosing that mode decrease by 0.28 times. In other words, when travel time increases, children are less likely to prefer that mode and more

likely to choose alternative modes. However, parents are less likely to select Motorcycle and easy bike for their children than Motorized rickshaw. Parents prefer that their children walk to school, but because of the lack of footpaths and illegal encroachment, parents tend to choose motorized vehicles for their children.

Comfort plays a vital role in mode modal choice behavior. Johansson et al. (2006) concluded that along with modal time and cost for mode choice, preferences for flexibility and comfort are essential. Comfort has a negative impact on Walking, Motorcycle and easy bike, where car has a positive influence. The probability of choosing car is 5.04 times more likely than Motorized rickshaw. Those who emphasize comfort in selecting mode choice are less likely to use Motorcycle, walking, and Easy bike than Motorized rickshaw. Motorized rickshaw is more comfortable and the privacy is higher than an Easy bike. With the increase in comfort, children's parents are more likely to choose car over any other modes available.

Environmental influences

The absence of sidewalks was associated with a decreased odd of walking. Those who have sidewalks available for going to school from home are more likely to choose cars than Motorized rickshaw. The likelihood of choosing walking and Motorcycle is 0.57 times and 1.66 times more likely than Motorized rickshaw. Car is more likely to be selected compared to any other mode. Most of the available sidewalks are not accessible for the pedestrian because these sidewalks are encroached by different local vendor shops and other obstacles.

Traffic safety is an essential factor for mode choice. According to the findings for traffic safety perceptions, the possibility of walking to/from school appeared to be higher for children who perceived that they lived in a safe area. Compared to Motorized rickshaw, the chances of walking to school are 0.36 times higher. The likelihood of choosing Car, Easy bike, and Motorcycle is less likely than choosing a Motorized rickshaw when children's parents perceive that they live in a safe area.

The odds that children would walk to school appeared to be higher for children whose parents perceived that their walking environment was good. The likelihood of choosing walk is 0.52 times higher for children than Motorized rickshaw. For the traffic environment of the school trip, increased traffic volume near home variable got significant. The likelihood of choosing walking is 0.53 times less than Motorized rickshaw when children's parents perceive heavy traffic near their home. According to the findings, the car is more likely to be chosen when parents perceive that there is heavy traffic near their house.

Conclusion

This paper analyzes the travel behavior of school-going children in Khulna city. It identified that most of the student uses motorized rickshaw for traveling to school, which is around 34% of the whole mode share. In this specific study, a multinomial logistic regression model is used to determine the influencing factors of mode choice. The sex-wise comparison revealed that female children are more likely to prefer a car over any other mode, whereas preference for a motorized rickshaw is higher among male children. Children who have their own Motorcycle are more likely to use a motorcycle than a motorized rickshaw, as most houses have a motorcycle. Children from higher-income households are more likely to use a car, and middle-income groups are more likely to choose motorized rickshaws as a travel mode for school. But the percentage of car ownership is meager in Khulna city. So, children are more likely to use motorized rickshaws, as privacy is higher than Easy bike. However, the low-income group of children mostly use non-motorized modes like walking, and higher distance public transport is preferred (Abane, 1993; Enam & Choudhury, 2011). Children from lower-income families were more likely to walk home from school than those from higher-income families (Guliani et al., 2015). This finding is consistent with previous research, as many studies have found that children from higher-income families have lower rates of ATS (Guliani et al., 2015; Larsen et al., 2013; Mitra et al., 2010). With the increase in travel cost, children are less likely to prefer the chosen mode of transport. When travel time increases for the selected mode, the likelihood of choosing that vehicle is reduced. Parent's education was significant for school trips. Children's parents who have higher education levels are

more likely to choose cars and less likely to choose walking and Easybike. This may be related to traffic safety and privacy. Comfort has been found to be an influential factor for children traveling to school. Children are more comfortable in cars and Motorized rickshaws. Lack of comfortable negatively influences easy bike, Motorcycle, and walking.

Khulna city has not enough walking infrastructure, and most sidewalks are encroached by different local vendor shops and obstacles. So, parents perceive that walking to school could be risky for their children. So, parents don't want their children to walk to school. The current study's findings indicate that when parents perceive that the walking environment feature is missing, the likelihood of walking decreases. Increased traffic volume may also be associated with an increased risk of pedestrian injury or death from a safety standpoint. Many parents have strongly agreed that their children have to cross major intersections, which is very risky for walking to school as there is no traffic signal or crosswalk facility in Khulna city. The results show a correlation exists between the built environment of children's home to school and children's likelihood of walking to/from school. These findings have immediate policy implications for sidewalk development; no new development should take place until a comprehensive network of sidewalks is built.

The study has some limitations. First, the study population was purposefully limited to children in grades 5 to 7 to avoid behavioral variations due to varying levels of cognitive ability and independence. Second, only parental perceptions of a child's traffic safety were investigated. Third, this study examined subjective environmental characteristics such as parental perceptions of safety and perceived quality of walking paths. It may be worthwhile to include additional objectively quantifiable characteristics of the built environment in future research. Finally, additional factors may affect children's satisfaction with their travel that were not captured by the parental survey. Also, further research can be conducted with extensive coverage of an area, which can help in transportation policy-making and management in Khulna city.

Acknowledgement

This study would not have been possible without the assistance of children's parents. We'd like to thank them. Authors are grateful to all anonymous reviewers for their insightful and constructive feedback to improve the manuscript.

Conflict of interests

The authors have declared no conflict of interests.

Author Contribution

Md. Toslim Hossen: Writing – review & editing, Writing – original draft, Validation, data collection, Methodology, Investigation, Data analysis, interpretation, Conceptualization. Mahmud Uz Zaman: Writing – review & editing, Methodology, Conceptualization, Supervision.

References

- Abane, A. (1993). Mode choice for the journey to work among formal sector employees in Accra, Ghana. *Journal of Transport Geography*, 1(4), 219–229. [https://doi.org/10.1016/0966-6923\(93\)90046-3](https://doi.org/10.1016/0966-6923(93)90046-3)
- Ashalatha, R., Manju, V. S., & Zacharia, A. B. (2013). Mode choice behavior of commuters in Thiruvananthapuram City. *Journal of Transportation Engineering*, 139(5), 494–502. [https://doi.org/10.1061/\(ASCE\)TE.1943-5436.0000533](https://doi.org/10.1061/(ASCE)TE.1943-5436.0000533)
- Badri, M. A. (2013). School travel modes: Factors influencing parental choice in Abu Dhabi. *International Journal of Education Economics and Development*, 4(3), 203–218.
- Banik, B. K., Chowdhury, A. I., & SARKAR, S. (2009). Study of traffic congestion in Sylhet city. *Journal of the Indian Roads Congress*, 70(1).

- Hossen, M. T., and Zaman, M. U. (2022). Travel mode choice behavior of school-going children in Khulna city. *Khulna University Studies*, Volume 19 (1): 90-104
- Bhat, C. R., & Sardesai, R. (2006). The impact of stop-making and travel time reliability on commute mode choice. *Transportation Research Part B: Methodological*, 40(9), 709–730. <https://doi.org/10.1016/j.trb.2005.09.008>
- Chen, C., Gong, H., & Paaswell, R. (2008). Role of the built environment on mode choice decisions: Additional evidence on the impact of density. *Transportation*, 35(3), 285–299.
- Clifton, J., Akar, G., Smith, A. L., & Voorhees, C. C. (2010). Gender Differences in 1 Adolescent Travel to School. *Exploring the Links with Physical Activity and Health. In*, 2, 203–222.
- Enam, A., & Choudhury, C. F. (2011). Methodological Issues in Developing Mode Choice Models for Dhaka, Bangladesh. *Transportation Research Record: Journal of the Transportation Research Board*, 2239(1), 84–92. <https://doi.org/10.3141/2239-10>
- Ewing, R., Schroer, W., & Greene, W. (2004). School location and student travel analysis of factors affecting mode choice. *Transportation Research Record*. <https://doi.org/10.3141/1895-08>
- Favero, L. P., & Belfiore, P. (2019). *Data science for business and decision making*. Academic Press.
- Frank, L., Bradley, M., Kavage, S., Chapman, J., & Lawton, T. K. (2008). Urban form, travel time, and cost relationships with tour complexity and mode choice. *Transportation*, 35(1), 37–54. <https://doi.org/10.1007/s11116-007-9136-6>
- Guliani, A., Mitra, R., Buliung, R. N., Larsen, K., & Faulkner, G. E. J. (2015). Gender-based differences in school travel mode choice behaviour: Examining the relationship between the neighbourhood environment and perceived traffic safety. *Journal of Transport & Health*, 2(4), 502–511. <https://doi.org/10.1016/j.jth.2015.08.008>
- He, S. Y., & Giuliano, G. (2017). Factors affecting children’s journeys to school: A joint escort-mode choice model. *Transportation*, 44(1), 199–224.
- Helbich, M. (2017). Children’s school commuting in the Netherlands: Does it matter how urban form is incorporated in mode choice models? *International Journal of Sustainable Transportation*, 11(7), 507–517. <https://doi.org/10.1080/15568318.2016.1275892>
- Johansson, M. V., Heldt, T., & Johansson, P. (2006). The effects of attitudes and personality traits on mode choice. *Transportation Research Part A: Policy and Practice*, 40(6), 507–525.
- Khan, M., Choudhury, C. F., & Wang, J. (2011). Modeling Preference for School Bus Service in Dhaka, Bangladesh: Stated Preference Approach. *Transportation Research Record*, 2239(1), 64–73. <https://doi.org/10.3141/2239-08>
- Larsen, K., Buliung, R. N., & Faulkner, G. E. J. (2013). Safety and school travel: How does the environment along the route relate to safety and mode choice? *Transportation Research Record*. <https://doi.org/10.3141/2327-02>
- Li, S., & Zhao, P. (2015). The determinants of commuting mode choice among school children in Beijing. *Journal of Transport Geography*, 46, 112–121.
- McDonald, N. C. (2008). Household interactions and children’s school travel: The effect of parental work patterns on walking and biking to school. *Journal of Transport Geography*, 16(5), 324–331. <https://doi.org/10.1016/j.jtrangeo.2008.01.002>
- McDonald, N. C., & Aalborg, A. E. (2009). Why Parents Drive Children to School: Implications for Safe Routes to School Programs. *Journal of the American Planning Association*, 75(3), 331–342. <https://doi.org/10.1080/01944360902988794>
- McFadden, D. (1977). *Quantitative methods for analyzing travel behavior of individuals: Some recent developments*. Institute of Transportation Studies, University of California Berkeley.

- McMillan, T., Day, K., Boarnet, M., Alfonzo, M., & Anderson, C. (2006). Johnny walks to school—does Jane? Sex differences in children's active travel to school. *Children Youth and Environments*, 16(1), 75–89.
- McMillan, T. E. (2007). The relative influence of urban form on a child's travel mode to school. *Transportation Research Part A: Policy and Practice*, 41(1), 69–79.
- Miller, E. J., Roorda, M. J., & Carrasco, J. A. (2005). A tour-based model of travel mode choice. *Transportation*, 32(4), 399–422. <https://doi.org/10.1007/s11116-004-7962-3>
- Mitra, R., Buliung, R. N., & Roorda, M. J. (2010). Built Environment and School Travel Mode Choice in Toronto, Canada. *Transportation Research Record*, 2156(1), 150–159. <https://doi.org/10.3141/2156-17>
- Pinjari, A. R., Pendyala, R. M., Bhat, C. R., & Waddell, P. A. (2007). Modeling residential sorting effects to understand the impact of the built environment on commute mode choice. *Transportation*, 34(5), 557–573. <https://doi.org/10.1007/s11116-007-9127-7>
- Rahman, M. S. U., & Shah, N. A. (2018). Analysis of school trips in Dhaka City: A case study on primary school students. *PLAN PLUS*, 8(1), Article 1. <https://planplusjournal.com/index.php/planplus/article/view/26>
- Sarkar, P. P., & Mallikarjuna, C. (2018). Effect of perception and attitudinal variables on mode choice behavior: A case study of Indian city, Agartala. *Travel Behaviour and Society*, 12, 108–114. <https://doi.org/10.1016/j.tbs.2017.04.003>
- Scheiner, J., Huber, O., & Lohmüller, S. (2019). Children's mode choice for trips to primary school: A case study in German suburbia. *Travel Behaviour and Society*, 15, 15–27.
- Srinivasan, K. K., Pradhan, G. N., & Naidu, G. M. (2007). Commute mode choice in a developing country: Role of subjective factors and variations in responsiveness across captive, semicaptive, and choice segments. *Transportation Research Record*, 2038(1), 53–61.
- Srinivasan, S., & Rogers, P. (2005). Travel behavior of low-income residents: Studying two contrasting locations in the city of Chennai, India. *Journal of Transport Geography*, 13(3), 265–274.
- Tuan, V. A. (2015). Mode choice behavior and modal shift to public transport in developing countries—the case of Hanoi City. *Journal of the Eastern Asia Society for Transportation Studies*, 11, 473–487.
- van den Berg, P., Waygood, E. O. D., van de Craats, I., & Kemperman, A. (2020). Factors affecting parental safety perception, satisfaction with school travel and mood in primary school children in the Netherlands. *Journal of Transport & Health*, 16, 100837. <https://doi.org/10.1016/j.jth.2020.100837>
- Van Goeverden, C. D., & De Boer, E. (2013). School travel behaviour in the Netherlands and Flanders. *Transport Policy*, 26, 73–84.
- Wee, B. van, Holwerda, H., & Baren, R. van. (2002). Preferences for modes, residential location and travel behaviour. *European Journal of Transport and Infrastructure Research*, 2(4). <https://doi.org/10.18757/ejtir.2002.2.4.3729>



GENERATION AND CHARACTERISTICS OF HOUSEHOLD SOLID WASTE IN KHULNA CITY, BANGLADESH

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KUS: 22/02: 110122

Manuscript submitted: January 11, 2022

Accepted: March 27, 2022

Abstract

For growing cities, solid waste management is a serious concern, focusing on household waste because it accounts for a significant portion of municipal solid waste. An accurate estimation of the quantity and characteristics of solid waste mixtures from diverse income levels is required for effective city-wide solid waste management planning. The purpose of this study is to assess the production and characteristics of domestic solid waste produced by different socio-economic groups in three wards (no. 17, 23 and 24) of Khulna city. Moreover, various factors that influence the pace of waste production have been critically investigated. The finding suggests that, household waste generation rate ranges from 0.421 to 5.81 kg/day, average of 1.917 kg/day and 0.476 kg/capita/day. The waste composition analysis depicts that kitchen garbage is the most prevalent component. The waste generation rate has a positive relationship with income level and household size. Nonetheless, the findings and proposed essential steps of this study would be beneficial in assisting policymakers in refining plans for controlling the municipal waste effectively.

Keywords: Solid waste, composition of waste, household size, socio-economic group, Khulna city.

Introduction

The overall system for managing municipal solid waste (MSW) is strongly influenced by the quantity of waste generated on a daily basis at home (Dangi et al., 2011a). During the previous several decades, the amount of MSW generated in cities of developing countries has grown many times. Most of the countries which are developing, have a substantial rate of MSW production (Jadoon et al., 2013). The expansion in waste generation has become one of the obvious consequences of overpopulation. Due to rural-urban migration, there has been a significant increase in population growth in metropolitan areas changing living conditions of city dwellers, growth in the urban economy, as well as social advancements in metropolitan areas, and concerned other factors are contributing to this massive increase in MSW amount in Asia and Africa's emerging cities (Suthar & Singh, 2015). Urban sprawl and slum growth result through migration, and these generate large amounts of uncontrolled solid waste in Bangladesh's main cities (Sujauddin et al., 2008a).

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DOI: <https://doi.org/10.53808/KUS.2022.19.01.2202-se>

Jodder et al., (2022). Generation and characteristics of household solid waste in Khulna city, Bangladesh.
Khulna University Studies, Volume 19 (1): 105-115

The management of produced municipal solid waste is inadequate in most of the emerging countries, resulting in major challenges with garbage storage, collection, and final disposal (Al-Khatib et al., 2010; Batool & Ch, 2009; Gomez et al., 2008b). The problem of open garbage, dumping on unoccupied plots and roadways as well as inefficient waste storage systems is a big issue nowadays. Besides garbage bins of various sorts and sizes are put in diverse areas without regard for their appropriateness. Except for those that were wrongly put, few of them were discovered entirely filled. This is due to a lack of information regarding the amount and type of garbage created in certain areas. The placement of community storage bins was not thoroughly analyzed. It was also discovered that economic segmentation has a significant impact on MSW amount and content. These issues lead to inefficient collection routes and, as a result, unlawful open garbage disposal which is becoming a major obstacle for sustainable waste management system (Jadoon et al., 2013).

For developing and implementing a feasible management system of solid waste at any particular location, it is essential to measure waste generation rate and categorize their composition (Gomez et al., 2008a). In addition, to establish a garbage collection and treatment scheme for urban residential unit, household waste should be quantified and characterized. Because, it varies in both amount and content in different income levels (Khan et al., 2016). Household garbage is a complex substance that contains a variety of heterogeneous materials (Ogwueleka, 2013). However, a massive amount of heterogeneous uncontrolled solid waste that is creating health and environmental problems. For this consequence, management of municipal solid waste has emerged as a significant concern for Bangladesh's urban areas. In preventing the health and environmental hazards significantly connected with overall waste management process, such concerns must be considered while designing the core waste management operations (processing, segmentation, transporting, and treating) (Suthar & Singh, 2015). In Bangladesh, local administrations are responsible for solid waste management (SWM), which is carried out by the Chief Conservancy Officer (CCO) under the supervision of the city corporation's Mayor. Most important responsibility of these officials is to manage garbage appropriately to make the city more hygienic. However, many municipalities throughout most of the urban areas are overwhelmed and therefore unable to satisfy expanding expectations, due to a lack of staff and supplies, resulting in unsanitary and unpleasant living conditions (Hasan & Chowdhury, 2006).

Nevertheless, for developing and implementing a feasible solid waste management system for a particular location, it is essential to measure waste generation rate and categorize their composition (Gomez et al., 2008a). In addition, to establish a garbage collection and treatment scheme for urban residential unit, household waste should be quantified and characterized (Ogwueleka, 2013). A few studies have been conducted on the quantity and characteristics of urban household's solid waste for Khulna city and most of them are backdated, which is not useful for the present situation to develop any effective decision towards MSW management system targeting the Sustainable Development Goal (SDG).

Considering above facts, this study deals with the production and characterize the household solid waste among different income levels of households in three representative wards (ward no. 17, 23 and 24) of Khulna city. Furthermore, the study has explored factors, which are influencing the production rate of household waste as well as the characteristics of waste components. Besides, this study will be helpful in policy making considering the actual needs targeting appropriate solid waste management system and also reducing the dangers of solid waste to people's quality of life. The findings of this study, may be utilized and replicated across the entire city of Khulna to address the forthcoming difficulties of household waste management.

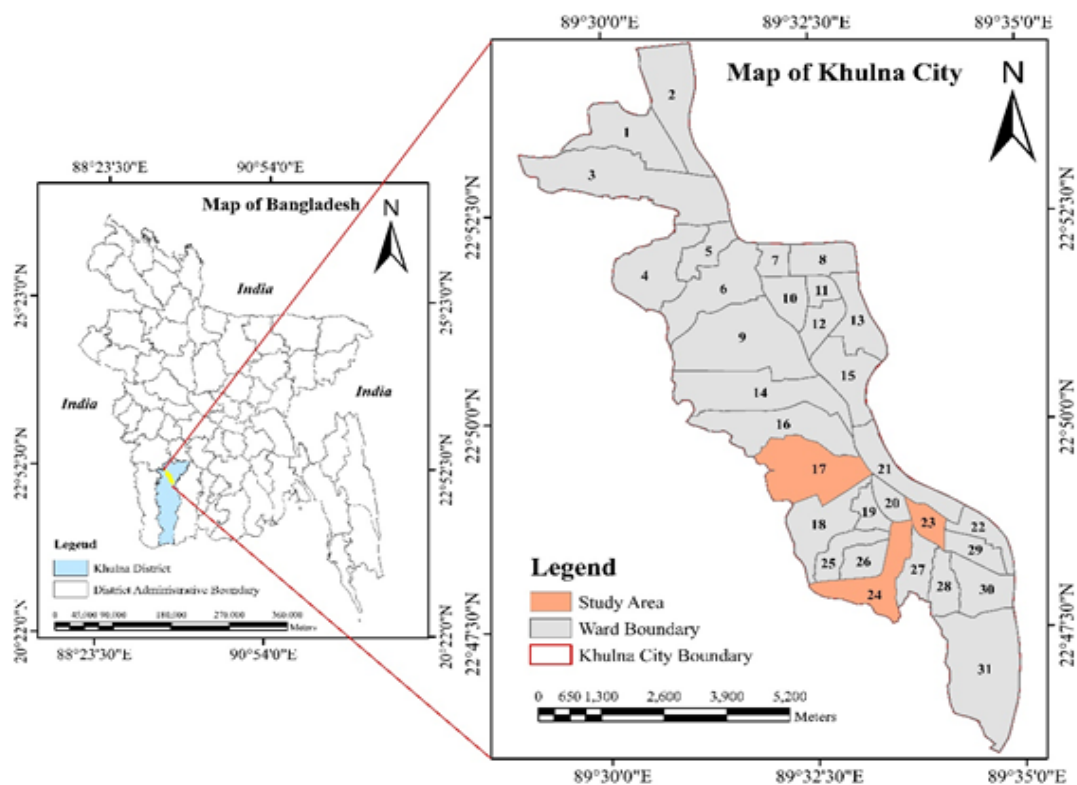


Figure 1. Map of study area.

Methods

Study area

The study has been performed in Khulna city under wards number 17, 23 and 24 which are representing the locality named Sonadanga, Dak Bangla and Nirala respectively. Khulna city is known as the third-largest city of Bangladesh, situated in the south-western part at 22°49'0"N and 89°33'0"E. The area of Khulna city is 45.65 sq. km and has about 1.30 million populations (BBS, 2015; Rahman & Kabir, 2019). The population density of Khulna city is steadily rising, resulting in rapid growth of solid waste production. MSW management is strongly correlated with increased amount of solid waste. Khulna city is becoming more contaminated day by day due to a lack of an effective solid waste management system. In recent years, rapid population growth and significant migration from rural to urban areas have considerable strain on the current solid waste management system of Khulna city. MSW production is predicted to be 520 Mg (megagram) per day, with a majority of food and vegetable wastes and the residential areas are the prime source of producing MSW. About half of the garbage produced from the household level is properly disposed of at the dumping site. The majority of the rubbish is left uncollected and unregulated (Ahsan et al., 2015).

Sampling and measurements

The study has been conducted under wards number 17, 23 and 24. These wards have been selected purposely for the research. Because, out of 31 wards of Khulna City Corporation, people from different socio-economic

groups are found together in these three wards. Different socio-economic strata have been selected based on household income. And from every income group 48 samples have been taken which has helped to represent the study area's waste generation and composition scenario. In total, 144 sample households (48 from each ward) have been considered for this study (Table 1). The stratified random sampling technique has been used for selecting households (Manly, 2009). By following the sampling technique, 16 sample households have been taken from each income group.

Table 1. Categorization of income group and sample distribution

| Ward No | Low Income Group (Less than 20,000 BDT/Month) | Middle Income Group (20,000 to 40,000 BDT/Month) | High Income Group (More than 40,000 BDT/Month) | Total |
|------------|---|--|--|-------|
| Ward No 17 | 16 | 16 | 16 | 48 |
| Ward No 23 | 16 | 16 | 16 | 48 |
| Ward No 24 | 16 | 16 | 16 | 48 |
| Total | 48 | 48 | 48 | 144 |

Source: Field Survey, 2021

Table 2. Demographic data of study population

| Aspects | Categories | Ward no 17 | Ward no 23 | Ward no 24 |
|---------------|------------------|------------|------------|------------|
| Households | No of HH | 7710 | 3226 | 9678 |
| Gender | Male | 16471 | 6982 | 19762 |
| | Female | 16692 | 6811 | 18127 |
| Age Group | Aged 5-9 Years | 3130 | 1101 | 3431 |
| | Aged 10-14 Years | 3543 | 1336 | 3693 |
| | Aged 18 Years + | 22090 | 9867 | 25977 |
| Literacy Rate | 7+ years | 70.1 | 84.7 | 78.3 |

Source: Population and housing census, BBS 2011

A survey questionnaire has been distributed to 144 chosen representative families in order to gather demographic and financial information of the households. To examine the waste production rate and their characteristics at household level in Khulna city, collecting waste from selected households and waste segregation method has been followed. This is one of the most precise methods for calculating the rate and content of solid waste generation (Gu et al., 2015). Following this method, household's waste has been collected for consecutive seven days and weighted using an electronic weighing machine. The amount of garbage collected from each household and their categories are measured and recorded separately. Households were instructed to dump each and every single garbage to that provided bag for that particular day. For collecting the waste, trash bag labeled with income group and house numbers were supplied to each household for these seven days. The plastic bag, containing household wastes were collected, weighed and recorded for each residence. Then the dumped waste has been segregated according to the specified 6 categories by the waste cleaner with direct supervision. Each of the categories was weighted individually using electronic weighing machine. The collected wastes from each bag were spread out on clean plastic sheets and sorted by hand during segregation process (Harun & Rashid, 2019). Every day, the same process has been done for each of the 144 households in the month of June, 2021. The composition categories for this study are given below:

- | | |
|---------------------------------|----------------------------|
| 1. Kitchen waste | 4. Metal & Glass waste |
| 2. Paper & Garden waste | 5. Wood & Textile waste |
| 3. Plastic (film & dense) waste | 6. Composite / Other waste |

Results

Households' socio-economic characteristics

Table 3 shows the socio-economic characteristics of the selected households. Most of the selected families have household members in between 4 to 6, which is around 56.9%. Household members less than 4 in numbers have been counted as 35.4%.

Table 3. Socio-economic characteristics of households

| Type | Value range | Frequency | Percentage |
|-----------------------|------------------------|-----------|------------|
| HH Members | Less than 4 | 51 | 35.4% |
| | Between 4 to 6 | 82 | 56.9% |
| | More than 6 | 11 | 7.6% |
| | Mean = 4.23 | n = 144 | 100.0% |
| Education Level | Primary Level | 28 | 19.44% |
| | Secondary Level | 56 | 38.89% |
| | Higher Secondary Level | 51 | 35.42% |
| | Higher Education | 9 | 6.25% |
| | | n = 144 | 100.0% |
| Environmental Concern | No Concern | 43 | 29.86% |
| | Have Concern | 88 | 61.11% |
| | No Response | 13 | 9.03% |
| | | n = 144 | 100.0% |

Generation of household waste

Table 4 shows the average waste generation rate [kg/HH/day] of different socio-economic group among the three selected wards. It has been found that ward no.17 produces the highest amount of waste, 2.086 kg/HH/day. The middle-income group has the maximum waste generation rate among the three socio-economic categories, with an average of 2.143 kg/HH/day.

Table 4. Rate of average waste generation per household per day

| Income Level | Average Generation Rate [kg/HH/day] | | | Average [kg/HH/day] |
|---------------------|-------------------------------------|-------|-------|---------------------|
| | Ward No. | | | |
| | 17 | 23 | 24 | |
| Low Income | 1.465 | 1.536 | 1.415 | 1.472 |
| Middle Income | 2.303 | 2.102 | 2.023 | 2.143 |
| High Income | 2.489 | 1.94 | 1.986 | 2.138 |
| Average [kg/HH/day] | 2.086 | 1.859 | 1.808 | 1.918 |

Table 5 shows the per capita waste generation rate among the different income levels of three different wards. The maximum per capita waste generation rate has been found 0.63 kg/cap/day in ward No. 17 particularly for the high-income level household. And the minimum per capita waste generation rate has been found 0.29 kg/cap/day again for ward No. 17 particularly for the low-income level. Among the three different socio-economic groups, the highest per capita waste generation rate has also been found on an average 0.061 kg/cap/day for the high-income level households. Furthermore, within these three different wards, the highest per capita waste generation rate has been found on an average 0.483 kg/cap/day for ward No. 17.

Table 5. Average per capita waste generation rate

| Income Level | Generation Rate [kg/cap/day] | | | Average [kg/cap/day] |
|----------------------|------------------------------|-------|-------|-------------------------|
| | Ward No. | | | |
| | 17 | 23 | 24 | |
| Low Income | 0.29 | 0.33 | 0.35 | 0.32 |
| Middle Income | 0.53 | 0.48 | 0.48 | 0.50 |
| High Income | 0.63 | 0.53 | 0.52 | 0.56 |
| Average [kg/cap/day] | 0.483 | 0.447 | 0.450 | 0.460 |

Relationship between the quantity of household waste and socio-economic factors

The degree of relationship between different parameters (such as household income level, household size, per capita waste generation and households waste generation) have been determined using correlation analysis. From the Table 6, it is found that, there is a strong positive correlation between income level and average per capita waste generation per day ($r_{xy} = 0.912$, $p < 0.01$), which means, an individual who lives in a high-income group produces a greater amount of waste every day. Similarly, the income level has a strong positive correlation with the average waste generation per household ($r_{xy} = 0.768$, $p < 0.05$), that means the households with high income level generate larger quantity of solid waste per day. The correlation value between average per capita waste generation and average per household's waste generation shows very strong positive relationship ($r_{xy} = 0.940$, $p < 0.01$), which indicates that the per capita waste generation is larger for those households which produce larger quantity of solid waste per day. The household size also has a positive moderate correlation with daily average waste generation rate ($r_{xy} = 0.650$, $p < 0.01$), that means the more the household size the larger is the amount of daily waste generation (Table 7).

Table 6. Relationship between the waste quantity and Socio-economic factors

| Variables | | Income Level | Average [kg/cap/day] | Average [kg/HH/day] |
|----------------------|---------------------|--------------|-------------------------|------------------------|
| Income Level | Pearson Correlation | 1 | 0.912** | 0.768* |
| | Sig. (2-tailed) | | .001 | 0.016 |
| | N | 9 | 9 | 9 |
| Average [kg/cap/day] | Pearson Correlation | .912** | 1 | .940** |
| | Sig. (2-tailed) | .001 | | .000 |
| | N | 9 | 9 | 9 |
| Average [kg/HH/day] | Pearson Correlation | .768* | .940** | 1 |
| | Sig. (2-tailed) | .016 | .000 | |
| | N | 9 | 9 | 9 |

** Correlation is significant at the 0.01 level (2-tailed); * Correlation is significant at the 0.05 level (2-tailed).

Table 7. Relationship between the waste quantity and Demographic factors

| Variables | | HH Size | Average[kg/HH/day] |
|---------------------|---------------------|---------|--------------------|
| HH Size | Pearson Correlation | 1 | .650** |
| | Sig. (2-tailed) | | .000 |
| | N | 144 | 144 |
| Average [kg/HH/day] | Pearson Correlation | .650** | 1 |
| | Sig. (2-tailed) | .000 | |
| | N | 144 | 144 |

** Correlation is significant at the 0.01 level (2-tailed).

Table 8. Characteristics of household solid waste

| Waste Categories | Average [kg/day] (n = 144) | Average [kg/HH/day] | Percentage |
|---------------------------------|----------------------------|---------------------|------------|
| 1.Kitchen waste | 240.47 | 1.670 | 87.37% |
| 2. Paper & Garden waste | 12.06 | 0.084 | 4.39% |
| 3. Plastic (film & dense) waste | 9.05 | 0.063 | 3.28% |
| 4. Metal and Glass waste | 2.84 | 0.02 | 1.03% |
| 5. Wood and Textile waste | 4.47 | 0.031 | 1.63% |
| 6. Composite / Other waste | 6.33 | 0.043 | 2.30% |

Characteristics of household solid waste

The characteristics of household solid waste generated from the selected 144 households shows that the kitchen waste (240.47 kg/day) has the largest share 87.37% among the other categories. Paper & garden waste, plastic (film & dense) waste, composite / other waste, wood & textile waste, metal & glass waste have the share of 4.39%, 3.28%, 2.30%, 1.63%, 1.03% respectively (Table 8).

Comparison between waste composition and households' income level

Figure 2 demonstrates the waste composition collected from the selected households. The result shows that, household income level is a determinant of characteristics of household waste. The findings show that the households with high income level generate larger amount of kitchen waste (90.37 kg), paper and garden waste (4.99 kg) and metal and glass waste (1.25 kg) per day. Whereas, the other compositions of wastes- plastic (film & dense) waste (3.32 kg), wood and textile waste (2.33 kg) and composite / other waste (2.67 kg) are more in amount per day for middle income household level. This occurs as a result of disparities in household consumption habits caused by socio-economic status. In other words, households with a high-income level and economic status generate a variety of kitchen waste because they consume a variety of foods and these different kinds of foods packaged in plastic, whereas households with a middle-income level are nearly identical to households with a high-income level. It also explains the observed increased use of plastic-film, plastic-dense for all of these socio-economic groups, and reduction of kitchen waste with the lower household's income.

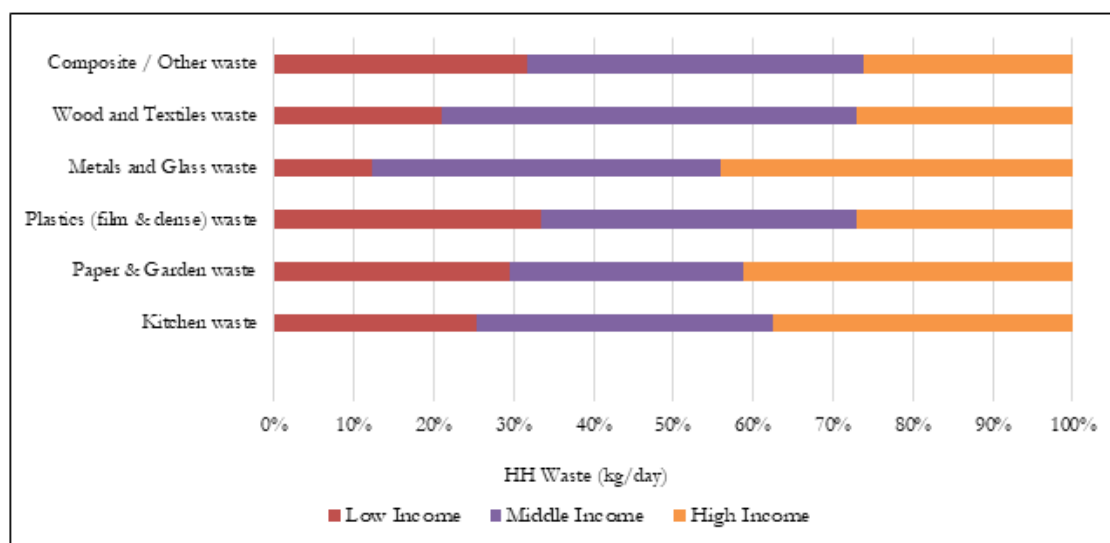


Figure 2. Comparison between waste composition and households' income level

Discussion

This study has tried to explore the generation of household waste among different socio-economic groups in three separate wards in Khulna city. We have calculated the waste generation rate and composition of domestic waste generation for each of the groups. According to the study, the average waste production rate per household is 1.918 kg per day and 0.460 kg per capita per day. The World Bank (1999) estimated a value of 0.15 per person per day, which differs from this result (Hoorweg & Bhada-Tata, 2012). Despite earlier work revealed that a higher income level generates more solid wastes (Khan et al., 2016). But in this study, the highest rate of waste generation has been identified in the middle-income group (2.143 kg/HH/day) (Table 4). The outcomes of this study matched up the findings of other studies, who also found that the middle socioeconomic class generated the most waste (Ojeda-Benítez et al., 2008; Saeed et al., 2009). Some of other investigations have been reported a strong correlation with waste generation rate and household size (Dangi et al., 2011b; Sujauddin et al., 2008b). So, as the size of the family rises, the amount of garbage produced per capita increases. The quantity of daily waste generated increases with household size (Table 7). Several researches (Masoud et al., 2011; Suthar & Singh, 2015) have documented comparable findings, such as the fact that kitchen waste has the largest shares of domestic wastes (87.37%). Paper and garden waste, plastic (film & dense) waste, composite / other waste, wood & textile waste, metal & glass waste account for 4.39%, 3.28%, 2.30%, 1.63%, and 1.03% of total waste, correspondingly (Table 8). The production of paper & garden waste, and plastic waste (bottles, cans, jars, tins, etc.) was relatively higher (7.28%) in the high-income group as well as minimal in the low-income group (Figure 2). All socioeconomic classes have extremely fewer waste for recycling (paper, plastics, metals, and glass).

Conclusion

The amount and composition of household solid waste of different socio-economic groups of Khulna city have been analyzed in this study (Table 4). Among the income groups, the average maximum waste generation rate is 2.143 kg/HH/day by middle income group. On the other hand, in terms of wards maximum waste generation rate is estimated higher in ward No. 17 which is about 2.086 kg/HH/day. Again, the maximum per

capita waste generation rate is found as 0.56 kg/cap/day by the high-income level. And the minimum per capita waste generation rate is 0.32 kg/cap/day by the low-income level. A strong positive correlation between income level and average per capita waste generation per day ($r_{xy} = 0.912$, $p < 0.01$), which means a person who belongs to the high-income level household generate a larger quantity of solid waste per day. The income level has a strong positive correlation with the average waste generation per household ($r_{xy} = 0.768$, $p < 0.05$), that means the households with high income level generate larger quantity of solid waste per day. Household size also has a positive moderate relation with daily average waste generation rate ($r_{xy} = 0.650$, $p < 0.01$), that means the more the household size the larger is the amount of daily waste generation. It is observed that, the kitchen waste (240.47 kg/day) has the largest share 87.37% among the other categories. Paper & garden waste, plastic (film & dense) waste, composite / other waste, wood & textile waste, metal & glass waste have the share of 4.39%, 3.28%, 2.30%, 1.63%, 1.03% respectively. MSW management is strongly correlated with increased amount of solid waste. Lack of proper solid waste management system has been making Khulna city environmentally polluted day by day with an increasing amount of waste. The MSW management tiers such as generation, source storage, collection, on-site storage, transportation, and open dumping is assessed, and it is determined that the current MSW management situation in Khulna is insufficient and not satisfactory (Ahsan et al., 2015). The non-governmental organizations and community-based organizations should come forwards with the strategies suggested here. In order to meet the SDGs target 11.6 "Reduce the environmental impacts of cities" an effective municipal solid waste management system should be part of every city's development plan. So, having analyzed the existing waste generation and composition scenario of Khulna city, necessary measures should be taken for an effective municipal solid waste management system to meet the SDGs target. Such as-

Firstly, most of the cases it has been found that the dumping station is not placed in a proper location. As a result, for low-income group of people as well as environmentally not concerned people sometimes dump their waste in open place besides roads. So, with a proper spatial analysis, we need to place our dumping stations in a place where people of all income groups have an easy access.

Secondly, some of the surveyed dumping stations are beyond the capacity of the waste generated in that particular area. As a result, low-capacity dumping stations are unable to properly capture the waste generated daily. It causes spread out of waste around, spread to the streets and become harmful to the environment and health. So based on this analysis, we can move towards a sustainable waste management by expanding the capacity of dustbins in the area according to the rate of waste production of different income groups of households.

Thirdly, another major problem is that in each case, the dumping stations are open all the time. As a result, it spreads bad smell from there and has a detrimental effect on the environment and health. So, if all the dumping stations could be converted into covered dumping stations, it would be very helpful for the environment and health as well as for managing solid waste properly.

Fourthly, we need to think about this compostable organic waste. We need to set up a waste treatment plant in Khulna City so that we can make this waste into fertilizer.

Fifthly, determining the bin size at the household level can be an efficient strategy to decrease waste collection mismanagement. As a result, the higher income group will be more aware of excessive waste generation and will be penalized if a household generates excess waste under this system. This study finds that plastic (film & dense) waste, wood and textile waste and composite / other waste are some of the most commonly recycled waste materials in Khulna.

Sixthly, recycling & reuse at local level can be an effective way to solid waste management system. In this process, the households will separate waste materials and give it to intermediate seller, then the intermediated seller will give it to the apex traders and the apex traders will send it to the end of chain groups for recycling. Privatization through engaging the non-governmental organizations and community-based groups in the resource distribution, processing of biodegradable waste, and municipal solid waste management

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systems, play a crucial role. As a result, they will be able to propose methods for overcoming current challenges as well as achieving the SDG.

Acknowledgement

This study would not have been possible without the assistance and support of Mr. Md. Sajadul Alam Saimon and Mr. Asif Ahmed. We would like to thank all anonymous reviewers for their inspiring and constructive comments on the paper. Authors are grateful to them for the critical comments and helpful suggestions to improve the manuscript.

References

- Ahsan, A., Alamgir, M., Imteaz, M., Shams, S., Rowshon, M. K., Aziz, M. G., & Idrus, S. (2015). Municipal solid waste generation, composition and management: Issues and challenges. A case study. *Environment Protection Engineering*, 41(3), 43–59.
- Al-Khatib, I. A., Monou, M., Abu Zahra, A. S. F., Shaheen, H. Q., & Kassinos, D. (2010). Solid waste characterization, quantification and management practices in developing countries. A case study: Nablus district – Palestine. *Journal of Environmental Management*, 91(5), 1131–1138.
- Batool, S. A., & Ch, M. N. (2009). Municipal solid waste management in Lahore City District, Pakistan. *Waste Management*, 29(6), 1971–1981.
- BBS. (2015). Bangladesh Bureau of Statistics - Government of the People's Republic of Bangladesh-Statistical-Yearbook. <http://www.bbs.gov.bd/site/page/29855dc1-f2b4-4dc0-9073-f692361112da/Statistical-Yearbook>
- Dangi, M. B., Pretz, C. R., Urynowicz, M. A., Gerow, K. G., & Reddy, J. M. (2011a). Municipal solid waste generation in Kathmandu, Nepal. *Journal of Environmental Management*, 92(1), 240–249.
- Dangi, M. B., Pretz, C. R., Urynowicz, M. A., Gerow, K. G., & Reddy, J. M. (2011b). Municipal solid waste generation in Kathmandu, Nepal. *Journal of Environmental Management*, 92(1), 240–249.
- Gomez, G., Meneses, M., Ballinas, L., & Castells, F. (2008a). Characterization of urban solid waste in Chihuahua, Mexico. *Waste Management*, 28, 2465–2471.
- Gomez, G., Meneses, M., Ballinas, L., & Castells, F. (2008b). Characterization of urban solid waste in Chihuahua, Mexico. *Waste Management*, 28(12), 2465–2471.
- Gu, B., Wang, H., Chen, Z., Jiang, S., Zhu, W., Liu, M., Chen, Y., Wu, Y., He, S., Cheng, R., Yang, J., & Bi, J. (2015). Characterization, quantification and management of household solid waste: A case study in China. *Resources, Conservation and Recycling*, 98, 67–75.
- Harun, M., & Rashid, O. (2019). Sustainable Municipal Solid Waste Management in Dhaka City: Challenges and Issues Towards Sustainable Energy Transition in Response to Climate Change in Dhaka City: Challenges and Issues View project Md Harun Or Rashid Ministry of Environment, Forest & Climate Change Sustainable Municipal Solid Waste Management in Dhaka City: Challenges and Issues. *Journal of Bangladesh Institute of Planners*, 12, 97–107.
- Hasan, G. M. J., & Chowdhury, M. A. I. (2006). Municipal Waste Management and Environmental Hazards in Bangladesh. *Asian Journal of Water, Environment and Pollution*, 3(1), 39–48.
- Hoornweg, D., & Bhada-Tata, P. (2012). *What a Waste: A Global Review of Solid Waste Management*. <https://openknowledge.worldbank.org/handle/10986/17388>

- Jadoon, A., Batool, S. A., & Chaudhry, M. N. (2013). Assessment of factors affecting household solid waste generation and its composition in Gulberg Town, Lahore, Pakistan. *Journal of Material Cycles and Waste Management* 2013 16:1, 16(1), 73–81.
- Khan, D., Kumar, A., & Samadder, S. R. (2016). Impact of socioeconomic status on municipal solid waste generation rate. *Waste Management*, 49, 15–25.
- Manly, B. (2009). Statistics for Environmental science and management. Second Edition. *Environmental and Ecological Statistics*, 295.
- Masoud, S., Ghasem, M. , Omrani, A., Karbassi, A., Farzaneh, , Raof, F., Monavari, S. M., Omrani, G. A., Raof, · F Fakheri, Karbassi, A., & Raof, F. F. (2011). The effects of socioeconomic parameters on household solid-waste generation and composition in developing countries (a case study: Ahvaz, Iran). *Environmental Monitoring and Assessment* 2011 184:4, 184(4), 1841–1846.
- Ogwueleka, T. C. (2013). Survey of household waste composition and quantities in Abuja, Nigeria. *Resources, Conservation and Recycling*, 77, 52–60.
- Ojeda-Benítez, S., Vega, C. A. de, & Marquez-Montenegro, M. Y. (2008). Household solid waste characterization by family socioeconomic profile as unit of analysis. *Resources, Conservation and Recycling*, 52(7), 992–999.
- Rahman, S. M. T., & Kabir, A. (2019). Factors influencing location choice and cluster pattern of manufacturing small and medium enterprises in cities: evidence from Khulna City of Bangladesh. *Journal of Global Entrepreneurship Research* 2019 9:1, 9(1), 1–26.
- Saeed, M. O., Hassan, M. N., & Mujeebu, M. A. (2009). Assessment of municipal solid waste generation and recyclable materials potential in Kuala Lumpur, Malaysia. *Waste Management (New York, N.Y.)*, 29(7), 2209–2213.
- Sujauddin, M., Huda, S. M. S., & Hoque, A. T. M. R. (2008a). Household solid waste characteristics and management in Chittagong, Bangladesh. *Waste Management*, 28(9), 1688–1695.
- Sujauddin, M., Huda, S. M. S., & Hoque, A. T. M. R. (2008b). Household solid waste characteristics and management in Chittagong, Bangladesh. *Waste Management*, 28(9), 1688–1695.
- Suthar, S., & Singh, P. (2015). Household solid waste generation and composition in different family size and socio-economic groups: A case study. *Sustainable Cities and Society*, 14(1), 56–63.



FAMILIAL AND SOCIAL SECURITY FOR THE RURAL ELDERLY: A STUDY OF SHATOIL VILLAGE IN NAOGAON DISTRICT

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KUS: 21/15: 210921

Manuscript submitted: September 21, 2021

Accepted: January 9, 2022

Abstract

In this study, efforts have been made to explore familial and social security for the rural elderly in Naogaon district. The main objective of this study was to learn about the familial and social security they enjoyed in the study area. The social survey method has been employed for data collection in this research. The research area of this study was the Shatoil village of Naogaon district in Bangladesh. Purposive sampling has been used in this research work. The sample size was 100. The findings of the study show that the highest number of the respondents lived in nuclear families. A majority of them were illiterate and poor with an average income of less than 50,000 Taka per year. Most of them could not avail good health services for treatment owing to poverty. Their socio-economic condition was not satisfactory. Familial security was strong. The social security they received in terms of old age allowance was not sufficient. Only 12 percent of the elderly received a monthly allowance. About half of the remaining respondents informed that they did not get any old age allowance because of corruption. Member and Chairman want 3000-4000 taka as a bribe for creating an old age allowance card. None of the widows received widowhood allowance. The government should ensure the access and extend of financial help such as old age allowance, widowhood allowance, and health insurance for the welfare of deprived elderly.

Keywords: Familial security, social security, rural elderly, Bangladesh.

Introduction

“There is a natural movement of individuals from the family of orientation to the family of procreation and this movement represents the beginning of a new generation (Decker, 1980, p. 209).” The aged population is defined in this paper as defined by the Bangladesh Association of Gerontology (2003) -- “the group of the population who belong to the age group of 60 years or more.” McNicoll (2002) studied that the old age (60+) population has tripled in 50 years since 1950, and it is expected to triple again by 2050. The elderly population in Asia is projected to reach 922.7 million by the year 2050 putting Asia at risk to become one of the oldest regions in the world in the next few decades (Asian Development Bank, 2013). In the Rajshahi division, the elderly population projection was 1.7 million for 2015, 1.8 million for 2020, and 2.3 million will be in 2025 based on 2011 census data. In this division, the number of elderly is expected to increase gradually over time (Bangladesh Bureau of Statistics, 2015).

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DOI: <https://doi.org/10.53808/KUS.2022.19.01.2115-s>

At the time of the disaster, sickness, and old age, adult children (especially sons) are deliberated to be the major source of security and economic support to their parents (Cain, 1986). The highest number of elderly people in Bangladesh suffer from some elementary human problems, such as poor senile diseases, economical support, exclusion, negligence, deprivation, socio-economic insecurity, deficiency of proper health care and medicine facilities (Nath & Islam 2009; Islam & Nath 2013; Rhaman, 2000).

In this study, familial security means that the elderly will get proper care from their family, especially from their children. Social security is any government system that provides old-age allowance, shelters, health insurance, and subsidized services to elderly persons. In this study, the rural elderly are the group of the population who belong to the age group of 60 years or more and live in a rural area.

Most of the previous research in this field focused on global, African, or Asian contexts. Some studies have been conducted in Bangladesh's national context. Nonetheless, sociological research on the familial and social security for the rural elderly in North Bengal is scant. No comprehensive research on this topic was found in the Naogaon district. Nowadays due to a lack of adequate family support or a formal social support system, elderly people are now seeking alternative financial and health care support from the government. The present study would be a good resource for the government and non-government policymakers considering the pension, old age allowance program, national elderly policy, and others like microcredit, health, population sector program, and community empowerment. Nevertheless, this study has focused on familial and social security for the rural elderly in Naogaon district only, which covers a specific area of Bangladesh, and therefore, findings cannot be generalized for all areas of Bangladesh.

Materials and Methods

The area selected for this study was the Shatoil village of Manda Upazila under the district of Naogaon in the division of Rajshahi, Bangladesh. The survey method was used to collect data from both males and females aged 60 and above. Purposive sampling has been used in this research work. Generally, Purposive sampling is used in qualitative analysis. But the researcher has used it in quantitative analysis. It may be a limitation/weakness of the study. But the researcher has chosen this sampling based on some arguments. Ma. Dolores C. Tongco (2007) said "purposive sampling may be used with both qualitative and quantitative research techniques" (p.147). Bryman (2012) also said, "a quantitative research approach can be employed for the analysis of qualitative studies and a qualitative research approach can be employed to examine the rhetoric of quantitative researchers. Some qualitative researchers employ quantification in their work" (p. 25). Besides, Purposive sampling is one kind of time and cost-effective sampling method. Since this work has been completed by the researcher's financial support, the researcher has chosen this sampling for saving time and money. Moreover, in this study area, there is only a limited number of elderly respondents who can contribute to this study. So, the researcher has chosen this sampling. The sample size was 100. A semi-structured interview schedule containing both open and closed-ended questions was used to collect the data from 04-06-2017 to 16-06-2017. The questionnaire in English was used to collect the data but during data collection, the questions were translated into Bengali. Each interview lasted for 20-25 minutes to complete in a face-to-face situation, initiated with rapport build-up. For any logical error or incompleteness, collected data were checked by the authors. All the data were tabulated and analyzed using descriptive statistical methods. Statistical procedures, such as tabulation, frequency distribution, percentage, mean, ratio, graphs have been used.

Results

Socio-Economic Conditions of the Rural Elderly

Table 1 indicates that 51 percent of the elderly belonged to the age group 60-69 years, where male elderly was 23 and female elderly was 28. Almost one-fourth (24%) of the elderly belonged to the age group 70-79 years,

where the number of male elderlies was 14 and the number of female elderlies was 10. Thus, almost three-fourths (75%) of the elderly were under 80 years of age. However, in the age category of 80-89 years women (9) outnumbered the men (5). The number of men and women aged 90 years or more were more or less the same (6 males and 5 females).

Table 1. Age categories of the elderly respondents

| Age categories (Years) | Frequency of the respondents (male) | Percentage | Frequency of the respondents (female) | Percentage | Total number of respondents | Percentage |
|------------------------|-------------------------------------|------------|---------------------------------------|------------|-----------------------------|------------|
| 60-69 | 23 | 47.92 | 28 | 53.85 | 51 | 51 |
| 70-79 | 14 | 29.17 | 10 | 19.23 | 24 | 24 |
| 80-89 | 5 | 10.41 | 9 | 17.30 | 14 | 14 |
| 90-99 | 5 | 10.41 | 4 | 7.70 | 9 | 9 |
| 100-109 | 1 | 2.09 | 1 | 1.92 | 2 | 2 |
| Total | 48 | 100 | 52 | 100 | N=100 | 100 |

Figure 1 indicates that the highest (67%) of the respondents belonged to a nuclear family and the remaining 33 percent lived in a joint family.

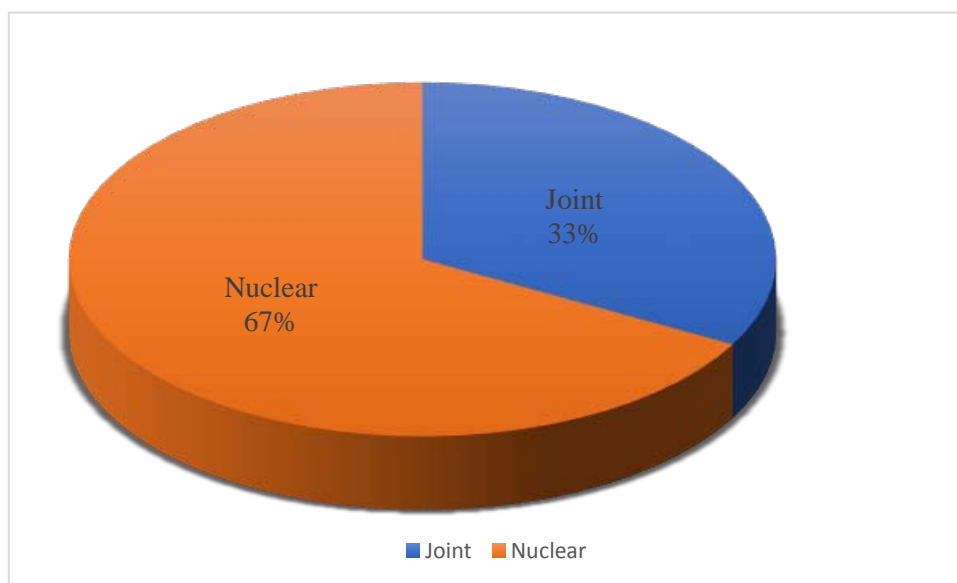


Figure 1. The pattern of respondents' family

Table 2. Educational qualification

| Educational qualification | Frequency |
|---------------------------|-----------|
| Illiterate | 71 |
| Primary | 16 |
| Secondary | 12 |
| Higher secondary | 1 |
| Tertiary | 0 |
| Total | N=100 |

In Table 2 we see that 71 percent of the elderly were illiterate, 16 percent completed primary level education, 12 percent completed secondary education, and only 1 respondent completed higher secondary education. None had tertiary education. Respondents opined that during their childhood the respondents did not have enough opportunity to receive an education. There were very few schools at the time of their education. The distance of these schools was so high that they could not continue their study.

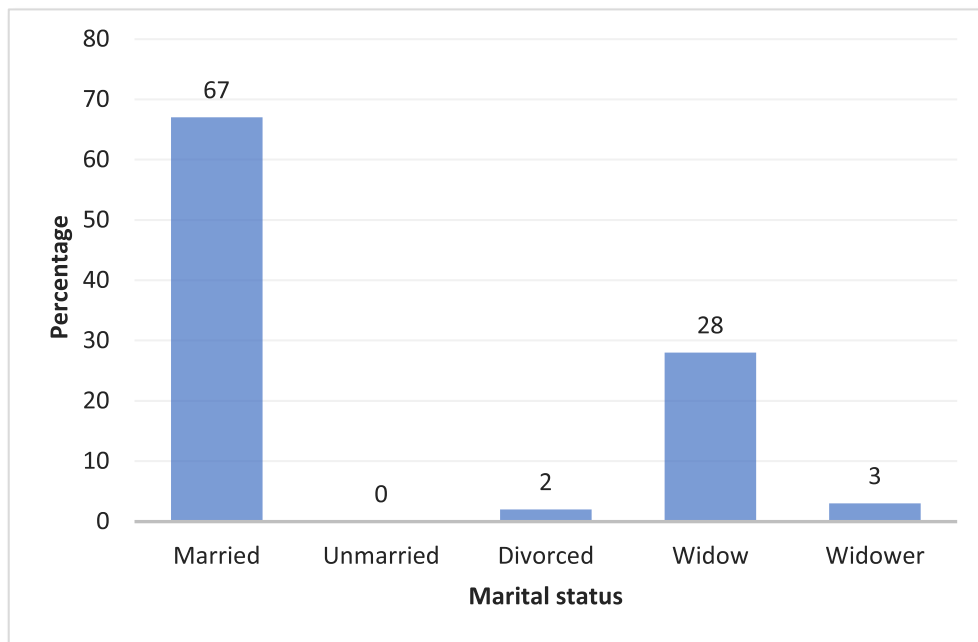


Figure 2. Marital information

Figure 2 shows that 67 percent of the respondents were married, 2 percent were divorced, 28 percent were widows, and 3 percent were widowers. None of the elderly was unmarried. This figure indicates a significant variation between widows and widowers.

Table 3. Individual Savings

| Individual savings | Frequency |
|--------------------|-----------|
| Yes | 25 |
| No | 75 |
| Total | N=100 |

Table 3 portrays that 25 percent of the elderly had individual savings and 75 percent did not. Most of them were poor and illiterate; they were not aware of their future life. For this reason, a majority of the elderly had no individual savings.

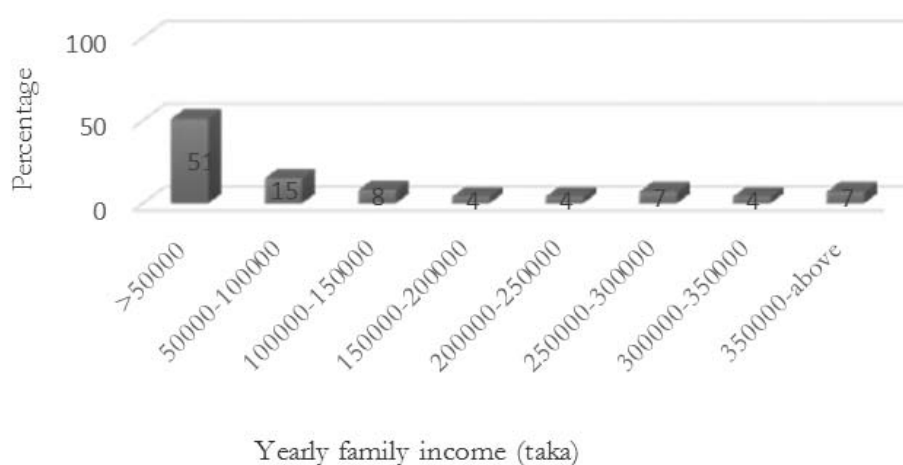


Figure 3. Yearly family income of the respondents

Figure 3 shows that 51 percent of the respondents' yearly family income was less than 50,000 Taka. In this figure, we find that 23 percent of the respondents' families earned between 50,000-150,000 Taka and 26 percent earned more than 150,000 Taka per year. It indicates that a majority of the respondents' families were poor in rural areas. They did not have enough income to maintain their families.

Familial Security for the Rural Elderly

Table 4 points out that 79 percent of the respondents got choiceful food and necessary clothing timely but the remaining 21 percent of the respondents did not. This data indicates that a majority of the respondents' children had taken care of them.

Table 4. Respondents' children provide them choiceful food and necessary clothing timely

| Respondents' children provide them choiceful food and necessary clothing timely | Frequency |
|---|-----------|
| Yes | 79 |
| No | 21 |
| Total | N=100 |

Table 5. Interest pattern in accepting suggestions of parents' in decision making

| Interest in accepting suggestions | Frequency |
|-----------------------------------|-----------|
| Very much interested | 37 |
| Interested | 18 |
| Neutral | 5 |
| Not interested | 8 |
| Not interested at all | 32 |
| Total | N=100 |

Table 5 portrays that 37 percent of the respondents' children were very much interested, 18 percent were interested, 5 percent were neutral, 8 percent were not interested and 32 percent were not at all interested in accepting their suggestions in decision making. According to this table, we can surmise that almost 55 percent of the respondents' children were interested in accepting their suggestions in decision-making. It conveys that the highest of the respondents get priority of their family.

Almost 64 percent of the respondents were sick in the study area. Table 6 shows that 72 percent of the respondents' children were interested and 28 percent of the respondents' children were not interested in spending money for their treatment during sickness time. So, we can say that the highest of the respondents' belonged to a suitable environment in the family as their children were willing to spend money at the time of their sickness.

Figure 4 indicates that 64 percent of the respondents' children considered them as important honorable persons, 22 percent did not, and another 14 percent of the respondents' children partially considered them as important honorable persons. By this data, we can interpret that a majority of the respondent's honored by their family members.

Table 6. Children's interest in spending money for respondents' treatment

| Children's interest in spending money for respondents' treatment | Frequency |
|--|-----------|
| Yes | 72 |
| No | 28 |
| Total | N=100 |

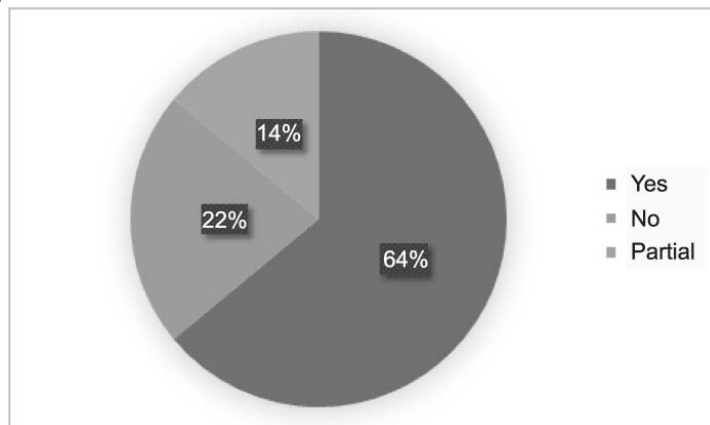


Figure 4. Children's considered them as important honourable persons

Table 7. Pattern of behavior of family members towards the elderly

| Pattern of behavior | Frequency |
|---------------------|-----------|
| Very good | 46 |
| Good | 18 |
| So-so | 17 |
| Bad | 9 |
| Very bad | 10 |
| Total | N=100 |

Table 7 points out that the behavior of children and other family members of 46 percent and 18 percent of the respondents were very good and good respectively. Only 9 percent and 10 percent of the respondents' family members behaved badly or very badly with them respectively. So, we can say that a majority of the respondents' children and family members' behavior was either good or very good towards them which indicates strong familial security of the elderly.

Table 8. "Family members consider them as a burden"- agreement pattern with this statement

| Agreement pattern | Frequency |
|--------------------|-----------|
| Perfectly agree | 20 |
| Agree | 13 |
| Neutral | 10 |
| Disagree | 30 |
| Perfectly disagree | 27 |
| Total | N=100 |

Table 8 points out that 20 percent of the respondents are perfectly agreed, 13 percent elderly are agreed, 10 percent are neutral, 30 percent disagree and 27 percent of the respondents perfectly disagree with the statement on family members consider them as a burden. By these data, we can interpret that the highest of the respondent's positions in the family was auspicious, so they disagree with that statement.

Social Security for the Rural Elderly

In this study area, a majority of the villagers were illiterate and had no adult education program. This area had no adult center/ club. They did not get proper treatment from the community clinic. Table 9 shows that only 12 percent of the respondents received an old-age allowance and the remaining 88 percent of the elderly did not get any old-age allowance. Among the 28 widows, none of the widows received widowhood allowance and among the 2 divorced women, none received divorcee allowance.

Table 9. Type of allowance received by the respondents

| Allowance received | Frequency |
|------------------------------|-----------|
| Received old age allowance | 12 |
| Received Widowhood Allowance | 0 |
| Received Divorcee allowance | 0 |
| Did not get any allowance | 88 |
| Total | N=100 |

Table 10. Causes of not getting old age allowance

| Causes of not getting old age allowance | Frequency | Percentage |
|---|-----------|------------|
| Unwillingness | 13 | 14.78 |
| Good economic condition | 18 | 20.46 |
| Corruption of Member/Chairman of union parishad | 45 | 51.13 |
| Could not communicate with Member/Chairman | 2 | 2.28 |
| Husband gets | 6 | 6.81 |
| Other's (Specify) | 4 | 4.54 |
| Total | 88 | 100 |

Table 10 indicates that 14.78 percent of the respondents opined that they did not get old age allowance because of their unwillingness, 20.46 percent enjoyed good economic conditions in their families, 51.13 percent did not get the allowance due to corruption of Member/Chairman of their Union Parishad, 2.28 percent did not get an allowance because they did not communicate with Member/Chairman, 6.81 percent did not get because their husband got old age allowance, and 4.54 percent did not get old age allowance because of other causes. Through analyzing this table, we can conclude that a majority of the respondents (51.13%) did not get an old age allowance because of the corruption of the Member/Chairman of the union parishad. Respondents' have also informed that Member/Chairman of union parishad wants 3000-4000 taka as a bribe for issuing an old age allowance card. Most of the elderly could not provide them with 3000-4000 Taka as a bribe for that purpose. For this reason, they did not get an old-age allowance. Even among 28 widows, 57.15 percent informed that they did not get widowhood allowance because of the negligence of union parishad Member/Chairman. These data indicate that the elderly are deprived of social security in Bangladesh for various reasons.

Discussion

Rahman et al. (2007) studied in Naogaon district and showed that 87.70 percent of the elderly have sanitary toilets and 12.30 percent have no sanitary toilet but in the present study, the percentage is not the same. The present study shows that 97 percent of the elderly have sanitary toilets and only 3 percent of respondents have no sanitary toilet. On the other hand, they found that 60.70 percent of respondents lived in a joint family and the rest of 39.30 percent lived in nuclear families in rural Naogaon but in the present study almost 67 percent elderly live in a nuclear family and the rest of 33 percent live in a joint family. In the patrilineal joint family, sons are regarded as the preserver of parents in old age (Ghuman and Ofstedal, 2004). Nevertheless, over the last few decades the traditional joint family structure in rural Bangladesh is breaking down because of poverty, attitudes of self-interest, quarrels, and maladjustment (UNESCO, 1992). Since in the present study the highest of 67 percent of respondents live in the nuclear family, the present study resembles the study of (Ghuman and Ofstedal, 2004) and (UNESCO, 1992). In the present study, a majority of the respondents were Muslim. It is also supported by Nolan et al. (2002) and Baumbusch et al. (2016) who said about the religious majority in certain countries.

Elderlies are vulnerable to disregard, absorption, and abuse (Datta, 2006). The highest number of elderly people in Bangladesh suffer from some elementary human problems, such as poor senile diseases, economical support, exclusion, negligence, deprivation, socio-economic insecurity, deficiency of proper health care and medicine facilities (Nath and Islam 2009; Islam and Nath 2013; and Rhaman 2000). Family provides care to older persons to assist and help in different physical tasks such as dressing, bathing, giving medication, and feeding (Morgan and Kunkel, 2006). At the time of the disaster, sickness, and old age, adult children (especially sons) are deliberated to be the major source of security and economic support to their parents (Cain, 1986). The present study resembles the study of Morgan and Kunkel (2006) and Cain (1986).

The findings of the present study did not reveal the study of Datta (2006) and do not resemble the point of exclusion and negligence which is provided by the study of Nath and Islam (2009), Islam and Nath (2013), and Rhaman (2000). Because almost three-fourths of the elderly were not forced by family members to work. Eighty percent of the elderly have expressed that their children provided them food of their choice and necessary clothing timely. Most of the elderly said that their sons and daughter-in-law showed honor to them, accepted their suggestions in decision making, and interacted well with them. More than 72 percent of them said that their children were willing to spend money at the time of their sickness. A majority of the elderly felt that family members did not consider them as a burden.

Findings of the present study resemble another point of the study of Nath and Islam (2009), Islam and Nath (2013), and Rhaman (2000) and fully support the findings of the study carried out by Eoken (2008); Abedin (2003); Laidmäe et al. (2012). UNFPA Representative Eoken (2008) mentioned that the elderly population of Bangladesh suffers from manifold problems concerning health and socio-economic issues. Abedin (2003) studied that older women, especially widows and those without sons, face economic vulnerability. In the present study, the highest of the elderly were very unhealthy and suffered from Arthritis. The yearly family income of a majority of the respondents was less than 50000 Taka. So, their socio-economic condition was not well. Because of insufficient family income, the respondents' children could not provide them good health service despite their earnest desire to do so. They took health services from the village doctors. The houses of the majority of the respondents were made of mud. Three of the respondents had no particular latrine for their use. Among these three elderlies, one of the widow respondent's sanitary conditions was so much piteous. Her husband died. She had a few sons. But after her husband's death, they did not take care of her. She lived alone in a house made of corrugated iron sheets. She had no sanitary latrine because her sons and daughter-in-law did not permit her to use their latrine. They told her— "*Tumi thikhabey toilet babobar kortey parona, tumi aparishkar*" (You are not able to use sanitary latrine properly, you are unclean).

The present research observed that the elderly who had distributed their land among their son and those who had no land to distribute did not have sufficient power, authority, and status in their family. On the other hand, the elderly who had not distributed their land among their sons, had sufficient power, authority, and status in their families. Since a majority of the respondents did not distribute their land among sons, the highest number of the elderly had sufficient power, authority, and status in their families. In this study, more than half of the elderlies' age was between 60 and 69 years. Most of the respondents were married, illiterate, and had no individual savings. A majority of the respondents' families were depending on agriculture but had no sufficient cultivable land. So, they had to pass their life with the economic crisis.

Elderly people suffer most from loneliness (Tomstad et al., 2012) but in this study, most of the elderly people had one to three children and grandchildren in their family; so, they did not face such kind of loneliness. The findings of the present study do not fully support the findings of the study carried out by Shanas (1979), Saha (2005), and Mason (1992). Saha (2005) found that the trend to take care of the elderly at the family level was declining. Mason (1992) showed the traditional family-based systems of care for older people seem likely to erode in Asian countries. But these trends were not observed in the present study area. Shanas (1979) found that perhaps 80 percent of elderly respondents' maintenance is furnished by families and other private individuals. But in the present study, the percentage is not the same. The present study revealed that 97.25 percent of respondents' maintenance is furnished by families (either husband or wife, either son/daughter-in-law or grandchildren) and only 2.75 percent is furnished by private individuals.

Rahman (2000) found that 44.3 percent of elderly people get involved in beggary to maintain their living expenses and family needs. Roy (2002) showed that modern society has failed to ensure honor as well as the dignity of the elders. The present study has a difference from the study of Rahman (2000) and Roy (2002). Because in the present study, none of the elderly involved in beggary and almost all of them informed that their family, neighbors, and relatives showed dignity and honor of them. A majority of the elderly attended social and religious gatherings and were shown respect when they rode on vehicles.

In Bangladesh, numerous organizations work for elderly people. There are many initiatives taken by the government, NGOs, and social organizations for the elderly but it is not enough to cover the whole elderly population of Bangladesh. In this study area, the highest number of respondents (71%) were illiterate. But this village had no adult education center. This village had no arrangement for the recreation of the elderly. There was no club for them where they can get together and had no old home. They did not get proper treatment from the community clinic. This village had no standard hospital for the elderly and had no free health care service programmed. So, most of the elderly face health problems.

Hossain (2014) studied that the elderly are not satisfied in terms of the socio-economic parameter like age, marital status, education, occupation, monthly income, the recipients of old age allowance. The present study's findings resemble the findings of Hossain (2014). In the present study, researchers found that their social security (especially at government and non-government levels) was not sufficient. Only 12 percent of the elderly got an old-age allowance. Among the remaining 88 percent, 51.13 percent have said that they did not get an old age allowance because of the negligence and corruption of the Member/ Chairman of the local government. Member and Chairman want 3000-4000 taka as a bribe for creating an old age allowance card. None of the widow respondents received widowhood allowance.

Policy Recommendations for the Welfare of the Elderly

The policy recommendation is an important issue in research work. In this research work, some policy recommendations have been derived from the analysis of the researchers for the welfare of the elderly:

1. The government should extend different kinds of financial help such as old age allowance, widowhood allowance, health insurance for the welfare of deprived elderly.
2. A majority of the respondents opined that they did not get proper treatment from the community clinic. So, the establishment of an elderly hospital in rural areas and providing free health care services to them was very important. Researchers think GOs and NGOs should increase health care services such as outdoor and indoor health care for the elderly.
3. GOs and NGOs should build up adult education and recreation centers.
4. GOs and NGOs should build up old homes at the upazila level to take care of the rural elderly who have no family.
5. The Government should take proper steps to reduce corruption in the union and upazila parishad.

If the above-mentioned steps are implemented, we can expect that the socio-economic condition of rural elderly will improve and they will get proper familial and social security.

Conclusion

In this study locale, the socio-economic condition of rural elderly was not satisfactory. The highest of the respondents' familial security was strong but social security was insufficient. Kofi Anan said that "Trees grow stronger over the years, rivers wider. Likewise, with age, human beings gain immeasurable depth and breadth of experience and wisdom. That is why older persons should not only be respected and revered; they should be utilized as the rich source to society that they are". It is the responsibility of everyone to take care of them and to utilize this asset. We should honor them. Government should take proper steps to reduce corruption in the union and upazila parishad and ensure different kinds of financial help such as old age allowance, widowhood allowance, and health insurance for the welfare of the elderly. Furthermore, more empirical studies should be conducted covering the entire rural society of Bangladesh to portray their condition.

Acknowledgement

The researcher would like to acknowledge the support from the department of Sociology, University of Rajshahi, Bangladesh. The researcher is also indebted to the villagers and respondents of Shatoil village.

References

- Abedin, S. (2003). *Living and Care Arrangements of the Elderly in Bangladesh*. The elderly contemporary Issues: Bangladesh Association of Gerontology.
- Anan, Kofi. (2020, March 31). "Positive Ageing – Older, Wiser, Happier." Accessed March 31, 2020, <http://www.whenat60.com/positive-ageing-older-wiser-happier/>
- Asian Development Bank. (2013). *Population and Ageing in Asia: The Growing Elderly Population*. <http://www.adb.org/features/asia-s-growing-elderly-population-adb-s-take>, (last accessed on April 14, 2015).
- Bangladesh Association of Gerontology. (2003). *The Elderly: Contemporary Issues*. Dhaka: Bangladesh.
- Bangladesh Bureau of Statistics. (2015). *Elderly Population in Bangladesh: Current Features and Future Perspectives*. Dhaka: Government of the People's Republic of Bangladesh.
- Baumbusch, J., Leblanc, M., Shaw, M., & Kjørven, M. (2016). Factors Influencing Nurses' Readiness to Care for Hospitalized Older People. *International Journal of Older People Nursing*, 11: 149-59.
- Bryman, A. (2012). *Social Research Methods*. Oxford University Press: New York.
- Cain, M. (1986). The Consequences of Reproduction Failure: Dependence, Mobility, and Mortality among Older People of Rural South Asia. *Population Studies*, 40: 375-388.
- Datta, A. (2006). "Greying Citizenship: The Situation of the Older Persons in India". *Indian Journal of Gerontology*, 20 (3), pp. 285-298.
- Decker, David L. (1980: 209). *Social Gerontology: An Introduction to the Dynamics of Aging*. Boston: Little Brown and Company (Canada) Limited, USA.
- Eoken, A. (2008). Aging of Population of the 21st Century. *Bangladesh Journal of Geriatrics*, 43:94-104.
- Ghuman, S., and Ofstedal, M. B. (2004). "Gender and Family Support for Older Adults in Bangladesh". PSC Research Report. No. 04-563. University of Michigan, USA.
- Hossain, Md. F. (2014). Dimension of the Old age allowance Programme of Bangladesh: Socio-economic perspective. *Rajshahi University Journal of Social Science and Business Studies*, Vols. 20-22:19-27.
- Islam, M. N., and Nath, D. C. (2013). A Future Journey to the Elderly Support in Bangladesh. *Journal of Anthropology*, 2012, 1-6.
- Ma. Dolores C, Tongco. (2007). Purposive Sampling as a Tool for Informant Selection. *Ethnobotany Research & Applications*, 5:147-158.
- Mason, Karen O. (1992). Family Change and Support of the Elderly in Asia: What Do we Know? *Asia Pacific Population Journal*, 7(3):13-32.
- McNicoll, G. (2002). World Population Ageing 1950-2050. *Population and Development Review*, 28(4), 814+.
- Morgan, L. A., & Kunkel, S. R. (2006). *Aging, Society and the Life Course* (5th ed.). Springer Publication: New York.
- Nath, D. C., & Islam, M. N. (2009). New Indices: An Application of Measuring the Ageing Process of Some Asian Countries with Special Reference to Bangladesh. *Journal of Population Ageing*, 2 (1-2), 23–39.

- Nolan, M., Brown, J., Davies, S., & Keady, J. (2002). *Longitudinal Study of the Effectiveness of Educational Preparation to Meet the Needs of Older People and their Carers: the Advancing Gerontological Education in Nursing (the AGEIN project)*. English National Board for Nursing, Midwifery and Health Visiting.
- Rahman, Md. Mostafizur., Tareque, Ismail., & Rahman, K. M. Mustafizur. (2007). Living Arrangements and Health Status of the Rural Elderly of Naogaon District, Bangladesh. *Indian Journal of Gerontology*, Vol. 21, No. 4. pp 378-393.
- Rahman, A. (2000). Beggary on Aging: An Analysis (Bangoli). *Dhaka University Patrica*, Vol. 66, pp: 89.
- Rhaman, A.A.S.M. (2000). The characteristics of old age in Bangladesh. *Bangladesh Journal of Geriatrics*, 37: 14-15.
- Roy, S. (2002). "Psychological Problems of Older People and Some Aspects of Alighting from these Problems". *Social Science Journal of Rajshahi University*, Vol. 7, pp. 73-83.
- Saha, S. (2005). Family Care-giving to the Elderly in Bangladesh. *Social Science Journal*, Vol.10:225-235.
- Shanas, E. (1979). The Family as a Social Support System in Old Age. *The Gerontologist*, 19:169-174.
- Tomstad, S. T., Soderhamn, U., Espenes, G. A., & Soderhamn, O. (2012). Living Alone, Receiving Help, Helplessness, and Inactivity are Strongly Related to Risk of under Nutrition among Older Home-Dwelling People. *International Journal of General Medicine*, (5):231– 40.
- UNESCO. (1992). "*The Changing Family in ASIA*", *Social and Human Sciences in Asia and the Pacific*. RUSHSAP Series on Monographs and Occasional Papers 35. Bangkok.



DETERMINANTS OF SATISFACTORY PUBLIC HEALTH CARE SERVICES IN RURAL BANGLADESH

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Manuscript submitted: November 30, 2021

Accepted: February 3, 2022

Abstract

Quality of public health care services is a necessary step in the process of improving health care services. It plays an important role for preventing the overuse, underuse and misuse of health care services and ensuring patient safety. Thus, the study aims to investigate the determinants of satisfactory public health care services in rural Bangladesh. Data are collected from 150 respondents of six upazilas in Khulna and Bagerhat districts who spend at least one day in the upazila health complex for receiving treatment. Quantitative analysis is performed through factor analysis and ordered logistic regression. This study demonstrates that almost three-fourth of the respondents visit hospitals at least 3-4 times in a year, also exerts that almost 70% of the respondents earn/month on an average between BDT 5,001-10,000, whereas nearly 40% of the respondents are compelled to spend almost about BDT 2,001-4,000 for availing medical facilities. Ordered logistic regression demonstrates that, educational status of the respondents, financial & physical access to care and health personnel conduct have positively associated with the respondent level of satisfaction on health care services rendered by public health complexes. Therefore, it is vital to improve the related facilities to increase the satisfaction level. Thus, authors suggest improving the overall structure of rural health complex, ensure availability of essential drugs, increase the financial support to government or initiate community-based health insurance to reduce the out of pocket health expenditure to increase the patient satisfaction level.

Keywords: Public health care services, determinants, ordered logistic regression, Bangladesh

Introduction

Health is considered as a fundamental need that helps to improve the quality of life. National economic and social developments largely depend on the status of a country's available health facilities for their people (Khandakar, 2014). The health care system reflects the socio-economic and technological development of a country. Thus, the government of a country has the responsibility to provide and improve the health care facilities of its people. The effectiveness of a health care system depends on the availability and accessibility of services in a form where the people are able to understand, accept and utilize the facility (Bhat *et al.*, 2016; Khandakar, 2014; Talib *et al.*, 2015).

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DOI: <https://doi.org/10.53808/KUS.2022.19.01.2135-s>

The concept of satisfactory public health care services denotes the degree of health care services provided for the individuals to increase the desired health outcomes which is consistent with the current professional knowledge (Narang, 2011). It includes three elements e.g., structure, process and outcome (Wong *et al.*, 2013). Structure has been connected with infrastructure, technology and resources. On the other hand, process includes interaction between service providers and patients that result in health outcomes. Additionally, outcome includes deaths, disability, satisfaction or responsiveness of the patients. Thus, the stakeholders should focus on the structure, process and outcomes to maintain a quality health care facility (Chassin & Loeb, 2011; Lluch, 2011; Scott *et al.*, 2011).

The government takes several attempts to improve the service quality of rural health care system of Bangladesh. The data of health indicators in Bangladesh clearly states a well improvement of this sector. Statistical evidence in World Bank shows that life expectancy at birth has been increased from 47 to 73 between the years 1971 to 2019. Noticeable issue is that, the female's life expectancy rate (75 years in 2019) is higher than males (72 years in 2019) in Bangladesh. The data also exerts that crude death rate decreases from 19 percent to 6 percent; infant mortality rate per 1000 live birth has been declined from 149 to 26 by the year 1971 to 2019; under five child mortality rates has been reduced from 221 per 1000 live birth to 31 during the year 1971 to 2019. More importantly, 98 percent children aged 12-23 months in Bangladesh have been immunized in 2019 (World Bank, 2019). Thus, these data indicate the radical improvement of the health indicators in Bangladesh.

This improvement is happened by taking a large number of initiatives to establish a strong health care network by developing medical universities, medical colleges, nursing and paramedical institutions and others (Hussain and Raihan, 2016). The Ministry of Health and Family Welfare (MOHFW) has supposed to ensure the basic health care facilities for its people. Mainly, they have two broad divisions e.g., health services and family planning. There exist three tiers to ensure the public health care services among the citizens: primary level (sub-district), secondary level (district) and tertiary level (division). Moreover, community health clinic services help the grass root people to assure the basic health facilities. The government of Bangladesh has taken many initiatives to make available the health care facility at the door step in the remote areas in rural Bangladesh. Statistics of 2019 shows that, almost 7000 hospitals exist in Bangladesh including both government and non-government hospitals (Newspaper Store, 2019).

Despite this progress, the health sector of Bangladesh has some concerning aspect to deliver the quality health care facility among its people. According to the service provider, this sector has not well coordinated to provide the service efficiently. According to Hussain & Raihan (2016), public health care service in Bangladesh rated as the lowest position in terms of user's satisfaction. This report also mentioned that staff absenteeism, pilferage of drugs, mistreatment and negligence of clients, unauthorized and illegal payments collected from customers are responsible for lower customer satisfaction. Importantly, user satisfaction has prioritized in most of the studies to assess the quality health care services (Ashrafun and Uddin, 2011). However, the user satisfaction is still less emphasized among the policymakers (Hossain and Westhues, 2011).

In the existing literature, some qualitative studies have been conducted to explore the issue of user satisfaction. Aldana *et al.* (2001) has explored that service provider's attitude and their behaviors, especially respect and politeness are considered as the most powerful predictor to measure client satisfaction with the public health care services. They further exhibit that there exists negative correlation between patient satisfaction and gift culture in hospital services. Another study on patient satisfaction with quality of health care of hospital services in Bangladesh has identified that there is a loss of faith in public and private hospitals. The study also showed that some factors such as doctor's treatment, the behavior of nurses and their services to patient are significantly influence the patient's satisfaction level (Andaleeb *et al.*, 2007).

A study on stakeholder's satisfaction regarding health care service of Bangladesh is immensely important for health-related service improvement and policy perspective of Bangladesh. Thus, it is important to explore the perception of service receivers about the public health care services and their condition of satisfaction. Hence, the general objective of the study is to find out the determinants of satisfactory public health care services in rural Bangladesh from the perspective of patients who stay at least one day in hospital during the survey year. Several research works have been conducted in many countries on the purpose of determining the quality of public health care services. Some qualitative research works on health care service are found in the context of Bangladesh. However, this study uses quantitative analysis e.g., ordinal logistic regression and factor analysis to reveal the determinants of the satisfactory public health care services is scarce in literature. Also,

So, to make a clear conception on the public health care services in rural Bangladesh, patient's perception and their level of satisfaction is considered in this study. This section briefly explains the background, objective and research gap of the study. Next section delineates the methodology of the study. The study result is portrayed in section three and section 4 recapitulates the study findings with discussion. Ultimately, conclusions and study recommendation are presented in section five.

Methodology

Study area: The study mainly focuses on the assessment of the determinants for satisfactory health care services provided by the public health care centers of rural Bangladesh from the perspective of patient's perception. Two disaster prone districts of the South-western region of Bangladesh, Khulna and Bagerhat are purposively selected as the primary study area for this study. South-western area of Bangladesh is considered as a disaster-prone region and suffer from water salinity, lack of safe drinking water and many problems (Saha 2017; Islam and Hasan, 2016). People of this region affected by different health hazard problems and they mainly depend on the rural health care services for treatment. Therefore, authors select this area to collect the relevant information to fulfill the aforementioned objective.

Sample size and sampling technique: People who receive public health care services from the selected study areas are the population of this study. However, for deep analysis of factors of satisfaction level, people who received not only health care facilities but also needed to stay at least a single day in the hospital to receive treatments are considered as the sample of this study. Authors choose a cross-sectional study among 150 individuals from the selected study areas to complete the study properly. At first, authors purposively select two districts and then randomly select twelve villages from six upazilas (sub-district) to select the respondents. Then, authors list down the respondent's information who receive public health care services from the hospital and stay at least one day in hospital during 1 January 2018 to 31 December 2018. Then, they randomly pick the 150 sample from the listed data and survey them to gather the information. A structured questionnaire was used to collect necessary data as defined in our preplanned study target which was surveyed at the end of 2018.

Study variables and measurement: This study attempts to assess the factors influencing the satisfactory quality public health care services in rural Bangladesh by using a cross-sectional data collecting from two south-western districts in Bangladesh. The explanations of study variable and its measurement scale are described in Table 1.

Analytical strategy: This study has used summary statistics, factor analysis and ordered logistic regression model to trace out the objective of this research. Factors of health care delivery, interpersonal & diagnostic aspect of care, factors of available facilities, health personnel conduct and factors of financial & physical access to care have been used in factor analysis (Table 1A to 1J).

To get a perceived value for each of the main variables through factor analysis, authors have conduct Kaiser-Meyer-Oklin (KMO) test which help to get a perceived value for each of the main variables and the impact of these values on the level of satisfaction defined through ordered logistic regression.

Table 1. List of Variable

| Variable Name | Measurement Scale | Literature Support |
|---|---|-------------------------|
| Gender | 0= male. 1= female | |
| Age | Years | Pradhan & Behera (2021) |
| Educational Status | Year of Schooling | |
| Monthly Income | BDT per Month | |
| Number of Family Member | In numbers | |
| Distance of Health Complex | In Kilometer | Authors Compilation |
| Frequency of Being Hospitalized (Year) | Number of times | |
| Frequency of Receiving Treatment | In numbers | |
| Number of Days Stayed in Hospital | Number of days | |
| Health Care Delivery | | |
| Interpersonal and Diagnostic Aspect of Care | Predicted value generated through Factor Analysis | Narang (2011) |
| Available Facilities | | |
| Health Personnel Conduct | | |
| Financial & Physical Access to Care | | |
| Expenditure for Medical Facilities | BDT per Year | Pradhan & Behera (2021) |

In this study, ordered logistic regression is used to examine the level of satisfaction of the patients with the public health care facilities they receive from Upazila Health Complexes. The ordered logistic regression model is formulated in equation 1:

$$Y_i = \beta_0 + \beta_i X_i + \epsilon_i \dots (1)$$

Where,

Y_i = Dependent variable which shows the level of satisfaction of the respondent (here, 5 = Highly Satisfied, 4 = Satisfied, 3 = Moderately Satisfied, 2 = Dissatisfied, 1 = Highly Dissatisfied), β_0 = Intercept or constant term; β_i = Coefficient of the explanatory variables; X_i = Explanatory variables; ϵ_i = Error term

Results

In this section, authors show an effort to evaluate and examine the socioeconomic and demographic features of the respondents who receives public health care services from the upazila health complex.

Socio-economic and Demographic Feature: Table 2 explains that percentage of female patient is higher than the male patient and it provides an image that the people within the age group of 31-45 receives maximum level of health care services from the health care center. This study also finds that most of the respondent belongs to the nuclear family because more than 75 percent respondents have 4 to 6 family members.

Respondent's monthly income is important in this study because people have supposed to manage their medical treatment with their income. This study exerts that nearly three-fourth of the total respondent's monthly income is only BDT 5,001-10,000. It is also revealed that two-fifth respondent's monthly expenditure for medical facilities is about BDT 2,001-4,000. Thus, it indicates that a significant portion of the respondent's

income is going to fulfill the demand of medical services. Distance is an important issue which can influence the decisions of a respondent about receiving medical facilities from Health Complex. This table shows that most of the respondents have available medical center with distance of 4 to 6 kilometers. Thus, they can easily find out the basic health related solution from this point. It also illustrates that more than 70 percent respondents visit Upazila Health Complex at least 3-4 times in a year. Number of days spend in hospital is considered as an important variable because as the respondents spend more days in the centers they can be more able to provide more accurate perceptions. This study describes that, 46 percent respondents spend 4-6 days to the public health care centers in the last time.

Table 2. Socioeconomic and Demographic Feature

| Gender | Frequency | Percentage |
|--|------------------|-------------------|
| Male | 60 | 40.00 |
| Female | 90 | 60.00 |
| Age Group (Year) | Frequency | Percentage |
| Below 15 | 12 | 8.00 |
| 16-30 | 48 | 32.00 |
| 31-45 | 78 | 52.00 |
| 46-60 | 12 | 8.00 |
| Number of Family Members | Frequency | Percentage |
| 1-3 | 14 | 9.33 |
| 4-6 | 114 | 76.00 |
| 7-9 | 22 | 14.67 |
| Monthly Income (BDT) | Frequency | Percentage |
| Below 5000 | 20 | 13.33 |
| 5001-10000 | 110 | 73.34 |
| 10001-15000 | 15 | 10.00 |
| 15001-20000 | 5 | 3.33 |
| Amount Used for Receiving Medical Facilities (Year) | Frequency | Percentage |
| 0-2000 | 75 | 50.00 |
| 2001-4000 | 61 | 40.66 |
| 4001-6000 | 12 | 8.00 |
| 6001-8000 | 1 | 0.67 |
| Distance of Health Complex (K.M.) | Frequency | Percentage |
| 1-3 | 38 | 25.33 |
| 4-6 | 95 | 63.33 |
| 7-9 | 17 | 11.34 |
| Frequency of Receiving Medical Facilities | Frequency | Percentage |
| 1-2 | 21 | 14.00 |
| 3-4 | 107 | 71.33 |
| 5-6 | 14 | 9.33 |
| 7-8 | 8 | 5.34 |
| Number of Days Being Hospitalized | Frequency | Percentage |
| 1-3 | 22 | 14.67 |
| 4-6 | 69 | 46.00 |
| 7-9 | 35 | 23.33 |
| More than 10 | 24 | 16.00 |
| Total | 150 | 100.00 |

Examining Patients Perception through Factor Analysis: This study has used factor analysis to examine the perceptions of the respondents on several variables those are concerned with quality of public health care services. Table 3 displays the results of the factor analysis and reveals which factors are mostly associated to predict the major five variables: health care delivery, interpersonal & diagnostic aspect of care, available facilities, health personnel conduct, financial & physical access to care.

The results of KMO>0.6 represent (Table 1A to 1J) that adequate availability of doctors, diagnosis system is good, satisfaction over prescriptions and quality of drugs is well are mostly relevant factors for the variable- health care delivery system. Whereas, all the factors except proper disposal of waste and transportation facilities are relevant influential factors for the variable-available facilities. Likely, all the factors under the variables- health personnel conduct and financial & physical access to care provide satisfactory KMO result.

Table 3. Perception through Factor Analysis

| Description of Variables | Scoring Factor | Mean | Standard Deviation | DF* |
|--|----------------|------|--------------------|-------|
| Health Care Delivery | | | | |
| Adequate availability of doctors | 0.612 | 3.05 | 0.911 | 0.672 |
| Diagnosis system is good | 0.529 | 3.17 | 0.730 | 0.725 |
| Satisfaction over prescriptions | 0.529 | 3.55 | 0.538 | 0.983 |
| Quality of drugs is well | 0.323 | 3.63 | 0.536 | 0.603 |
| Recovery is fast | 0.324 | 3.43 | 0.584 | 0.555 |
| Sufficient time to patients | 0.035 | 3.47 | 0.539 | 0.065 |
| Payment arrangements is fine | 0.229 | 3.22 | 0.489 | 0.468 |
| Adequate availability of information | 0.211 | 3.01 | 0.272 | 0.775 |
| Interpersonal & Diagnostic Aspect of Care | | | | |
| Organized systems in reception counter | 0.724 | 3.56 | 0.596 | 1.214 |
| Staffs are honest | 0.627 | 3.59 | 0.667 | 0.941 |
| Good clinical examination | 0.181 | 3.53 | 0.609 | 0.297 |
| Follow-up, monitoring of patients is satisfactory | 0.096 | 3.71 | 0.482 | 0.199 |
| Medical equipment is satisfactory | 0.088 | 3.24 | 0.514 | 0.171 |
| Staffs are skilled | 0.379 | 3.03 | 0.383 | 0.989 |
| Available Facilities | | | | |
| Adequacy of beds & cabins | 0.514 | 3.09 | 0.567 | 0.908 |
| Adequate number of doctors for women | 0.342 | 3.21 | 0.547 | 0.625 |
| Neat and clean hospital premises | 0.499 | 3.58 | 0.547 | 0.914 |
| Clean appearance of staff | 0.499 | 3.75 | 0.463 | 1.079 |
| Proper disposal of waste | 0.207 | 3.68 | 0.482 | 0.429 |
| Waiting time for doctors is logical | 0.278 | 2.99 | 0.426 | 0.652 |
| Transportation facility is satisfactory | 0.200 | 2.39 | 0.515 | 0.389 |
| Health Personnel Conduct | | | | |
| Compassion and support is satisfactory | 0.583 | 3.42 | 0.495 | 1.178 |
| Adequate respect to patients | 0.701 | 3.47 | 0.609 | 1.145 |
| Timely supply of all drugs | 0.642 | 3.36 | 0.662 | 0.969 |
| Financial & Physical Access to Care | | | | |
| Financial feasibility of treatment | 0.575 | 3.21 | 0.575 | 1.000 |
| Easily approachable | 0.575 | 3.05 | 0.577 | 0.997 |

Based on the eigenvalues >1, we exert that adequate availability of doctors explain 82% variation of health care delivery. Similarly, the most explainable factors of other variables are organized systems in reception counter, adequacy of beds and compassion and support is satisfactory under the variable-interpersonal & diagnostic aspect of care, available facilities, and health personnel conduct respectively. A factor with positive scoring factor shows that it has a higher association with the broad variable and vice-versa (Sana, 2012).

Factor of difference (DF) is concluded from scoring factor divided by the standard deviation. The increase or decrease of perception about a variable from one respondent to another respondent in categorical scale (from 1 to 5) is influenced by the DF of that variable. For first variable, satisfaction over prescription has a positive DF which means that a patient's perception about this variable is higher than the perception of the previous patient and it is influenced by the DF.

Table 4. Ordered Logistic Regression on Level of Satisfaction

| Variable Name | Unit of Measurement | Level of Satisfaction |
|---|---|-----------------------|
| Age | Years | 0.86 (0.12) |
| Educational Status | Years of Schooling | 1.32* (0.22) |
| Ratio of Children to the Family Member | Ratio | 7.11* (8.01) |
| Distance of Health Complex | In Kilometer | 1.01 (0.12) |
| Frequency of Receiving Treatment | In numbers | 0.99 (0.17) |
| Medical Expenditure | In BDT | 0.99 (0.00) |
| Number of Days Stayed in Hospital | Number of days | 0.93 (0.07) |
| Health Care Delivery | | 1.12 (0.53) |
| Interpersonal & Diagnostic Aspect of Care | | 0.80 (0.42) |
| Available Facilities | Predicted Value Generated through Factor Analysis | 0.60 (0.42) |
| Health Personnel Conduct | | 3.52*** (1.83) |
| Financial and Physical Access to Care | | 2.94** (1.57) |
| Log pseudo likelihood = -217.13 | | |
| Pseudo R ² = 0.0695 | | |
| Observations= 150 | | |

*Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Source: Author's Compilation*

Ordered Logistic Regression: This study has conducted an ordered logistic regression to image the determinants of satisfactory public health care services in rural Bangladesh. To find out the determinants, authors randomly select the respondents who receive public health care services from the hospital and stay at least one day in hospital in survey year. The respondent's level of satisfaction on health care services rendered

by public health complexes, which is the interest of outcome, is measured by the help of five-point scaling (5=Highly Satisfied, 4=Satisfied, 3=Moderately Satisfied, 2=Dissatisfied and 1=Highly Dissatisfied) and the determinants is presented in table 4.

Table 4 illustrates the proportional odd ratios of mentioned variables and exerts that educational status, ratio of children to the family member; health personnel conduct and financial & physical access to care have significant positive impact on patient satisfaction level.

More specifically, it shows that for a one-year increase of schooling of the respondent, the odds of the high category of satisfaction level compare to the others are 1.32 times greater ($p < 0.10$) which is consistent with the findings of Priporas *et al.* (2008). In general, educated people are heavily concerned to the choice of doctors, maintain regularity of checking and have access to digital platform. Thus, they can easily contact with the doctors for any emergency case which amplify the scope of satisfaction level of the educated respondents. Surprisingly, ratio of children to the family member exhibits a positive significant association to the satisfaction of the respondents. Specifically, for a one unit increase in ratio of children to the family members, the odds of the high category of satisfaction level are 7.11 times ($p < 0.05$) greater compare to the other categories. This result indicates that children and family member ratio is important because in the diseased time, children plays a significant role to manage the family and other household chores. Importantly, for a one-point increase in health personnel's good conduct, the odds of the high category of satisfaction level are 3.52 times ($p < 0.01$) greater comparing to the other categories. Additionally, for a one-point increase in financial and physical access to care index, the odds of the high category of satisfaction level are 2.94 times ($p < 0.05$) greater than lower categories. This result indicates that it is important to provide the mental support, compassion, financial feasibility and easily approaches to the services for higher level of patient satisfaction. This result is consistent with the findings of Fatima *et al.*, (2018); Jalil *et al.* (2017), Westaway *et al.* (2003).

Discussion

This study aims to seek the determinants for satisfactory public health care services through using the factor analysis and ordered logistic regression model. Five interpersonal factors have been used in this study which shows a good internal consistency which is similar to the findings of Narang (2011).

This study identifies that females visit in the hospital is higher than male which is similar to the findings of Findik *et al.* (2010) and Beyene *et al.* (2015) where they state that the rate of females' hospital visiting and number of days stayed in hospital is comparatively higher than their counterparts.

This study recognizes that almost three-fourth of the respondent's visit Upazila Health Complex at least 3-4 times in a year also exerts that two-fifth respondent's monthly expenditure for medical facilities is about BDT 2,001-4,000. This indicates the out of pocket expenditure for medical issues is a significant problem for the rural respondent which is similar to the findings of Molla *et al.* (2017) and Hamid *et al.* (2014).

This study also identifies that health personnel conduct has positive impact on the level of satisfaction. The availability of drugs, adequate respect to patients and satisfactory compassion and support increase the satisfaction level of a patient that is consistent with the findings of (Van *et al.*, 2004). Most of the studies have been recognized that behavior of a doctor and staffs related to medical services is a matter of fact in perspective of patient satisfaction of patient satisfaction (Fatima *et al.*, 2018; Jalil *et al.*, 2017; Manzoor *et al.*, 2019).

This study also recognizes that availability of financial support & physical access to care increase the level of patient satisfaction. Many studies find that increasing pocket expenditure leads to decrease the level of patient satisfaction (Callander *et al.*, 2020; Khalid *et al.*, 2021; Zeng *et al.*, 2018). This is similar to the findings of this study that is financial availability and easily accesses to health care facility improve the level of satisfaction.

Conclusion

Current public health care system is surrounded by many problems and rural respondents face several difficulties to get public health care services. Mainly, government's health care service is important as it saves the pocket expenditure of the households and ensures their health safety. Otherwise, people are compelled to take service from private health care centers which generate a poverty trap especially for poor household. Thus, government takes necessary steps to change the scenario of the rural health complex but still it needs some more attention to ensure good quality of services.

Authors consider some important variables for this study such as; health care delivery, interpersonal & diagnostic aspect of care, available facilities, health personnel conduct, financial & physical access to care. This study finds that years of schooling, health personnel conduct, financial & physical access to care have positive impact on the level of satisfaction of the respondents. The results of estimating these variables through incorporation of respondent's perspectives can provide valuable assistance in improving the quality of public health care services. This study also recognizes that almost three-fourth of the respondent's visit hospitals at least 3-4 times in a year also exerts that two-fifth respondent's monthly expenditure for medical facilities is about BDT 2,001-4,000 whereas the monthly income of the three-fourth of respondent's is only BDT 5,001-10,000.

Thus, this study suggests improving the overall structure of rural health complex and availability of essential drugs in rural area to increase the satisfaction of the patients. Also, suggest to increasing the financial support to government or initiate community-based health insurance to reduce the out of pocket health expenditure especially in the rural area. So, the government should provide necessary financial and technical support for higher patient satisfaction level.

The results of this study throw lights to the areas which require urgent and immediate attention. This will help to employ suitable strategies to improve the quality of public health care service as well as help to restore the faith of the respondents on the public health care centers and subsequently their increased consumption.

The researcher faced many difficulties due to the lack of prior research works in the context of rural Bangladesh. Though only patient's perspective is not enough to access the quality of public health care services, further research work can be done by comprising the aspects of both service providers and clients. Thus, here is option for future research to include patient, doctor and other stakeholders of medical services from different public and private health care centers of different regions of Bangladesh, then it would be more fruitful to assess the quality of health care services. However, this research reveals out the determinants of satisfactory public health care services, which is useful to the policy makers to identify the factors of patient satisfaction level that might be helpful to improve the rural health care facilities.

Acknowledgement

We would like to acknowledge Economics Discipline of Khulna University for providing institutional support. Our complements are due to the respondents, enumerators and concerned others. Finally, our thankful gratitude goes to the anonymous reviewers and editors for their invaluable comments and suggestions to improve this article.

References

- Aldana, J. M., Piechulek, H., & Al-Sabir, A. (2001). Client satisfaction and quality of health care in rural Bangladesh. *Bulletin of the World Health Organization*, 79(6), 512-517.
- Andaleeb, S. S., Siddiqui, N., & Khandakar, S. (2007). Patient satisfaction with health services in Bangladesh. *Health Policy and Planning*, 22(4), 263-273.
- Ashrafun, L., & Uddin, M. J. (2011). Factors determining inpatient satisfaction with hospital care in Bangladesh. *Asian Social Science*, 7(6), 15.

- Beyene, A., Muhiye, A., Getachew, Y., Hiruye, A., Mariam, D. H., Derbew, M., ... & Enquesselassie, F. (2015). Assessment of the magnitude of teenage pregnancy and its associated factors among teenage females visiting Assosa General Hospital. *Emergency Medicine Journal*, 25-37.
- Bhat, S., Gijo, E. V., & Jnanesh, N. A. (2016). Productivity and performance improvement in the medical records department of a hospital: an application of Lean Six Sigma. *International Journal of Productivity and Performance Management*.
- Callander, E. J., Topp, S., Fox, H., & Corscadden, L. (2020). Out of pocket expenditure on health care by Australian mothers: Lessons for maternal universal health coverage from a long-established system. *Birth*, 47(1), 49-56.
- Chassin, M. R., & Loeb, J. M. (2011). The ongoing quality improvement journey: next stop, high reliability. *Health Affairs*, 30(4), 559-568.
- Fatima, T., Malik, S. A., & Shabbir, A. (2018). Hospital healthcare service quality, patient satisfaction and loyalty: An investigation in context of private healthcare systems. *International Journal of Quality & Reliability Management*.
- Findik, U. Y., Unsar, S., & Sut, N. (2010). Patient satisfaction with nursing care and its relationship with patient characteristics. *Nursing & Health Sciences*, 12(2), 162-169.
- Hamid, S. A., Ahsan, S. M., & Begum, A. (2014). Disease-specific impoverishment impact of out-of-pocket payments for health care: evidence from rural Bangladesh. *Applied Health Economics and Health Policy*, 12(4), 421-433.
- Hossen, A., & Westhues, A. (2011). Improving access to government health care in rural Bangladesh: the voice of older adult women. *Health Care for Women International*, 32(12), 1088-1110.
- Hussain, M. M., & Raihan, M. M. H. (2016). Patients' satisfaction with public health care services in Bangladesh: Some critical issues. *Malaysian Journal of Medical and Biological Research*, 3(1), 51-62.
- Islam, M. R., & Hasan, M. (2016). Climate-induced human displacement: A case study of Cyclone Aila in the south-west coastal region of Bangladesh. *Natural Hazards*, 81(2), 1051-1071.
- Jalil, A., Zakar, R., Zakar, M. Z., & Fischer, F. (2017). Patient satisfaction with doctor-patient interactions: a mixed methods study among diabetes mellitus patients in Pakistan. *BMC health services research*, 17(1), 1-13.
- Khalid, F., Raza, W., Hotchkiss, D. R., & Soelaeman, R. H. (2021). Health services utilization and out-of-pocket (OOP) expenditures in public and private facilities in Pakistan: an empirical analysis of the 2013-14 OOP health expenditure survey. *BMC Health Services Research*, 21(1), 1-14.
- Khandakar, M. S. A. (2014). Rural Health Care System and Patients' Satisfaction towards Medical Care in Bangladesh: An Empirical Study. *Journal of Business*, 35(2).
- Lluch, M. (2011). Healthcare professionals' organisational barriers to health information technologies A literature review. *International Journal of Medical Informatics*, 80(12), 849-862.
- Manzoor, F., Wei, L., Hussain, A., Asif, M., & Shah, S. I. A. (2019). Patient satisfaction with health care services; an application of physician's behavior as a moderator. *International Journal of Environmental Research and Public Health*, 16(18), 3318.
- Molla, A. A., Chi, C., & Mondaca, A. L. N. (2017). Predictors of high out-of-pocket healthcare expenditure: an analysis using Bangladesh household income and expenditure survey, 2010. *BMC Health Services Research*, 17(1), 1-8.
- Narang, R. (2011). Determining quality of public health care services in rural India. *Clinical Governance: An International Journal*, 16(1), 35-49.
- Newspaper Store. (2019). Available at. <https://www.newspapersstore.com/hospitals-in-bangladesh/>.

Mamun T.M., Chowdhury S. & Sumi N.S. (2022). Determinants of Satisfactory Public Health Care Services in Rural Bangladesh. *Khulna University Studies*, Volume 19 (1): 128-140

- Pradhan, J., & Behera, S. (2021). Does choice of health care facility matter? Assessing out-of-pocket expenditure and catastrophic spending on emergency obstetric care in India. *Journal of Biosocial Science*, 53(4), 481-496.
- Priporas, C. V., Laspa, C., & Kamenidou, I. (2008). Patient satisfaction measurement for in-hospital services: a pilot study in Greece. *Journal of Medical Marketing*, 8(4), 325-340.
- Saha, S. K. (2017). Cyclone Aila, livelihood stress, and migration: empirical evidence from coastal Bangladesh. *Disasters*, 41(3), 505-526.
- Scott, A., Sivey, P., Ouakrim, D. A., Willenberg, L., Naccarella, L., Furler, J., & Young, D. (2011). The effect of financial incentives on the quality of health care provided by primary care physicians. *Cochrane Database of Systematic Reviews*, (9).
- Talib, F., Azam, M., & Rahman, Z. (2015). Service quality in healthcare establishments: A literature review. *International Journal of Behavioural and Healthcare Research*, 5(1-2), 1-24.
- Van Duong, D., Binns, C. W., Lee, A. H., & Hipgrave, D. B. (2004). Measuring client-perceived quality of maternity services in rural Vietnam. *International Journal for Quality in Health Care*, 16(6), 447-452.
- Westaway, M. S., Rheeder, P., Van Zyl, D. G., & Seager, J. R. (2003). Interpersonal and organizational dimensions of patient satisfaction: the moderating effects of health status. *International Journal for Quality In Health Care*, 15(4), 337-344.
- Wong, C. A., Cummings, G. G., & Ducharme, L. (2013). The relationship between nursing leadership and patient outcomes: a systematic review update. *Journal of Nursing Management*, 21(5), 709-724.
- World Bank. (2019). Available at. <https://data.worldbank.org/indicator/SP.DYN.LE00.IN?locations=BD>.
- Zeng, W., Lannes, L., & Mutasa, R. (2018). Utilization of health care and burden of out-of-pocket health expenditure in Zimbabwe: results from a National Household Survey. *Health systems & reform*, 4(4), 300-312.

Supplementary materials:

Table 1A. Factor Analysis of Health Care Delivery

| Factor | Eigenvalue | Difference | Proportion | Cumulative |
|--------------------------------------|------------|------------|------------|------------|
| Adequate availability of doctors | 1.242 | 0.648 | 0.823 | 0.823 |
| Diagnosis system is good | 0.594 | 0.275 | 0.393 | 1.216 |
| Satisfaction over prescriptions | 0.319 | 0.256 | 0.211 | 1.427 |
| Quality of drugs is well | 0.063 | 0.057 | 0.042 | 1.469 |
| Recovery is fast | 0.006 | 0.131 | 0.004 | 1.473 |
| Sufficient time to patients | -0.124 | 0.120 | -0.082 | 1.391 |
| Payment arrangements is fine | -0.244 | 0.102 | -0.162 | 1.229 |
| Adequate availability of information | -0.346 | | -0.229 | 1.00 |

Table 1B. Scoring Factors and Result of KMO Test

| Factor | Health Care Delivery | KMO |
|--------------------------------------|----------------------|-------|
| Adequate availability of doctors | 0.612 | 0.617 |
| Diagnosis system is good | 0.529 | 0.676 |
| Satisfaction over prescriptions | 0.529 | 0.667 |
| Quality of drugs is well | 0.323 | 0.614 |
| Recovery is fast | 0.324 | 0.494 |
| Sufficient time to patients | 0.035 | 0.397 |
| Payment arrangements is fine | 0.229 | 0.511 |
| Adequate availability of information | 0.211 | 0.435 |

Table 1C. Factor Analysis of Interpersonal & Diagnostic Aspect of Care

| Factor | Eigenvalue | Difference | Proportion | Cumulative |
|---|------------|------------|------------|------------|
| Organized systems in reception counter | 1.111 | 0.796 | 1.092 | 1.092 |
| Staffs are honest | 0.314 | 0.267 | 0.309 | 1.402 |
| Good clinical examination | 0.048 | 0.113 | 0.047 | 1.448 |
| Follow-up, monitoring of patients is satisfactory | -0.066 | 0.031 | -0.065 | 1.383 |
| Medical equipment is satisfactory | -0.097 | 0.196 | -0.095 | 1.288 |
| Staffs are skilled | -0.293 | | -0.288 | 1.000 |

Table 1D. Scoring Factor and Result of KMO Test

| Factor | Interpersonal & Diagnosis Aspect of Care | KMO |
|---|--|-------|
| Organized systems in reception counter | 0.724 | 0.513 |
| Staffs are honest | 0.627 | 0.509 |
| Good clinical examination | 0.181 | 0.569 |
| Follow-up, monitoring of patients is satisfactory | 0.096 | 0.545 |
| Medical equipment is satisfactory | 0.088 | 0.359 |
| Staffs are skilled | 0.379 | 0.591 |

Table 1E. Factor Analysis of Available Facilities

| Factor | Eigenvalue | Difference | Proportion | Cumulative |
|--|------------|------------|------------|------------|
| Adequacy of beds & cabins | 1.041 | 0.721 | 1.253 | 1.253 |
| Adequate availability of doctors for women | 0.320 | 0.244 | 0.386 | 1.639 |
| Neat and clean hospital premises | 0.076 | 0.142 | 0.091 | 1.730 |
| Clean appearance of staff | -0.067 | 0.042 | -0.080 | 1.649 |
| Proper disposal of waste | -0.109 | 0.066 | -0.131 | 1.519 |
| Waiting time for doctors is logical | -0.175 | 0.081 | -0.211 | 1.308 |
| Transportation facilities is satisfactory | -0.256 | | -0.308 | 1.000 |

Table 1F. Scoring Factor and Result of KMO Test

| Factor | Facility | KMO |
|--|----------|-------|
| Adequacy of beds & cabins | 0.515 | 0.703 |
| Adequate availability of doctors for women | 0.342 | 0.645 |
| Neat and clean hospital premises | 0.499 | 0.675 |
| Clean appearance of staff | 0.499 | 0.679 |
| Proper disposal of waste | 0.207 | 0.580 |
| Waiting time for doctors is logical | 0.278 | 0.608 |
| Transportation facilities is satisfactory | 0.200 | 0.555 |

Table 1G. Factor Analysis of Health Personnel Conduct

| Factor | Eigenvalue | Difference | Proportion | Cumulative |
|---|------------|------------|------------|------------|
| Compassion and support are satisfactory | 1.244 | 1.355 | 1.349 | 1.349 |
| Adequate respect to patients | -0.111 | 0.099 | -0.121 | 1.229 |
| Timely supply of all drugs | -0.211 | | -0.229 | 1.000 |

Table 1H. Scoring Factor and Result of KMO Test

| Factor | Health Personnel Conduct | KMO |
|--|--------------------------|-------|
| Compassion and support is satisfactory | 0.583 | 0.715 |
| Adequate respect to patients | 0.701 | 0.629 |
| Availability of all drugs | 0.642 | 0.665 |

Table 1I. Factor Analysis of Financial and Physical Access to Care

| Factor | Eigenvalue | Difference | Proportion | Cumulative |
|------------------------------------|------------|------------|------------|------------|
| Financial feasibility of treatment | 1.038 | 1.187 | 1.488 | 1.489 |
| Ease of obtaining drugs | -0.149 | 0.042 | -0.214 | 1.274 |
| Easily approachable | -0.191 | | -0.274 | 1.000 |

Table 1J. Scoring Factor and Result of KMO Test

| Factor | Financial and Physical Access to Care | KMO |
|------------------------------------|---------------------------------------|-------|
| Financial feasibility of treatment | 0.575 | 0.671 |
| Ease of obtaining drugs | 0.614 | 0.643 |
| Easily approachable | 0.575 | 0.669 |



JOURNALISTS' JOB SATISFACTION IN KHULNA DISTRICT OF BANGLADESH

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KUS-21/20: 151021

Manuscript submitted: October 15, 2021

Accepted: February 14, 2022

Abstract

Job contentment is one of the essential aspects for the journalists to assess the impact of work. Satisfaction in the workplace helps them do work properly; inspire them to perform much more generic work for the news house. This research is all about exploring the nature of job satisfaction of the local newspaper journalists of Khulna District. A total of 70 local newspaper journalists were purposely selected to carry out the study through questionnaire-based surveys. From the analysis, more than half of them have come to this profession, considering journalism as a prestigious one. However, the research reveals that the maximum local newspaper houses don't follow the wage board perfectly. A large portion of the journalists don't think that they have much job security in Bangladesh. If they are given proper facilities, they should come in this noble profession.

Keywords: Job satisfaction, regional newspaper, local journalists, workplace, Khulna

Introduction

Whether or not democratic or authoritarian, journalism's significance in any state is a well-documented fact. Journalism is pervasive as it cuts across our societal fabrics. To use Wahl-Jorgensen and Hanitzsch (2009) words, journalism is "one of the most vital social, cultural, and political institutions" in society (p. 3). McNair (1998) has described journalism as the "pre-eminent cultural shape of our era" (p. 25). Thus, the influential role of journalism in society has resulted in a developing physique of lookup on journalists round the world. Although many journalism scholars (Beam, et al., 2006; Weaver, et al., 1997; Weaver, et al., 1991) have explored numerous variables associated to the exercise of journalism in one of a kind countries, this find out about especially investigates how tons the local newspaper journalists of Khulna District are comfy with their jobs. It additionally examines elements that predict job pride amongst the people of the newspaper house.

Vroom in his definition on job delight focuses on the role of the worker in the workplace. Thus he defines job pride as affective orientations on the section of folks toward work roles which they are presently occupying (Vroom, 1964). Hoppock described job delight as any combination of psychological, physiological and environmental circumstances that purpose a character unquestionably to say I am satisfied with my job (Hoppock, 1935). According to this method even though job satisfaction is below the have an impact on of

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DOI: <https://doi.org/10.53808/KUS.2022.19.01.2120-s>

many external factors, it stays something internal that has to do with the way how the employee feels. That is job satisfaction gives a set of factors that cause a feeling of satisfaction the importance of job pride specifically emerges to floor if had in thinking the many negative consequences of job dissatisfaction such a lack of loyalty, increased absenteeism, increase wide variety of accidents etc. Spector (1997) lists three important elements of job satisfaction. First, groups have to be guided by human values. Such companies will be oriented in the direction of treating employees fairly and with respect.

In such instances the assessment of job pleasure may also serve as a top indicator of worker effectiveness. High tiers of job delight can also be sign of a proper emotional and mental kingdom of employees. Second, the behavior of workers relying on their level of job satisfaction will affect the functioning and things to do of the organization's business. From this it can be concluded that job pride will end result in nice behavior and vice versa, dissatisfaction from the work will result in negative behavior of employees. Third, job satisfaction may additionally serve as indications of organizational activities. Through job delight comparison different levels of pleasure in different organizational devices can be defined, however in turn can serve as a precise indication regarding in which organizational unit adjustments that ought increase performance to be made. For any sort of job, delight, trust, loyalty and other matters help in growing productivity in the workplace.

Tietjen and Myers (1998) said, "Satisfaction creates confidence, loyalty and in the end improves pleasantness in the output of the employed" (p. 226-231). That means job happiness brings enthusiasm among workforces of different Institutes and also increases their powers. It generally means the recognition of their works. Job satisfaction is directly related to the organization's productivity and personal well-being. Therefore, the management and scholars worldwide are interested in research on job satisfaction. In the 1960s and 1970s, research on job satisfaction at the national and professional level began. The first research conducted in 1971 over the professional satisfaction of US journalists using social survey methods on a large scale was the study of follow-up research conducted by Johnstone, Slawski and Bowman(1976) and the last research was conducted in 2019 by Weaver et al (2019) (p.101-130).

In the 21st century, the emerging trends of journalism have created many new opportunities in Bangladesh. With the increasing opportunities, the diversity has also been found with the increased numbers of media. In this condition job satisfaction comes to the journalists as a question. Again, there is a kind of negative opinion about professional satisfaction among all types of media journalists. The journalists working at different newspaper houses are facing more problems and get less opportunity in the present time. This scenario is worth mentioning for the local newspaper journalists. Understanding their job satisfaction is important because it might influence their attitude and behaviors in their daily performance. There is compelling evidence (Brownlee and Beam, 2012; Chan, et al., 2004; Deprez & Raeymaeckers, 2012) that job satisfaction is one of the most researched variables in the practice of journalism. Willnat, et al. (2013) have noted that job pleasure is an sizeable signal of working circumstances and perceived autonomy among journalists in quite a number countries; even though numerous lookup on job delight and its forecasters have been frequent (Lederbogen, 1992; Weaver, et al., 1991; Weischenberg, et al., 2012).

There are both Bangla and English newspaper houses in Khulna city. The study area covers eleven (11) local newspaper houses of Khulna District includes The Daily Purbanchal, The Daily Somoyer Khobor, Dakhinanchal Protidin, The Daily Probaha, Pathoker Potrika, Daily Prabartan, The Daily Tathya, Daily Khulna Times, The Daily Ajker Tathaya, Daily DeshSongjog and The Daily Jonmovumi (Department of Films and Publications, 2021).

A study Deprez and Raeymaeckers (2012) of Flemish journalists discovered news human beings were fairly satisfied with their job. Their job pleasure used to be related to contract type and job autonomy. Hao, et al. (2012) surveyed 930 Singaporean journalists. They discovered the majority of journalists comfortable with their job, with nearly thirteen percent feeling very comfy and sixty four percent of respondents feeling pretty satisfied. The researchers stated that job delight correlated with age, income, and autonomy. And the Russian

lookup (Pasti et al., 2012) including 620 respondents located the self-sufficiency in news preference expected job happiness. Chinese journalists additionally derive their job pride from job autonomy (Chan et al., 2004).

Hanitzsch and Hidayat (2012) studied a relatively excessive degree of job contentment amongst Indonesian reporters. Surveying 385 journalists in 2001, they found that 22.6% of respondents had been very satisfied, 54.4% satisfied, 21.8% dissatisfied. Pay and job security accounted for job satisfaction. Farias et al. (2012) surveyed 1,000 Spanish journalists in 2009, and discovered that job protection correlated with job satisfaction. Their study highlighted a growing conviction that job safety was once a deep seated problem affecting the working stipulations of Spanish journalists. Kirat, et al.(2012) surveyed 2,000 United Arab Emirates journalists and found that job autonomy determined job satisfaction.

Ileri (2016), a Kenya nationwide find out about journalists shown in 2012 to 2013 examines job happiness, profits fulfillment, and predictors of job gratification. Findings point out that, large majority of journalists are satisfied with their modern-day jobs (83%). However, a clear majority (61.8%) are disenchanted with their month-to-month incomes. Nearly, a quarter of journalists fall in the month-to-month profits bracket of US\$375 to US\$625. Compared by gender, male and lady journalists are equally at ease with their jobs. Mature journalists, broadcasting journalists, excessive profits earners, and everlasting journalists pronounced higher job satisfaction. Salary, job safety, and work independence were the key analysts of job gratification.

Fedler (2004), found that traditionally newspaper journalists have blamed 9 sources of stress: their reputations and the reputations' consequences, the need to sacrifice and compromise ideals, the work's bodily and mental demands, lengthy and irregular hours, the occupation's low salary, opposition for jobs and stories, job insecurity, witnessing disasters and poor treatment through editors. Because of these factors, journalism has been described as a profession for the young. In 1889, Julian Ralph of the New York Sun stated that journalism was once excellent desirable for those ages 21 to 30 years historical due to the fact their bodies should manage the lack of sleep, irregular meals and plenty of stress (Fedler, 2004). Fedler (2004) also observed that after about six years in the business, the stress started out to have an effect on journalists' personal and expert lives. This stress can contribute to burnout and turnover.

Those who studied journalism or mass communications in college discovered extra pleasure working in media than working outdoors of media, (Defluer, 1992) and a reporter for the Tampa Tribune reports that most of her friends who took buyouts or left the industry want they had stayed in journalism because it offers greater satisfaction (Macy, 2009).It is often puzzling to newspaper journalism veterans why inexperienced persons are so eager to jump on to what they see as a "sinking ship" (Macy, 2009, p. 43). Journalism is often viewed as a seductive career due to the fact of the thrilling pace, chance to strive new matters and visit new places, meet well-known humans and two days are never alike (Fedler, 2004).Reinardy's 2009 lookup confirms the motivation-hygiene principle inside journalism in that the lack of motivators does not lead to dissatisfaction, simply any satisfaction. The biggest tie to job satisfaction for newspaper journalists is the professionalism of the newspaper the quality of the journalism produced (Reinardy, 2011)

There are more dispositions for altering the place of business in televisions and radios. The above literature overview shows that journalists enjoy various job pleasures relying on the prevailing work stipulations in their countries. The literature also demonstrates that job autonomy, job security, and income are the primary predictors of job satisfaction across nations. However, there are notable instances where different factors predict job satisfaction—for example, contract type in Belgium, age in Singapore and Russia, and training in Taiwan. The present findings will look at the level of job satisfaction with an exclusive predictor amongst the neighborhood journalists of Khulna District.

In Bangladesh, there are some researchers who have found the job satisfaction of the national level journalists who work on different news media. But very few research has been conducted in the near past to measure professional or job satisfaction of our country's local newspaper journalists. But since the main objective of journalism is to serve the people and the local journalists play the primary role in providing public

service through publishing news on different local issues to make local people know about the news happening to them (making the local people know about the real and authentic information), the performance done by them have to be satisfactory. It is advisable to be relevant to the recital of journalists and in this case it is necessary to maintain an acceptable job satisfaction level for them. This research work is over the local newspaper journalists of Khulna District and it can be the small step of and also will help in recovering the gap in measuring the job satisfaction of overall country's journalists working in different sectors.

Three research questions i.e. the degree of job satisfaction among journalists who work for local newspapers; its determinant factors, and possible remedies to improve the situation were set to satisfy the study objectives - the reasons of choosing their profession, exploring the nature of job satisfaction among them through identifying the determinant factors of it.

Materials and Methods

This study was both descriptive and explanatory in nature. It was conducted from September to December of 2019. Based on internet information (www.banglaesh.govt.bd), 11 newspaper houses were found in study areas in which about 200 to 220 journalists were working. Among them the researcher purposely selected 70 journalists for conducting this study. There were 13 local daily newspapers published from this district. Survey research methods had been adopted to collect data following both structured and unstructured questionnaires. A pilot study was carried out on nine respondents by five data collectors. After editing some questions, the questionnaire was finalized and data collection was continued for three months. A telephone-based consent was taken from every respondent and they took 20 more minutes to fill up the questionnaire. When there arose any problem in understanding any issues, data collectors made them easy. After the completion of data collection, data were coded and edited and then processed in SPSS. These processed data were computerized to analyze and interpret the study outcome.

Theoretical framework

The most common and prominent theories in this area, includes Maslow's needs hierarchy theory and Herzberg motivation-hygiene theory. Abraham H. Maslow's (1970) hierarchy of needs was developed to explain human motivation in general. However, its main tenants are applicable to the work setting, and have been used to explain job satisfaction. Within an organization, financial compensation and healthcare are some of the benefits which help an employee meet their basic physiological needs. Safety needs can manifest itself through employees feeling physically safe in their work environment, as well as job security and/ or having suitable company structures and policies. When this is satisfied, the employees can focus on feeling as though they belong to the workplace. This can come in the form of positive relationships with colleagues and supervisors in the workplace, and whether or not they feel they are a part of their team organization. Once satisfied, the employee will seek to feel as though they are valued and appreciated by their colleagues and their organization. The final step is where the employee seeks to self-actualize; where they need to grow and develop in order to become everything they are capable of becoming. Although it could be seen as separate, the progressions from one step to the next all contribute to the process of self-actualization.

Therefore, organizations looking to improve employee job satisfaction should attempt to meet the basic needs of employees before progressing to address higher-order needs. However, more recently this approach is becoming less popular as it fails to consider the cognitive process of the employee and, in general, lacks empirical supporting evidence. Frederick Herzberg's (1959) motivation-hygiene theory indicated that job satisfaction and dissatisfaction are treated as a separate entities influenced by intrinsic and extrinsic factors. The motivators or intrinsic factors are achievement, recognition, work itself, responsibility, advancement, and growth. The hygiene or extrinsic factors that can lead to job dissatisfaction include company policy and administration, supervision, relationship with supervisor, working conditions, salary, and relationships with peers, personal life, and relationships with subordinates, status, and security. In his two factor theory, Herzberg

advanced Maslow's main physiologic and self-realization theory. According to Herzberg (1966), the opposite of job satisfaction is not job dissatisfaction but rather, no job satisfaction. And similarly, the opposite of job dissatisfaction is not job satisfaction, but no job dissatisfaction. It is to mean that the absence of one doesn't imply the existence of the other.

These two theories are closely connected with job satisfaction and this research work is also on the job satisfaction of the local journalists. Maslow's (1970) hierarchy of needs theory mainly explain human motivation, some benefits and also needs of employee and the impact of satisfaction such as positive relationships with colleagues and supervisors in the workplace, and whether or not they feel they are a part of their team organization and it's related to this research work. The second theory which is Herzberg (1959) motivation-hygiene theory focuses on hygiene or extrinsic factors that can lead to job dissatisfaction include company policy and administration, supervision, relationship with supervisor, working conditions, salary, and relationships with peers, personal life, and relationships with subordinates, status, and security which are also connected with the main factors of measuring job satisfaction in this research. By this, these two theories are closely connected with this research work.

Results

Table 1 describes that 91.4 percent of journalists were male whereas only 8.6 percent were female and most of them (60 percent) were 25-40 aged. From the educational qualification of the respondents, it is seen that 42.9 and 35.7 percent have completed their Honors and master's degree respectively.

Table 1. Basic information of the respondents by percentage distribution

| Variables | N (%) |
|---|-----------|
| Gender | |
| Male | 64 (91.4) |
| Females | 06 (8.6) |
| Age (years) | |
| < 25 | 03 (4.3) |
| 25-40 | 42 (60) |
| 41-50 | 14 (20) |
| >51 | 11 (15.7) |
| Qualifications | |
| Master | 25 (35.7) |
| Honors | 30 (42.9) |
| Below Honors | 15 (21.4) |
| Home District of the Respondents | |
| Khulna | 51 (72.9) |
| Bagerhat | 05 (7.1) |
| Satkhira | 04 (5.7) |
| Jashore | 03 (4.3) |
| Gopalganj | 05 (7.1) |
| Magura | 02 (2.9) |

From Table 2 it is seen that 54.3 percent respondents came to this profession considering it as a noble one though 37.1 percent were followed by their personal attraction. While 88.6 percent journalists were to do their work from 1 to 10 hours a day. In the case of professionalism, 55.8 percent of journalists had been working for more than 10 years.

Table 3 indicates that 64.7 percent journalists were selected through scrutiny and examination. 64.3 percent journalists considered their working place as a comfortable one though they mentioned their office prevailing in some problems like space crisis (18.6%), lack of managerial flaw (28.6%), lack of necessary equipment (21.4%) and job insecurity (31.4%). Those who were more reliable (27.1%) were to perform extra work.

Table 2. Choice of profession and its aspects

| Variables | N (%) |
|---|--------------|
| Priority in choosing this Profession | |
| Personal will | 26 (37.1) |
| Getting no other alternative job | 04 (5.7) |
| Family desire | 02 (2.9) |
| Thinking as a noble profession | 38 (54.3) |
| Working hours a day | |
| <5 | 48 (68.6) |
| 6 to 10 | 14 (20.0) |
| 11 to 15 | 5 (7.1) |
| >15 | 3 (4.3) |
| Years in Journalism Profession | |
| <5 | 19 (27.1) |
| 6 to 10 | 12 (17.1) |
| 10 to 15 | 18 (25.7) |
| >15 | 21 (30.1) |

Table 3. Office environment of the respondents

| Variables | N (%) |
|--|--------------|
| Recruiting systems | |
| Through examination and scrutiny | 44 (64.7) |
| Reference of the owners | 4 (5.9) |
| References of political leaders | 3 (4.4) |
| By the choice of editors or supervisors | 16 (23.5) |
| Others | 1 (1.5) |
| Office environment as a workplace | |
| Satisfactory | 45 (64.3) |
| unsatisfactory in some cases | 10 (14.3) |
| Fairly | 15 (21.4) |
| Opinion regarding office environment | |
| Space crisis | 13 (18.6) |
| Managerial flaw | 20 (28.6) |
| Lack of necessary equipment | 15 (21.4) |
| Job insecurity | 22 (31.4) |
| Lack of modern equipment | |
| Yes | 28 (40.0) |
| No | 42 (60.0) |
| Reason behind doing extra work | |
| Experienced | 15 (21.4) |
| Lack of discipline in distributing assignments | 7 (10.0) |
| Reliability | 19 (27.1) |

| | |
|----------------------------------|-----------|
| Lack of manpower | 15 (21.4) |
| Enjoyable | 7 (10.0) |
| Only experienced person in a bit | 5 (7.1) |
| Enforcement | 2 (2.9) |

Table 4 portrays that 65.7 percent of journalists' monthly income was one to ten thousand only and they were not satisfied with their salary. They (35.7%) opined that it had been difficult to meet up the life expenses with that poor salary even 24.3 percent respondents did not get their salary in time. Best performance (60%) was considered as the highest priority for salary increase whereas good performances (64.2%) were enumerated for their promotion.

Table 4. Economic issues of the journalists

| Variables | N (%) |
|---|-----------|
| Monthly income (in taka) | |
| Less than 5,000 | 21 (30.0) |
| 6,000 to 10,000 | 25 (35.7) |
| 11,000 to 15,000 | 6 (8.6) |
| 16,000 to 20,000 | 6 (8.6) |
| 21,000 to 25,000 | 5 (7.1) |
| Above 25,000 | 7 (10.0) |
| Satisfied with current salary | |
| Yes | 24 (34.3) |
| No | 46 (65.7) |
| Opinion about the current salary | |
| Suitable for conducting life expenses | 7 (10.0) |
| Difficult for life expenses | 25 (35.7) |
| Not good at all | 5 (7.1) |
| Less than the quality | 19 (27.1) |
| Good | 9 (12.9) |
| Very good | 5 (7.1) |
| Getting salary in time | |
| Yes | 53 (75.7) |
| No | 17 (24.3) |
| Factors considered regarding salary increase | |
| Best Performance | 42 (60.0) |
| Good management | 12 (17.1) |
| Choice of editor | 16 (22.9) |
| Factors considered for Promotion | |
| Good Performance | 45 (64.2) |
| Choice of management board | 16 (22.9) |
| Choice of editor or supervisor | 9 (12.9) |

Table 5 shows that there was a system of rewarding (62.9%) related to their satisfaction but much senior junior salary disparity (41.4%) was observed and regulation of the wage board was not followed at all (47.2%). 70 percent of respondents had changed their news house due to job insecurity (28.6). One of the dissatisfactions was marked by their provision of time with family (55.9%).

Table 5. Factors associated with journalists' satisfaction/dissatisfaction

| Variables | N (%) |
|--|-----------|
| Rewarding | |
| Yes | 44 (62.9) |
| No | 26 (37.1) |
| Opinion on senior-junior salary disparity | |
| The Disparity is much | 29 (41.4) |
| Considering normal | 17 (24.3) |
| No disparity seen | 24 (34.3) |
| Regulation of wage board | |
| Follows perfectly | 15 (21.4) |
| Partly follows | 22 (31.4) |
| Does not follow at all | 33 (47.2) |
| Change of News House | |
| Yes | 49 (70.0) |
| No | 21 (30.0) |
| Given enough time to family | |
| Yes | 32 (44.1) |
| No | 38 (55.9) |
| Reasons behind changing news house | |
| For higher salaries | 11 (15.7) |
| Job insecurity | 20 (28.6) |
| Bad behave of the management | 7 (10.0) |
| Much workloads | 11 (15.7) |
| Salaries were paid irregularly | 9 (12.9) |
| Bad behavior of the supervisor | 12 (17.1) |
| Trends of Changing the Current Workplace | |
| Yes | 39 (55.7) |
| No | 31 (44.3) |

Christen, Iyer and Soberman (2006), provide a model of job satisfaction presented in Figure, 1, in which the following elements are included: Job related factors, Role perceptions, Job performance and Firm performance.

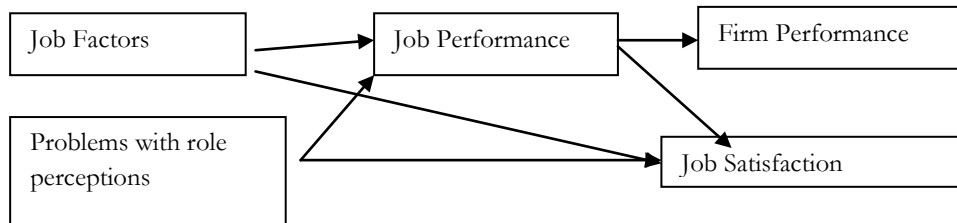


Figure 1. Christen, Iyer and Soberman model of job satisfaction (Christen *et al.*, 2006)

Lawler and Porter (1967) give their model of job satisfaction which unlike the previous model places a special importance on the impact of rewards on job satisfaction, Figure 2.

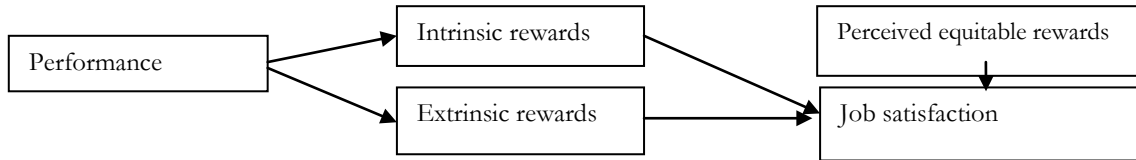


Figure 2. Lawler's and Porter's model of job satisfaction (Lawler and Porter, 1967)

According to this model the intrinsic and extrinsic rewards are not directly connected with job satisfaction, because of the employee's perceptions regarding the deserved level of pay. Locke and Latham (1990) provide a somewhat different model of job satisfaction. They proceed from the assumption that the objectives set at the highest level and high expectations for success in work provides achievement and success in performing tasks. Success is analyzed as a factor that creates job satisfaction. This model is presented in Figure 3.

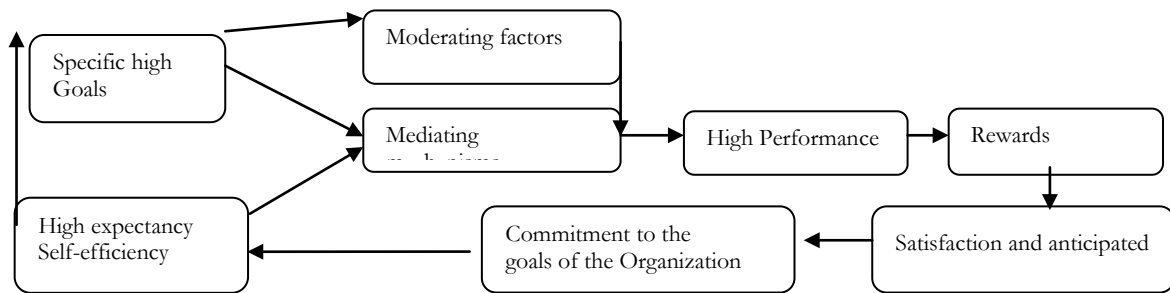


Figure 3. Locke and Latham model of Job Satisfaction (Locke and Latham, 1990)

Table 6. Job Satisfaction Factors (Herzberg, 1976)

| Hygiene Factors | Motivators |
|-------------------------|----------------|
| Company policies | Achievement |
| Supervision | Recognition |
| Interpersonal relations | Work itself |
| Work conditions | Responsibility |
| Salary | Advancement |
| Status | Growth |
| Job security | |

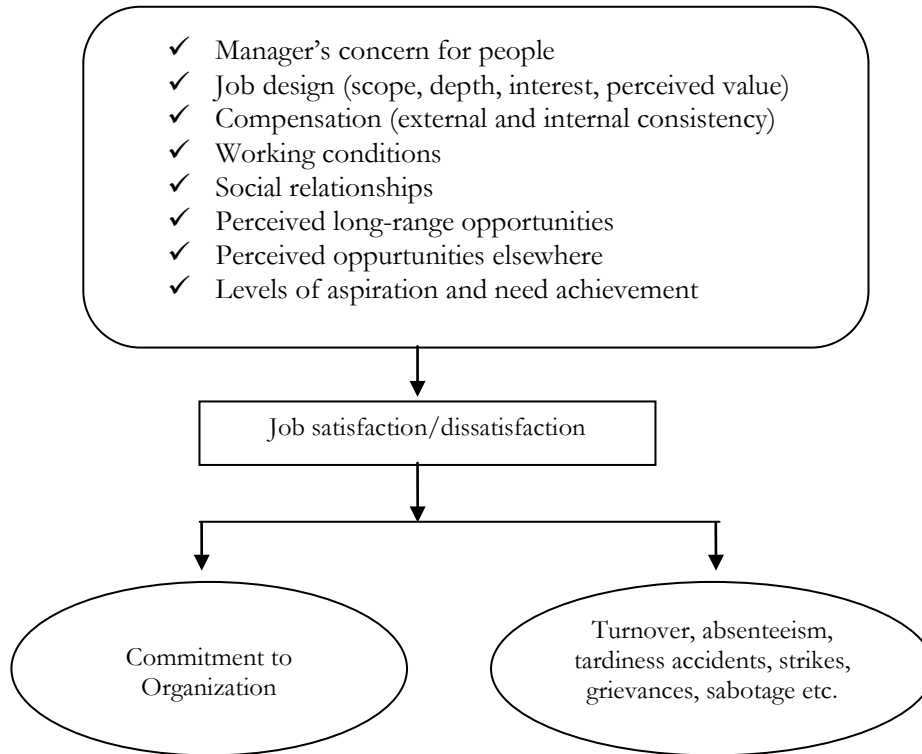


Figure 4. Determinants of satisfaction and dissatisfaction (Rue and Byaes, 2003)

Discussion

Most of the respondents of the study were from male group, which means the local newspaper houses of the Khulna District were mainly male dominated. The highest education level of the journalists was graduation and a lion share of that belongs to the Khulna district. Majority of the respondents came to this profession thinking journalism as a noble profession. They had to work every day for at least 5 hours. There is an interesting part that the local newspaper journalists of Khulna District were more experienced though there were some newcomers in few newspaper houses.

One important thing is that very few of the journalists got a handsome amount of salary but the majority of the journalists got a salary between 6 to 10 thousands. Though the majority of the journalists said they got their salary in due time. Besides there were higher numbers of seniors-juniors salary disparity visibility. There were three factors considered to their salary; Best Performance, Good management and Choice of editor and one the other hand approximately the same criteria were followed to give a promotion. Maximum houses follow the rewarding system if they do better in their performance. In the case of the wage board following, their houses did not follow the wage board. One third of the journalists had to work a good number of times in a day for this reason they didn't give enough time to their family. Space problem is a big deal in every local newspaper house of Khulna.

Most of the houses followed the examination and scrutiny system to recruit new employees though some were recruited by the reference of political leaders. Working environment of their house was quite

satisfactory though a major number of the journalists confessed it not having necessary modern equipment of technical and logistic support. Due to reliability they had to perform extra work on the other experience was provocation of their doing extra work. The journalists were sometimes free in their bit, that means sometimes they are not free also and the pressure of management and the pressure of supervisor or the editor is the main cause of their not being free. A large number of the journalists changed their house because of the insecurity of their job, even some mentioned the misbehavior of their boss.

Job satisfaction is under the influence of a series of factors such as: The nature of work, Salary, Advancement opportunities, Management, Work groups and Work conditions. A somewhat different approach regarding the factors of job satisfaction is provided by Rue and Byars, Figure 4. When talking about factors of job satisfaction the fact that they can also cause job dissatisfaction must be kept in mind. Therefore the issue whether job satisfaction and job dissatisfaction are two opposite and excludable phenomena? There is no consensus regarding this issue among authors. Herzberg's Two Factor Theory is probably the most often cited point of view. In fact the main idea is that employees in their work environment are under the influence of factors that cause job satisfaction and factors that cause job dissatisfaction. Therefore all factors that have derived from a large empirical research and divided in factors that cause job satisfaction (motivators) and factors that cause job dissatisfaction (hygiene factors), Table 6.

Usually job satisfaction is measured by using general scientific research methods such as the questionnaire. Some of the most commonly used techniques for measuring job satisfaction include:

- Minnesota satisfaction questionnaire and
- Job description index

The Minnesota Satisfaction Questionnaire is a paper-pencil type of a questionnaire and can be implemented both individually and in group, but it does not take sex differences into consideration. This questionnaire has one short form and two long forms that date from 1967 and 1977. In fact 20 work features in five levels are measured with this questionnaire. Responding to this questionnaire usually takes between 15-20 minutes. The 1967 version of the Minnesota Satisfaction Questionnaire uses the following response categories:

- Not satisfied,
- Somewhat satisfied,
- Satisfied,
- Very satisfied and
- Extremely satisfied.

The 1977 version of the Minnesota Satisfaction Questionnaire uses the following response categories

- Very satisfied,
- Satisfied,
- Neither satisfied nor dissatisfied,
- Dissatisfied and
- Very dissatisfied.

Conclusion

Journalists' job satisfaction is one of the most imperative things like other occupations. Journalists are part and parcel in a society and also in a country because they do work for the betterment of the people across the country. In this study, findings exhibit that the journalist's career delight is common in their career however at the same time they are enormously upset with their monthly incomes and maximum of the information homes don't follow the wage board at all. The most important predictors of job delight have been determined to be

income, job autonomy that is skill free in their beat whilst working, and job safety. This study also reveals that, most of the local newspaper journalists of Khulna District are sometimes free in their beat. Job security is another predictor of job satisfaction. This study also indicates that most of the journalists have no job security and as the reason they show it's because of not being a proper job rule and their job isn't stable. Overall, this finds very beneficial insights and facts about job pride amongst journalists in Khulna District.

To conduct this study the researcher faced some sorts of limitations such as sample size determination .If it was possible to take a large proportion of samples, the result would have been more accurate. Another problem was the time and budget as if the researcher carried out this study by self-funding that he didn't reach a large number of respondents. However, it was not possible for the researcher to survey all the local newspaper journalists' of Khulna District because they are too busy in their workplaces. For instance, some news homes declined to participate in such an essential study-citing a number of reasons. It was once also challenging to conduct full- scale research activities barring funding.

Acknowledgement

Our special thanks go to those who volunteered to help collect data. We also thank the journal editor and anonymous reviewers for their suggestions that have improved the quality of the work. We especially want to thank the employees in the sample who took their valuable time completing the questionnaire and who, in our opinion, provided authentic responses.

References

- Beam, R., A. (2006). Organizational Goals and Priorities and the Job Satisfaction of USA, Journalists. *Journalism & Mass Communication Quarterly*, *SAGE Publications*, 83(1), 169-185.
- Brownlee, B. Beam, R., & Weaver, D. (2009). Changes in professionalism of U.S. Journalists in the Turbulent Twenty-First Century. *Journalism & Mass Communication Quarterly*, 86, 277-298.
- Chan, J., Pan, Z., & Lee, F. (2004). Professional Aspirations and Job Satisfaction: Chinese Journalists at a Time of Change in the Media. *Journalism & Mass Communication Quarterly*, 81, 254-273.
- Chowdhury, S. A. M. (2017). *How Satisfied the Professional Journalists are in their Job*. Bangladesh Press Institute, Dhaka, Bangladesh.
- Christen, M., Iyer, G. & Soberman, D. (2006). Job Satisfaction, Job Performance, and Effort: A Reexamination Using Agency Theory, *Journal of Marketing*, 70,137-150.
- Defluer, M. H. (1992). Foundations of Job Satisfaction in the Media Industries. *Journalism Educator*, 47(1), 3-15.
- Deprez, A., & Raeymaeckers, K. A. (2012). Longitudinal Study of Job Satisfaction among Flemish Professional Journalists. *Journalism and Mass Communication*, 2(1), 1-15.
- Farias, P., Rojano, F., Roses, S., Weaver D. & Willnat L. (2005). The global journalist in the 21st century: Journalists in Spain, New York, *Routledge*, 3 (5), 295-305.
- Fedler, F. (2004). Insiders Stories: Coping with Newsroom Stress: An Historical Perspective. *American Journalism*, 2(3), 77-106.
- Hanitzsch, T., Hidayat, D., Weaver D. & Willnat L. (2012). The Global Journalist in the 21st Century: Journalists in Indonesia. New York, *Routledge*, 5(3), 36-51.
- Hao, X., George, C., Weaver D. & Willnat L. (2012). The Global Journalist in the 21st Century: Singapore Journalism: Buying into a Winning Formula. New York, *Routledge*, 91-103.
- Herzberg, H. F. (1976). *Motivation-Hygiene Profiles*, 3(5), 20-22.

- Ibne Zaman M.M., Rashid M. and Kabir M.R. (2022). Journalists' job satisfaction in Khulna district of Bangladesh. *Khulna University Studies*, Volume 19 (1): 141-154
- Herzberg F. (1959). The motivation to work. *Wiley*, New York, 2(3), 15-20.
- Herzberg. F. (1966). Work and the Nature of Man. *Cleveland World Publishing Company*, 32.
- Hoppock, R. (1935). *Job Satisfaction*, Harper and Brothers, New York, 47.
- Ileri, K. (2009). Correlating News Media Agenda-setting to Public Opinion in Kenya's 2007 General Election (Unpublished master's thesis). Miami University, Oxford, OH.
- Kioko Ileri (2013) A Study of Newspaper Columnists' Framing of Kenyan Politics Inpost-2007 Election Violence, *Ecquid Novi: African Journalism Studies*, 34(2), 109-127. Doi: 10.1080/02560054.2013.782284
- Ileri, J. K. (2015). Constructing a Portrait of Kenyan Journalists in the 21st Century: Demographics, Job Satisfaction, Influences on News Values and Autonomy, and Standards of Journalism Training (Doctoral dissertation, Indiana University).
- Ileri, K. (2016). High job satisfaction despite low income: A national study of Kenyan journalists. *Journalism & mass communication quarterly*, 93(1), 164-186. doi.org/10.1177/1077699015607334
- Johnstone, J. W., Slawski, E. J., & Bowman, W. W. (1972). The Professional Values of American Newsmen. *Public opinion quarterly*, 36(4), 522-540.
- Johnstone, J., Slawski, E., & Bowman, W. (1976). The news people: A sociological portrait of American Journalists and their Work. Urbana, *University of Illinois Press*. 28 (3), 225-230.
- Kirat, M., Weaver D. & Willnat L. (2012). The Global Journalist in the 21st Century: Journalists in the United Arab Emirates, *Routledge*, New York, 26(2), 458-469.
- Lawler, E.E. III and Porter, L.W. (1967). The Effect of Performance on Job Satisfaction. *Industrial Relations*, 20-28.
- Lederbogen, U. (1992). *Watchdog or missionary? : A portrait of African news people and their work: a case study in Tanzania* (Vol. 31). Peter Lang Pub Incorporated.
- Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting & task performance*. Prentice-Hall, Inc.
- McNair, B. (1998). *The sociology of journalism*. Oxford University Press.
- Macy, Beth. (2009). Hunkering Down. *American Journalism Review*, 31(3), 38-43.
- Maslow, H. A. (1970). *Motivation and Personality*, Harper & Row Publisher, 2nd edition, New York,
- Mellado, C., Weaver D. & Willnat L. (2012). The Chilean Journalist: The Global Journalist in the 21st Century, *Routledge*, New York, 382-399.
- Mwesige, P. (2004). Disseminators, advocates and watchdogs: A profile of Ugandan journalists in the new millennium. *Journalism*, 5, 69-96.
- Pasti, S., Chernysh, M., & Svitich, L., Weaver D. & Willnat L. (2012). The global journalist in the 21st century: Russian journalists and their profession, *Routledge*, New York, 267-282.
- Reinardy, S. (2009). Beyond Satisfaction: Journalists Doubt Career Intentions as Organizational Support Diminishes and Job Satisfaction Declines. *Atlantic Journal of Communication*, 17(3), 126-139.
- Reinardy, S. (2011). Newspaper journalism in crisis: Burnout on the rise, eroding young journalists' career commitment. *Journalism*, 12(1), 33-50.
- Rue, L.W. and Byars, L. (2003). *Management, Skills and Application*, McGraw-Hill/Irwin, New York, 259.
- Stephen D. Reese (2007). The American Journalist in the 21st Century: U.S. News People at the Dawn of a New Millennium, *Political Communication*, 24(4), 459-461, DOI: 10.1080/10584600701641755

- Spector, P.E. (1997). *Job satisfaction: Application, Assessment, Causes and Consequences*, Thousand Oaks, CA, *Sage Publications*, Inc.
- Tietjen, M., & Myers, R. (1998). Motivation and job satisfaction. *Management Decision*, (36) 226-231.
- Tsfati, Y., Meyers, O., D. Weaver & L. Willnat (2012). *The global journalist in the 21st century: Journalists in Israel*. *Routledge*, New York, 443-457.
- Vroom, V.H. (1964). *Work and motivation*, *John Wiley and Sons*, New York, 99.
- Wahl-Jorgensen, K., & Hanitzsch, T. (2009). Introduction: On why and how we should do Journalism Studies. In *The Handbook of Journalism Studies*, *Routledge*, 23-36.
- Weaver, D. H., & Wilhoit, G. C. (1997). The American Journalist in the 1990s: US News People at the End of an Era (Book Review). *Journalism and Mass Communication Quarterly*, 74(1), 200.
- Weaver, D. H., Wilhoit, G. C., Bergen, L. A., Drew, D. G., & Lafky, S. A. (1991). *The American journalist: A portrait of US news people and their work*. Indiana University Press.
- Weaver, D. H., Willnat, L., & Wilhoit, G. C. (2019). The American journalist in the digital age: Another look at US news people. *Journalism & Mass Communication Quarterly*, 96(1), 101-130.
- Weischenberg, S., Maja M, Armin S, David H, Weaver, & Willnat, L. (2012). *Journalism in Germany in the 21st Century, and the Global Journalist in the 21st Century*, *Routledge*, New York, United States of America.
- Willnat, L., Weaver, D. H., & Choi, J. (2013). The global journalist in the twenty-first century: A cross-national study of journalistic competencies. *Journalism Practice*, 7(2), 163-183.



FACTORS ASSOCIATED WITH AGE AT MENOPAUSE: A CROSS-SECTIONAL STUDY IN KHULNA DISTRICT, BANGLADESH

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KUS: 21/45: 301121

Manuscript submitted: November 30, 2021

Accepted: March 20, 2022

Abstract

Menopause is a significant milestone in women's lives that marks the end of their reproductive capability. This study aimed to explain the factors associated with age at menopause among women at Khulna district of Bangladesh. Survey method was followed to carry out the study. A total of 186 postmenopausal women aged 45 years and above were purposively selected for data collection. Following a semi-structured interview schedule, data were collected between February and March, 2019. In multivariate analysis, residence, number of pregnancy, experience of breast feeding, and having gynecological problem were found to be significantly associated ($p < 0.05$) with age at menopause of the respondents. Women living in rural areas, having higher number of pregnancy, having breastfeeding experience, and not having any gynecological problem were more likely to experience delayed menopause. Programs and campaigns motivating women for family planning, breastfeeding and proper monitoring of gynecological problems in rural areas could be helpful for safe and delayed menopause.

Keywords: Menopause, age, women, Khulna, Bangladesh

Introduction

Age at natural menopause has been attributed by different genetic and environmental factors which has become one of the most commonly explored areas in menopause-related research in recent decades due to various health risks associated with it. It is an inevitable stage of life for women as their reproductive capability is terminated by this process. All the women living beyond the age of 45 to 50 years experienced this period of transition from reproductive to non-reproductive level of life (Avin Alva & Chethan, 2016). In reference to the natural menopausal age range between 45 to 55 years worldwide, the maximum range for menopause is up to 55 years in Bangladesh (World Health Organization, 1996; Rahman et al., 2011). Menopause before the age of 45 is considered as early menopause and experiencing menopause after 50 years is known as late (Panay, 2008). Early menopause has been reported to be associated with different health issues including higher risk of cardiovascular disease and osteoporosis (Gong et al., 2016; Muka et al., 2016; Cauley et al., 2012; Thulkar & Singh, 2015). On the contrary, delayed menopause has been associated with a higher risk of breast cancer (Li et al., 2017), endometrial (Ali, 2014), and ovarian cancer (Tsilidis et al., 2011; Wellons et al., 2017).

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DOI: <https://doi.org/10.53808/KUS.2022.19.01.2145-s>

Menopausal age is influenced by multifaceted factors including socioeconomic, demographic, environmental, genetic and reproductive health related factors. Among the environmental factors, it is evident that smoking is significantly associated with the menopausal age (Schoenaker et al., 2014; Sun et al., 2012). Of the genetic factors, mother's age at menopause has been reported to have an influence on women's early or late menopause (Ceylan & Özerdoğan, 2015). Socioeconomic factors including religion, residence, age at marriage, BMI (Awal et al., 2019), education (Ali et al., 2020; Awal et al., 2019), occupation (Ahuja, 2016), and lower socioeconomic status (Canavez et al., 2011; Li et al., 2012) in general has been reported as the significant determinants of age at menopause in some previous studies. Women with lower education (Li et al., 2012; Pérez- Alcalá et al., 2013; Wang et al., 2018), separated, divorced and widowed (Ahmed et al., 2016), and underweight (Szegda et al., 2017; Tao et al., 2015; Wang et al., 2018) are more likely to experience early menopause.

Previous studies have shown that among reproductive factors, age at menarche, regularity of menstrual cycle, use of oral contraceptives, and number of pregnancies were the significant determinants of menopausal age (Bjelland et al., 2014; Eum et al., 2014; Sapre & Thakur, 2014). In addition, use of contraceptive pills (Ahuja, 2016; Ali et al., 2020), and earlier menarche (Wang et al., 2018) was also reported to be linked with early menopause. Some believe that an increase in duration of breastfeeding might have prolonged the period of lactating amenorrhea resulting in a probable delay in reaching menopause (Sharma & Mahajan, 2015).

A large number of the women in Bangladesh have low level of education, and therefore are not conscious about menopause, its symptoms, side effects and the influencing factors (Rahman et al., 2011). At present, research on menopause is getting attention due to the increased life expectancy of women (Natarajan et al., 2013). However, majority of the study so far has been carried out in the western world, and very little is known in the context of Bangladesh. Therefore, the present study attempts to explore the association of socioeconomic, demographic and reproductive health related factors with age at menopause among women in Khulna district of Bangladesh. The study will help government and NGOs to implement or improvise policies and programs as necessary.

Materials and Methods

Setting and design

The study was cross-sectional in nature as it focused on identifying the factors associated with age at menopause among women in Khulna district of Bangladesh. Data were collected from women who belonged to the age group of 45 years and above with an experience of menopause. We used survey method in two areas: Sonadanga Thana (Ward 16) under Khulna City Corporation and Pankhali village of Dacope Upazila under the same district.

Sampling

The study areas were purposively selected in order to show rural-urban differences in age at menopause among women. A total of 186 women were purposively selected from two areas of Khulna District during February and March, 2019.

Study instrument and measures

A semi-structured interview schedule comprising open-ended and close-ended questions was used for data collection. The main outcome variable of this study was the age at menopause dichotomized into <45 (early menopause) and ≥ 46 years (delayed menopause). Several socioeconomic, demographic and reproductive health related factors were considered as independent variables which include religion, residence, education,

occupation, income, Body Mass Index (BMI), age at marriage, age at menarche, menstrual regularity, number of pregnancy, experience of breast feeding, use of oral contraceptive pills and gynecological problem. Women's BMI was measured from the ratio of weight (kg) to height (m) square. Digital weighing machine and vertical scale were used to measure these parameters.

The BMI was classified into three categories i.e. underweight (<18.5 kg/m²), normal weight (18.5-23.9 kg/m²), and overweight (≥ 24 kg/m²) (World Health Organization, 2020). Age at marriage was classified into <18 and ≥ 18 years, and age at menarche in two categories: ≤ 12 and ≥ 13 years. In line with a previous study (Sarkar et al., 2010), monthly household income was categorized into lower-middle income (BDT 5001-10000), upper-middle income (BDT 10001-15000), and high income (BDT >15000) categories. Apart from that menstrual regularity (regular/irregular), number of pregnancy ≤ 2 and ≥ 3 times), history of breast feeding (yes and no), use of oral contraceptive pills (yes and no), and gynecological problem (yes and no) were considered for categorization. All these variables were considered for the bivariate analysis, and further for the regression analysis. The selected variables were chosen for the current study as these were found to be significantly associated with menopausal age in previous studies (Ali et al., 2020; Awal et al., 2019; Ceylan & Özerdoğan, 2015; Li et al., 2012; Wang et al., 2018).

Ethical issues

Data were collected by seeking verbal consent from the respondents participated in this study. It has been assured that anonymity will be maintained and the provided information will be kept confidential. Besides, they were free to opt out from the survey at any time without prior justification. Data were collected by the female researcher considering the gender sensitivity so that the participants can express their views without any hesitation as the study focuses on reproductive health issues.

Data analysis

For bivariate analysis we used Pearson's chi-square test followed by binary logistic regression for the multivariate analysis. At first, chi-square test was conducted to find out the significant factors of age at menopause considering 5 percent significance level. Binary logistic regression model was then employed to detect the significant predictors of age at menopause and results were presented by using Adjusted Odds Ratios (AOR) with 95 percent confidence intervals (CI). Data were analyzed by using Statistical Package for the Social Sciences (SPSS) version 20.0.

Results

Factors associated with age at menopause

Different socioeconomic and demographic variables were considered to conduct the bivariate analysis to predict the factors associated with age at menopause (Table 1). Residence, education and occupation of the women, BMI, age at marriage, menstrual regularity, number of pregnancy, experience of breast feeding, use of oral contraceptive pills, and gynecological problem have significant association ($p < 0.05$) with age at menopause of the women.

Table 1. Age at menopause and its determinants

| Variables | Age at menopause | | Chi-square value | p value |
|--|------------------|------------|------------------|---------|
| | ≤ 45 years | ≥ 46 years | | |
| Religion | | | | |
| Muslim | 50 (59.5) | 66 (64.7) | 0.527 | 0.468 |
| Non-Muslim | 34 (40.5) | 36 (35.3) | | |
| Residence | | | | |
| Urban | 71 (84.5) | 36 (35.3) | 45.692 | <0.001* |
| Rural | 13 (15.5) | 66 (64.7) | | |
| Education | | | | |
| Non-literate (0) | 6 (24.0) | 19 (76.0) | 15.716 | 0.001* |
| Primary (1-5) | 13 (30.2) | 30 (69.8) | | |
| Secondary (6-10) | 32 (48.5) | 34 (51.5) | | |
| Higher education (≥11) | 33 (63.5) | 19 (36.5) | | |
| Occupation | | | | |
| Working | 33 (39.3) | 23 (22.5) | 6.132 | 0.013* |
| Non-working | 51 (60.7) | 79 (77.5) | | |
| Monthly household income (in BDT) | | | | |
| Lower-middle income (5001-10000) | 9 (33.3) | 18 (66.7) | 3.297 | 0.192 |
| Upper-middle income (10001-15000) | 12 (37.5) | 20 (62.5) | | |
| High income (>15000) | 63 (49.6) | 64 (50.4) | | |
| BMI | | | | |
| Underweight | 42 (61.8) | 26 (38.2) | 12.691 | 0.002* |
| Normal | 19 (31.7) | 41 (68.3) | | |
| Overweight | 23 (39.7) | 35 (60.3) | | |
| Age at marriage | | | | |
| <18 | 21 (31.3) | 46 (68.7) | 8.074 | 0.004* |
| ≥18 | 63 (52.9) | 56 (47.1) | | |
| Age at menarche | | | | |
| ≤12 | 39 (54.2) | 33 (45.8) | 3.847 | 0.050 |
| ≥13 | 45 (39.5) | 69 (60.5) | | |
| Menstrual regularity | | | | |
| Regular | 31 (28.2) | 79 (71.8) | 29.684 | <0.001* |
| Irregular | 53 (69.7) | 23 (30.3) | | |
| Number of pregnancy | | | | |
| ≤2 | 63 (65.6) | 33 (34.4) | 33.547 | <0.001* |
| ≥3 | 21 (23.3) | 69 (76.7) | | |
| History of breast feeding | | | | |
| Yes | 26 (23.6) | 84 (76.4) | 48.260 | <0.001* |
| No | 58 (76.3) | 18 (23.7) | | |
| Use of oral contraceptive pills | | | | |
| Yes | 52 (65.8) | 27 (34.2) | 22.244 | <0.001* |
| No | 32 (29.9) | 75 (70.1) | | |
| Gynecological problem | | | | |
| Yes | 62 (67.4) | 30 (32.6) | 34.570 | <0.001* |
| No | 22 (23.4) | 72 (76.6) | | |

*Significant at 5%

Predictors of age at menopause

Binary logistic regression was executed including the ten statistically significant ($p < 0.05$) variables extracted from the thirteen variables considered in our bivariate analysis. Overall, four variables including residence, number of pregnancy, history of breast feeding, and having gynecological problem were significantly associated with age at menopause among married women in our regression analysis. Women residing in rural area were 6.371 times more likely to have menopause in a later age compared to those who live in urban area (CI: 2.454-16.537; $p < 0.001$). Similarly, women who had three or more pregnancies had 3.368 times greater chances of late menopause compared to their counterparts (CI: 1.234-9.191; $p = 0.018$). Besides, women who did not experience breastfeeding were 0.201 times more likely to have menopause at an early age (CI: 0.075-0.542; $p = 0.002$), and women who did not have any gynecological problem had around five times higher probability of getting menopause in later age (CI: 1.922-12.561; $p = 0.001$) compared to those with gynecological problems.

Table 2. Age at menopause and its predictors

| Factors | Coefficient (β) | p value | AOR | CI (95%) |
|--|-------------------------|-----------|-------|--------------|
| Residence | | | | |
| Urban ^(ref) | | | | |
| Rural | 1.852 | <0.001* | 6.371 | 2.454-16.537 |
| Education | | | | |
| Non-literate (0) ^(ref) | | | | |
| Primary (1-5) | 0.876 | 0.241 | 2.401 | 0.555-10.389 |
| Secondary (6-10) | 0.330 | 0.654 | 1.390 | 0.329-5.874 |
| Higher education (≥ 11) | 0.658 | 0.477 | 1.930 | 0.315-11.833 |
| Occupation | | | | |
| Working ^(ref) | | | | |
| Non-working | -0.230 | 0.694 | 0.794 | 0.252-2.501 |
| BMI | | | | |
| Underweight ^(ref) | | | | |
| Normal | -0.088 | 0.869 | 0.915 | 0.320-2.616 |
| Overweight | 0.378 | 0.464 | 1.459 | 0.531-4.005 |
| Age at marriage | | | | |
| <18 ^(ref) | | | | |
| ≥ 18 | 0.339 | 0.523 | 1.401 | 0.496-3.970 |
| Menstrual regularity | | | | |
| Regular ^(ref) | | | | |
| Irregular | 0.743 | 0.176 | 2.103 | 0.717-6.169 |
| Number of pregnancy | | | | |
| ≤ 2 ^(ref) | | | | |
| ≥ 3 | 1.214 | 0.018* | 3.368 | 1.234-9.191 |
| History of breast feeding | | | | |
| Yes ^(ref) | | | | |
| No | -1.602 | 0.002* | 0.201 | 0.075-0.542 |
| Use of oral contraceptive pills | | | | |
| Yes ^(ref) | | | | |
| No | 0.663 | 0.130 | 1.942 | 0.823-4.579 |
| Gynecological problem | | | | |
| Yes | | | | |
| No | 1.592 | 0.001* | 4.913 | 1.922-12.561 |

*Significant at 5%; AOR = Adjusted Odds Ratio

Discussion

The current study aimed to examine the factors associated with age at menopause among women in Khulna district of Bangladesh through a cross-sectional survey. Results of our regression analysis indicate that residence, number of pregnancy, history of breast feeding, and experience of gynecological problem were significantly associated with age at menopause among the participants. Findings of this study revealed that women residing in countryside area were more likely to face menopause in later age compared to those who live in urban area which corresponds with some previous studies (Awal et al., 2019; Avin Alva & Chethan, 2016). The possible reason might be the lower level of education among rural women (Akter et al., 2018) and lack of consciousness about reproductive health as well as the dearth of healthcare facilities in those areas.

We observed that women who had three or more pregnancies had greater chances to experience delayed menopause compared to the others, and this finding is consistent with other study (Ceylan & Özerdoğan, 2015). Another study reported that women who had a greater number of pregnancies experienced late menopause compared to those with smaller number of pregnancies (Lee et al., 2012).

We found that the duration of breastfeeding was significantly associated with menopausal age among the participants. Our results indicate that women without a record of breastfeeding were more likely to have menopause at an early age. This is consistent with another study which confirms that an increase in the duration of breastfeeding might have prolonged the period of lactating amenorrhea resulting in a probable delay in reaching menopause (Dasgupta & Ray, 2009). We argue that since many of the urban women are working mothers, they had less breastfeeding opportunities and experiences compared to rural women who are housewives in most cases. In addition, urban women are more conscious about beauty (body shape) and fitness issues which might have demotivated them to practice breastfeeding.

In our analyses, we also recorded that women who do not have any gynecological problem had higher probability of getting late menopause compared to their counterparts. This finding is aligned with the results of a prior study which revealed that there is a significant relation between gynecological problem and hormone affecting the age at menopause (Lawton et al., 2012). One possible reason of this might be the side effects of taking medicine during a longer period due to chronic health problems.

One of the strengths of the present study is that it has taken into account a wide range of factors related to the age at natural menopause among women living in south-western region of Bangladesh. We used established models of predicting the factors associated with menopause using empirical field data. However, we acknowledge that there are several limitations of this study. First, the sample size is small, so it is difficult to generalize implications across the country although such specification is always helpful for region-specific interventions. Secondly, purposive sampling technique was used which might raise questions of bias. Lastly, the information was collected mostly based on recalls, but it is evident that menopausal age studies through recall is reasonably dependable (Cairns et al., 2011).

Conclusion

The menopausal experience encompasses a multidimensional interaction among socio-cultural, psychological, and environmental factors along with biological changes relating to altered ovarian hormone status or deficiency. Our study was designed to explain the factors associated with age at menopause among women in Khulna district of Bangladesh. Findings of the study revealed that residence, number of pregnancy, history of breast feeding, and having gynecological problem were significantly associated with age at menopause amongst women in the study area. Strategies and interventions to promote awareness and encourage birth control programs could be effective in addressing menopausal adversities. Longer breastfeeding and proper monitoring of gynecological problems in rural settings are equally important for safe and sound menopause

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experience. We encourage further nationwide research involving mixed-methods for a more comprehensive idea on this matter in post-pandemic era.

References

- Ahmed, K., Jahan, P., Nadia, I., & Ahmed, F. (2016). Assessment of menopausal symptoms among early and late menopausal midlife Bangladeshi women and their impact on the quality of life. *Journal of Menopausal Medicine*, 22(1), 39-46.
- Ahuja, M. (2016). Age of menopause and determinants of menopause age: A PAN India survey by IMS. *Journal of Mid-life Health*, 7(3), 126.
- Akter, S., Chanda, S. K., Mamun, A. A., Razu, S. R. (2018). Role of education in women empowerment: A study from Khulna district of Bangladesh. *International Journal of Innovative Research*, 3(1), 19-23.
- Ali, A. T. (2014). Reproductive factors and the risk of endometrial cancer. *International Journal of Gynecologic Cancer*, 24(3), 384-93.
- Ali, M., Afrose, S., Ahmed, N. A. M. F., & Khatun, M. F. (2020). Factors associated with early menopause in Bangladesh. *Family Medicine & Primary Care Review*, 22(1), 13-17.
- Avin Alva, B., & Chethan, T. (2016). A study to assess the average age of menopause and menopause associated symptoms among rural women in Mangalore, Karnataka. *National Journal of Community Medicine*, 7(5), 404-408.
- Awal, M. A., Parvin, F., Wadood, M. A., Sazzad, J., Al Mamun, A. S. M., & Hossain, M. G. (2019). Factors influencing early menopause in Bangladesh. Proceedings of the 7th International Conference on Data Science and SDGs (pp. 259-264). Department of Statistics, University of Rajshahi, Bangladesh.
- Bjelland, E., Wilkosz, P., Tanbo, T., & Eskild, A. (2014). Is unilateral oophorectomy associated with age at menopause? A population study (the HUNT2 Survey). *Human Reproduction*, 29(4), 835-841.
- Cairns, B. J., Liu, B., Clennell, S., Cooper, R., Reeves, G. K., Beral, V., & Kuh, D. (2011). Lifetime body size and reproductive factors: Comparisons of data recorded prospectively with self reports in middle age. *BMC Medical Research Methodology*, 11(1), 1-13.
- Canavez, F. S., Werneck, G. L., Parente, R. C. M., Celeste, R. K., & Faerstein, E. (2011). The association between educational level and age at the menopause: A systematic review. *Archives of Gynecology and Obstetrics*, 283(1), 83-90.
- Cauley, J. A., Danielson, M. E., Greendale, G. A., Finkelstein, J. S., Chang, Y. F., Lo, J. C., Crandall, C., Neer, R. M., Ruppert, K., Meyn, L., Prairie, B. A., & Sowers, M. F. R. (2012). Bone resorption and fracture across the menopausal transition: The study of women's health across the Nation. *Menopause* 19(11), 1200-1207.
- Ceylan, B., & Özerdoğan, N. (2015). Factors affecting age of onset of menopause and determination of quality of life in menopause. *Turkish Journal of Obstetrics and Gynecology*, 12(1), 43.
- Dasgupta, D., & Ray, S. (2009). Menopausal problems among rural and urban women from eastern India. *Journal of Social, Behavioral, and Health Sciences*, 3(1), 2.
- Eum, K. D., Weisskopf, M. G., Nie, L. H., Hu, H., & Korrick, S. A. (2014). Cumulative lead exposure and age at menopause in the Nurses' Health Study cohort. *Environmental Health Perspectives*, 122(3), 229-234.
- Gong, D., Sun, J., Zhou, Y., Zou, C., & Fan, Y. (2016). Early age at natural menopause and risk of cardiovascular and all-cause mortality: A meta-analysis of prospective observational studies. *International Journal of Cardiology*, 203, 115-119.

- Lawton, B. A., Rose, S. B., Pullon, S., Stanley, J., Garrett, S., Sykes, P., Cotmack, D., Robson, B., Langdana, F., Cooper, A. & Filoche, S. K. (2012). The impact of outpatient booking systems on waiting times for investigation of suspected cancer: The case of post-menopausal bleeding. *Clinical Ovarian and Other Gynecologic Cancer*, 5(2), 87-93..
- Lee, S., Jo, H., Kim, M., You, Y., & Kim, J. (2012). Association between metabolic syndrome and serum leptin levels in postmenopausal women. *Journal of Obstetrics and Gynaecology*, 32(1), 73-77.
- Li, H., Sun, X., Miller, E., Wang, Q., Tao, P., Liu, L., Zhao, Y., Wang, M., Qi, Y., & Li, J. (2017). BMI, reproductive factors, and breast cancer molecular subtypes: A case-control study and meta-analysis. *Journal of Epidemiology*, 27(4), 143-151.
- Li, L., Wu, J., Pu, D., Zhao, Y., Wan, C., Sun, L., Shen, C., Sun, W., Yuan, Z., Shen, Q., He, X., Jiang, J., Luo, N., He, Y., Qian, Q., Cai, P., & Zhang, M. (2012). Factors associated with the age of natural menopause and menopausal symptoms in Chinese women. *Maturitas*, 73(4), 354-360.
- Muka, T., Oliver-Williams, C., Kunutsor, S., Laven, J. S., Fauser, B. C., Chowdhury, R., Kavousi, M., & Franco, O. H. (2016). Association of age at onset of menopause and time since onset of menopause with cardiovascular outcomes, intermediate vascular traits, and all-cause mortality: A systematic review and meta-analysis. *JAMA Cardiology*, 1(7), 767-776..
- Natarajan, J., Seshan, V., & Muliira, R. (2013). Review literature on distress during the menopausal transition and their impact on the quality of life of women: What is the evidence. *Journal of Nursing and Health Science*, 2(4), 1-10.
- Panay, N. (2008). Menopause and the postmenopausal woman. *Denburs't's Textbook of obstetrics and Gynaecology*. Oxford, UK: Blackwell Publishing, 479-495.
- Pérez- Alcalá, I., Sievert, L. L., Obermeyer, C. M., & Reher, D. S. (2013). Cross cultural analysis of factors associated with age at natural menopause among latin- american immigrants to madrid and their spanish neighbors. *American Journal of Human Biology*, 25(6), 780-788.
- Rahman, S., Salehin, F., & Iqbal, A. (2011). Menopausal symptoms assessment among middle age women in Kushtia, Bangladesh. *BMC Research Notes*, 4(1), 1-4.
- Sapre, S., & Thakur, R. (2014). Lifestyle and dietary factors determine age at natural menopause. *Journal of Mid-life Health*, 5(1), 3.
- Sarkar, M. S. K., Sikdar, M. M. H., Alam, M. F., & Rahman, K. T. (2010). Impact of price hike on the consumers livelihood. *International Journal of Biological Research*, 2(12), 23-27.
- Schoenaker, D. A., Jackson, C. A., Rowlands, J. V., & Mishra, G. D. (2014). Socioeconomic position, lifestyle factors and age at natural menopause: A systematic review and meta-analyses of studies across six continents. *International Journal of Epidemiology*, 43(5), 1542-1562.
- Sharma, S., & Mahajan, N. (2015). Menopausal symptoms and its effect on quality of life in urban versus rural women: A cross-sectional study. *Journal of Mid-life Health*, 6(1), 16.
- Sun, L., Tan, L., Yang, F., Luo, Y., Li, X., Deng, H. W., & Dvornyk, V. (2012). Meta-analysis suggests that smoking is associated with an increased risk of early natural menopause. *Menopause*, 19(2), 126-132.
- Szegda, K., Whitcomb, B. W., Purdue-Smithe, A., Boutot, M., Manson, J., Hankinson, S., Rosner, B., & Bertone-Johnson, E. R. (2017). Adult adiposity and risk of early menopause. *Human Reproduction*, 32(12), 2522-2531.
- Tao, X., Jiang, A., Yin, L., Li, Y., Tao, F., & Hu, H. (2015). Body mass index and age at natural menopause: A meta-analysis. *Menopause*, 22(4), 469-474.

Akter et al. (2022). Factors associated with age at menopause: A cross-sectional study in Khulna district, Bangladesh. *Khulna University Studies*, Volume 19 (1): 155-163

- Thulkar, J., & Singh, S. (2015). Overview of research studies on osteoporosis in menopausal women since the last decade. *Journal of Mid-life Health*, 6(3), 104.
- Tsilidis, K., Allen, N. E., Key, T. J., Dossus, L., Lukanova, A., Bakken, K., Lund, E., Fournier, A., Overvad, K., Hansen, L., Tjønneland, A., Fedirko, V., Rinaldi, S., Romieu, I., Clavel-Chapelon, F., Engel, P., Kaaks, R., Schutze, M., ... Riboli, E. (2011). Oral contraceptive use and reproductive factors and risk of ovarian cancer in the European Prospective Investigation into Cancer and Nutrition. *British Journal of Cancer*, 105(9), 1436-1442.
- Wang, M., Gong, W. W., Hu, R. Y., Wang, H., Guo, Y., Bian, Z., Lv, J., Chen, Z., Li, L., & Yu, M. (2018). Age at natural menopause and associated factors in adult women: Findings from the China Kadoorie Biobank study in Zhejiang rural area. *PloS one*, 13(4), e0195658.
- Wellons, M. F., Matthews, J. J., & Kim, C. (2017). Ovarian aging in women with diabetes: An overview. *Maturitas*, 96, 109-113.
- WHO (1996). Research on the menopause in the 1990's: A report of the WHO Scientific Group. *Geneva: World Health Organization*, 1-107. Retrieved from <https://apps.who.int/iris/handle/10665/41841> WHO (2020). Obesity and overweight. *Geneva: World Health Organization*. <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>.



HEALTH CARE SEEKING BEHAVIOR OF ADOLESCENT GIRLS IN RURAL AREAS OF KHULNA DISTRICT

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KUS: 21/36: 301121

Manuscript submitted: November 30, 2021

Accepted: April 14, 2022

Abstract

The health care seeking behavior is a growing concern which in realizing the characteristics of health as well as level of health care knowledge of the adolescent girls in Bangladesh. The study aimed to explore the health care seeking behavior of the adolescent girls who were belonged to the age group of 13 to 19 in three villages under Batiaghata Upazilla of Khulna district. Following survey research design a self-administered questionnaire (SAQ) was used to collect data from 157 respondents by using simple random sampling. Findings reveal that majority of the respondent (66.9 percent) were Islam believers and accomplished secondary level (60.5 percent) of education. Moreover, maximum respondents were practicing allopath (66 percent), treatment received from pharmacy (42 percent). More than 50 percent (50.3%) maintained menstruation management by using sanitary napkin as well as taking primary knowledge from school (10.8 percent). However, household income was significantly associated with place of treatment ($p < .024$). In addition, education of mother was positively associated with level of health care knowledge ($p < .004$). Furthermore, household income is strongly correlated with cost of treatment of the respondent ($r = .577$, $p = .000$). Even year of schooling of the respondent is related with level of health care knowledge ($r = .185$, $p = .035$). Finally, it can be concluded that there is a necessity for taking proper initiatives by GOs and NGOs to improve the health care seeking behavior of adolescent girls in rural areas of Bangladesh.

Keywords: Health, care, seeking, behavior, knowledge, adolescent

Introduction

Bangladesh is a developing country in South Asian region with total 164 million populations. There are 50.8 million male and 49.2 million female remaining in the country. Among female, 13.7 million are adolescent girls who are mostly suffering in their health care seeking behavior [Bangladesh Bureau of Statistics (BBS), 2020]. However, in this study “Health Care Seeking Behavior” (HCSB) refers to decision or action taken by adolescent girls to maintain good health and to prevent illness (Chauhan *et al.*, 2015). Although the health care seeking behaviors of adolescents is an important pipe to human development but over population and poverty are pervasive. Even, over the last decade, it has become a serious concern in the world (Pradhan, 2013).

Moreover, The International Conference on Population and Development in 1994 formally recognized the health needs of adolescent girls who constitute about one fifth of the world population

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DOI: <https://doi.org/10.53808/KUS.2022.19.01.2136-ss>

addressed in health policies across the world (Sapkota *et al.*, 2016). In the rural areas of Bangladesh reported that 43 percent of the 200 adolescent girls ages 13-19 who were studied vulnerable in their health care issues (Ekong, 2016). Besides they face different complex situations in their family life as well as in the hospital in case of their health care seeking behavior and revealed that 64.3 percent girls suffered (Kumar *et al.*, 2018). Even many religious views and superstitions are remained at still in rural side, for this reason adolescent girls are getting less scope in their socio-economic factors (Katung, 2010). Among the rural respondents, 12.5 percent had an unpleasant experience at a health care center. Furthermore, adolescent health services provision to the respondents was generally poor; obviously the girls were ignorant about the existence of such services (Musoki *et al.*, 2014). The study found that the majority of female patients (53.3%) utilized primary treatment but main health care service among adolescents was medical problem (20.5%) whereas obstetrical & gastrical problems were least (13.8%) (Davey *et al.*, 2014).

In many health systems, particularly in developing countries, illiteracy, under funding of health sector, poverty, inadequate water and poor sanitation facilities have a great impact on adolescent girl's health indicators (Farotimi *et al.*, 2015). The aspects of nature and pattern as well as factors which affect health care seeking behavior, education perception regarding health care, level of health care knowledge etc. are addressed to understand what type of health care behavior exists among the adolescent girls (John & Annear, 2020). The factors that mostly affect this behavior and quality of services that are being provided through primary health care facilities in the rural areas. For health related problems community members first discuss with family members and accordingly take decision regarding where to seek care and treatment (Jain *et al.*, 2016). In the study areas socio environmental approach stresses on the responsibilities of governments and other organizations for making socio environmental conditions for adolescent girls. It involves strategies of identifying the causes of health inequalities, developing policies to reduce them, incorporating them into the education and practice of health professionals (Katung, 2010). This study tried to make a relationship between health issues and socio environmental approach. Apart from the social model of health focuses on how social processes work in defining and understanding the causes of illness or interpreting within the nature and pattern of health care system (Chauhan *et al.*, 2015).

However, the level of health care knowledge is developed by the training but in spite of being confronted with various barriers there was got their training on the behalf of different health care institutions (Patil *et al.*, 2017). There was a considerable increase in the awareness levels of girls with regard to knowledge of health problems, environmental health, nutritional aware. Improving the health and well-being of adolescent girls will require a concerted effort to see that they grow up safe and have access to responsive health care and supportive adults (Abraham & Sheeran, 2020). As adolescent girls are the important human resources for the development of a nation. Social, economic, environmental and demographic legal policy must be needed for their health improvement. Adolescent girls' health education should be built into the adolescent health program as well as the basic education curriculum (Busari, 2012). It can be included as a part of school health program and should be emphasized to make them aware about the importance of health care seeking behavior by breaking the silence. So, the purpose of this paper is to explore three questions a) what is the nature and pattern of health care seeking behavior of adolescent girls? b) What are the socio- economic factors influencing health care seeking behavior of adolescent girls? and c) How to know their levels of health knowledge in the context of Bangladesh.

Methodology

Observing the survey research design, this study is explanatory in nature as well as the study was carried out on adolescent girls who were chosen purposively under the Batiaghata Upazilla [Namely i) Sachibuniya, ii) Raingamari and iii) Dorgapur] in Khulna district of Bangladesh. To achieve the study objectives, some specifications were made to identify the respondents, the data were collected from i) adolescent girls who were unmarried ii) belonged to the age group of 13 to 19 iii) live in the selected study area for at least 1 year. A

questionnaire containing both open and closed questions in English as well as designed for data collection. According to the aforecited a criterion by census was conducted by the research, 265 adolescent girls were identified from Batiaghata Upazilla Selected through simple random sampling. In this research, the sample was determined by following the formula-

$$SS = \frac{Z^2 \times P(1 - P)}{C^2}$$

$$SS_i = \frac{SS}{1 + \frac{SS - 1}{Pop}}$$

Here, SS = Sample Size; SS_i = Sample Size, according to Population; Z = Confidence Level (*i.e.* 1.96 for 95% confidence level); P = Percentage of Picking a Choice (*i.e.* 0.5 used for sample size needed); C = Confidence Interval (*i.e.* 5); Pop = Population.

Formula 1: The first formula had been used to define the sample size

$$SS = \frac{(1.96)^2 \times 0.5 (1-0.5)}{(0.0500)^2} = \frac{3.842 \times 0.5 \times 0.5}{0.00250000} = \frac{0.9604}{0.002500} = 384.16$$

Formula 2: The first formula had been used for correction for finite Population

$$SS_i = \frac{SS}{1 + \frac{SS - 1}{pop}}$$

$$= \frac{384.16}{1 + \frac{384.16 - 1}{265}} = \frac{384.16}{1 + \frac{383.16}{265}} = \frac{384.16}{1 + 1.45} = \frac{384.16}{2.45} = 156.8 = 157$$

Table 1. Population and sample size of the Study Areas at a Glance

| Name of the Rural Area | Population | Sample size |
|------------------------|------------|-------------|
| Sachibuniya | 113 | 65 |
| Raingamari | 90 | 62 |
| Dorgapur | 62 | 30 |
| Total | 265 | 157 |

Table 1, a total of 265 adolescent girls aged between 13 to 19 years were identified by census. Then, in accordance three rural areas of the population in selected 157 adolescent girls were chosen respectively as the sample of the study. For the study, primary data were collected from 23 July to 15th August 2017 and the data were collected by the researcher herself. Secondary data were published which used to make an assessment of the quality of the information provided and to identify bias and pure imagination (Walliman, 2020). The nature and pattern of health care seeking behavior covers treatment pattern, illness type, cost of treatment, place of treatment etc. Socio-economic factors affecting health care seeking behavior that identifies large family size, traditional healing practices, low income and parental educational level. The level of health care knowledge involves level of formal education, HCSB related knowledge, access to health services and social environment etc. The hypothesis of this study mentioned that a) there is a relationship between household income and place of treatment of adolescent girls b) there is a relationship between education of mother and the level of health care knowledge of adolescent girls. c) there is a relationship between household income and nature of treatment of adolescent girls. So, the raw data were edited, coded, classified and cleaned by the researcher before analysis started. Tabulated data were preceded by computerizing and using computer

software's like SPSS and MS word. Answers of the respondents were counted through different value as given in the questionnaire. After data processing, data analysis and interpretation were done through using statistical techniques by using different software like (SPSS-20 and MS Word etc.). Additionally, means, standard deviations, Pearson's Chi-square test and correlation were calculated along with frequencies and percentages were calculated from respondents'. Following the variable, Table 2, (List of Indices) Likert scaling was used to measure socio-economic factors affecting health care seeking behavior and level of health care knowledge.

Table 2. List of Indices

| Level | Score |
|---|-------|
| Socio- economic Factors Affecting HCSB | |
| Low | ≥25 |
| Medium | 26-30 |
| High | ≥31 |
| Level of Health Care Knowledge | |
| Low | ≥29 |
| Medium | 30-39 |
| High | ≥40 |

Results

Background information of the respondents: The data, presented in the Table 3, denominate that around 40.8 percent of the respondents were in the age group of 15 to 16 years as well as the higher percentage (66.9%) of the respondents belonged to Islam. Most of the respondents (82.8%) continued their study and 17.2 percent dropped out for many reasons. The data reveal that major portion of (53.5%) respondents had been studying higher secondary as well as 28 percent completed their secondary level. The mean year of schooling was 10.17 with standard deviation 1.63 years. In the case of monthly income, the average income of the respondents was BDT. 2922.03, the standard deviation of 4802.33 BDT. Even the mean of the monthly saving was 653.33 BDT with 547.97 BDT standard deviation.

Socio economic status of parents: Table 4 reveals that a greater number of household (87.3%) were headed by the respondent's father as well as only 8.9 percent were by her mother. In case of occupation, majority of the household head (46.5%) engaged in labor force, 23.6 percent having own business along with 29.9 percent belonged to service sector. Major portion of household heads (61.8%) and 75.0 percent mother completed secondary level education. Furthermore, the mean of family size and household income were respectively 3.79 and 13482.80 BDT. Meanwhile, the higher portion of household (85.4%) used modern sanitation facility and 14.6 percent included traditional ways.

HCSB Of the respondents: The highest portion of adolescent girls (59.9%) are affected by separate diseases in different seasonal time and 40.1 percent adolescent girls have no illness (Table 5). Among the highest percentage (38.2%) suffered from gastrointestinal illness and the major part of the respondents (68.8%) is received allopath and pharmacy and some respondent (14.6%) practice the homeopath in various times. The highest percentage (66.5%) of respondents received services from allopath for available facilities and quick cures from illness. In spite of being absorbed the allopath, some respondents (17.2%) involved homeopath for better cure in the illness. maximum 44.6 percent of total adolescent girls chose that source of health care due to economic crisis. 11.5 percent respondents choose the traditional healing practices. But on the basis of

religious belief or superstitions there are 43.3 percent respondents utilizing cloth or tissue and the others are (5.7%) practiced traditional ways. The most of the adolescent girls (20.4%) were faced vomiting tendency and 14 percent suffered excessive bleeding. The study highlighted that pharmacy treatment (42%) were most available and 21 percent respondents took self-treatment at home. 34.4 percent respondents were moderately impacted by the socio economic factors and the mean impact is 29.19 with the standard deviation of 4.76. It is measured that most of respondents (92.4%) had knowledge about their health conscious and the main barrier was remaining not enough doctors (65%) There are 52.9 percent respondents reported to have moderate level of health care knowledge. Even it is a matter of fact that there were only 33.1percent owned higher level of health care knowledge.

Table 3. Background profile of the respondents

| Variables | Frequency | Percent (%) |
|--------------------------|-----------|------------------------|
| Age (in Year) | | |
| 13-14 | 53 | 33.8 |
| 15- 16 | 64 | 40.8 |
| 17-19 | 40 | 25.5 |
| Mean | 16.15 | Std. Deviation 1.63 |
| Religious Status | | |
| Islam | 105 | 66.9 |
| Sanatan | 37 | 23.6 |
| Christianity | 15 | 9.6 |
| Continuous Study | | |
| Yes | 130 | 82.8 |
| No | 27 | 17.2 |
| Year of Schooling | | |
| ≥8 | 2 | 1.3 |
| 9-16 | 44 | 28.0 |
| ≥17 | 84 | 53.5 |
| No Schooling | 27 | 17.2 |
| Mean | 10.17 | Std. Deviation 1.63 |
| Monthly Income | | |
| ≥5000 | 53 | 33.8 |
| ≥5001 | 6 | 3.8 |
| No income | 98 | 68.4 |
| Mean | 2922.03 | Std. Deviation 4802.33 |
| Monthly Saving | | |
| ≥500 | 32 | 20.4 |
| 501 -1000 | 8 | 5.1 |
| ≥1001 | 5 | 3.2 |
| No Saving | 112 | 71.3 |
| Mean | 653.33 | Std. Deviation 547.97 |

Table 4. Socio economic status of parents

| Variables | Frequency | Percent (%) |
|--|-----------|------------------------|
| Head of the Household | | |
| Father | 137 | 87.3 |
| Mother | 14 | 8.9 |
| Sister | 2 | 1.3 |
| Brother | 4 | 2.5 |
| Occupation of the Head of the Household | | |
| Labor | 73 | 46.5 |
| Business | 37 | 23.6 |
| Service man | 47 | 29.9 |
| Educational Status | | |
| ≥10 | 97 | 61.8 |
| 11-12 | 48 | 30.6 |
| ≥13 | 12 | 7.6 |
| Mean | 9.62 | Std. Deviation 3.31 |
| Educational Status of Mother | | |
| ≥10 | 120 | 75.0 |
| 11-12 | 26 | 16.6 |
| ≥13 | 3 | 1.9 |
| No Schooling | 8 | 5.1 |
| Mean | 8.08 | Std. Deviation 3.08 |
| Size of Family | | |
| ≥3 | 45 | 28.7 |
| ≥4 | 112 | 71.3 |
| Mean | 3.79 | Std. Deviation 0.59 |
| Household Income | | |
| ≥15000 | 116 | 73.9 |
| 15001-30000 | 36 | 22.9 |
| 30001≥ | 5 | 3.2 |
| Mean | 13482.80 | Std. Deviation 7224.07 |
| Source of Water | | |
| Tape stand/ supply | 54 | 34.4 |
| Tube-well | 93 | 59.2 |
| Pond | 4 | 2.5 |
| Rainwater | 6 | 3.8 |
| Type of Sanitation Facility | | |
| Modern | 134 | 85.4 |
| Traditional | 23 | 14.6 |

Table 5. HCSB Of the respondents

| Variables | Frequency | Percent (%) |
|--------------------------------------|-----------|-------------|
| Suffering from Illness | | |
| Yes | 59.9 | 59.9 |
| No | 40.1 | 40.1 |
| Frequency of Illness | | |
| No illness | 63 | 40.1 |
| At least once in a month | 17 | 10.8 |
| Once in a few month | 71 | 45.3 |
| Once or twice in a year | 6 | 3.8 |
| Type of illness | | |
| Cold fever/ cough/ severe cold | 48 | 30.6 |
| Gastrointestinal illness | 60 | 38.2 |
| Menstrual problems | 24 | 15.3 |
| Skin/ eye/ ENT related illness | 22 | 14.0 |
| Headache | 3 | 1.9 |
| Taking Measure in Illness | | |
| Self- care | 9 | 5.7 |
| Allopath and pharmacy | 108 | 68.8 |
| Kabiraj | 11 | 7.0 |
| Ayurvedic | 6 | 3.8 |
| Homeopath | 23 | 14.6 |
| Nature of Treatment | | |
| Self- treatment | 11 | 7 |
| Allopath | 106 | 66 |
| Kabiraj | 13 | 10 |
| Homeopath | 27 | 17.2 |
| Reason for Choosing Treatment | | |
| Good reputation | 13 | 8.3 |
| Economic problem | 70 | 44.6 |
| Available health facilities | 52 | 33.1 |
| Traditional practice | 18 | 11.5 |
| Proximity | 4 | 2.5 |
| Menstruation Management | | |
| Traditional | 10 | 6.2 |
| Sanitary napkin | 79 | 50.3 |
| Cloth or tissue | 68 | 43.3 |
| Types of Menstrual Problem | | |
| No menstrual problem | 87 | 55.4 |
| Severe pain | 16 | 10.2 |
| Vomiting tendency | 32 | 20.4 |
| Excessive bleeding | 22 | 14.0 |
| Place of Treatment | | |
| Hospital | 56 | 35.7 |
| Home | 35 | 22.3 |
| Pharmacy | 66 | 42.0 |

Table 5. Cont'd...

| Cost of Treatment | | | |
|--|--------|----------------|--------|
| ≥500 | | 113 | 72.0 |
| 501-1000 | | 31 | 19.7 |
| ≥1101 | | 13 | 8.3 |
| Mean | 584.39 | Std. Deviation | 619.16 |
| Socio- economic Factors Affecting HCSB | | | |
| Low | | 36 | 22.9 |
| Medium | | 54 | 34.4 |
| High | | 67 | 42.7 |
| Mean | 29.19 | Std. Deviation | 4.76 |
| Knowledge about Health Care Seeking Behavior | | | |
| Yes | | 145 | 92.4 |
| No | | 12 | 7.6 |
| Knowledge about from Different Institutions | | | |
| No Knowledge | | 12 | 7.6 |
| From Go/ NGO program | | 11 | 7.0 |
| From school | | 75 | 47.8 |
| From books/ internet | | 34 | 21.7 |
| From friends and family members | | 25 | 15.9 |
| Barrier from Hospital | | | |
| For medicine | | 38 | 24.2 |
| Not Enough doctor | | 102 | 65.0 |
| Behave of nurses | | 17 | 10.8 |
| Level of Health Care Knowledge | | | |
| Low | | 22 | 14 |
| Medium | | 83 | 52.9 |
| High | | 52 | 31.1 |
| Mean | 36.15 | Std. Deviation | 5.99 |

Table 6. Relationship between Household Income and Place of Treatment

| Household income | | Place of treatment | | | Total |
|------------------|---|--------------------|-------|----------|--------|
| | | Clinic/ Hospital | Home | Pharmacy | |
| ≥15000 | N | 37 | 27 | 52 | 116 |
| | % | 23.6% | 17.2% | 33.1% | 73.9% |
| 150001- 30000 | N | 16 | 6 | 14 | 36 |
| | % | 10.2% | 3.8% | 8.9% | 22.9% |
| ≥300001 | N | 30 | 0 | 2 | 5 |
| | % | 19.1% | 0.0% | 1.3% | 3.2% |
| Total | N | 56 | 33 | 66 | 157 |
| | % | 35.7% | 22.3% | 42.0% | 100.0% |

Pearson Chi-Square $\chi^2 = 4.554(6)$; $p < .024$
 Fisher's Exact Test = 4.256

Source: Field Survey, 2017

In Table 6, Household income is an important factor which is greatly associated with the place of treatment of the respondents. The findings clearly show that there is a strong relationship between household income and place of treatment of respondents as well as the differences were statistically significant Pearson's Chi-Square $\chi^2 = 4.554; (6)$: $p < .024$ and Fisher's Exact Test = 4.256.

In Table 7, Education of mother is associated with improving the level of health care knowledge of the respondents. The mother who were going to school up to different level, their adolescent girls had more health care knowledge along with accepted more health facilities than others. The findings clearly show that there is a strong relationship between education of mother and level of health care knowledge of respondents as well as the differences were statistically significant Pearson's Chi-Square $\chi^2 = 2.047; (4)$: $p < .004$ and Fisher's Exact Test = 2.01

Table 7. Relationship between Education of Mother and Level of Health Care Knowledge

| Education of Mother | | Level of Health Care Knowledge | | | Total |
|---------------------|---|--------------------------------|--------|-------|--------|
| | | Low | Medium | High | |
| ≥10 | N | 19 | 59 | 42 | 120 |
| | % | 12.8% | 39.6% | 28.2% | 80.5% |
| 11-12 | N | 1 | 18 | 7 | 26 |
| | % | 0.7% | 12.1% | 4.7% | 17.4% |
| ≥13 | N | 0 | 1 | 2 | 3 |
| | % | 0.0% | 0.7% | 1.3% | 2.0% |
| Total | N | 20 | 78 | 51 | 149 |
| | % | 13.4% | 52.3% | 34.2% | 100.0% |

Pearson Chi-Square $\chi^2 = 2.047; (4)$: $p < .004$
 Fisher's Exact Test = 2.018

Source: Field Survey, 2017

In Table 8, the household income that was involved medium and higher income, the respondent of them was not used standard nature of treatment than low income. The findings clearly show that there is a weak relationship between household income and nature of treatment of respondents as well as the differences were statistically insignificant Pearson's Chi-Square $\chi^2 = 6.236; (8)$: $p > .621$ and Fisher's Exact Test = 7.832.

Table 8. Relationship between Household Income and Nature of Treatment

| Household Income | | Nature of Treatment | | | | Total |
|------------------|---|---------------------|----------|---------|-----------------|--------|
| | | Homeopath | Allopath | Kabiraj | Self- treatment | |
| ≥15000 | N | 21 | 74 | 14 | 7 | 116 |
| | % | 13.4% | 47.1% | 8.9% | 4.4% | 73.9% |
| 150001-30000 | N | 6 | 25 | 1 | 4 | 36 |
| | % | 3.8% | 15.9% | 0.6% | 2.5% | 22.9% |
| ≥300001 | N | 0 | 4 | 1 | 0 | 5 |
| | % | 0.0% | 2.5% | 0.6% | 0.0% | 3.2% |
| Total | N | 27 | 103 | 16 | 11 | 157 |
| | % | 17.2% | 65.6% | 10.2% | 7.0% | 100.0% |

Pearson Chi-Square $\chi^2 = 6.236; (8)$: $p > .621$
 Fisher's Exact Test = 7.832

Source: Field Survey, 2017

In Table 9, Education of mother is related with the menstruation management of the respondent. The findings of table-9 presents adolescent girls had no enough knowledge about standard menstruation management. The findings clearly show that there is a weak relationship between education of mother and menstruation management of respondents as well as the differences were statistically insignificant Pearson's Chi-Square $\chi^2 = 19.270; (6): p < .421$ and Fisher's Exact Test = 22.527.

Correlation of Different Variables of Health Care Seeking Behavior: A Pearson's Correlation was run to assess the possible explanation of this correlation was that the data, in the Table-10 shows year of schooling of the respondent, education of mother, size of family, household income followed by Pearson Correlation (r) .185, .876, .085, .347, -.112, .223, .534, .247, .907, .197, -.105, .577 were associated with level of health care knowledge, socio-economic factors affecting HCSB, cost of treatment with correlation coefficients.

The table presents that year of schooling of the respondent, education of mother, size of family, household income followed by the P- value .035, .017, .336, .076, .164, .098, .050, .093, .009, .013, .190, .000 were associated with level of health care knowledge, socio-economic factors affecting HCSB, cost of treatment with correlation coefficients. Without the relationship education of mother (-.112), household income (-.105) with socio-economic factors affecting HCSB were negatively assisted but all other variables were positively related.

Table 9. Relationship Education of Mother and Menstruation Management

| Education of Mother | | Menstruation Management | | | Total |
|---------------------|---|-------------------------|-----------------|-----------------|--------|
| | | Traditional | Sanitary Napkin | Cloth or Tissue | |
| ≥10 | N | 7 | 48 | 65 | 120 |
| | % | 4.7% | 32.2% | 43.7% | 80.5% |
| 11-12 | N | 2 | 21 | 3 | 26 |
| | % | 1.3% | 14.1% | 2.0% | 17.4% |
| ≥13 | N | 0 | 3 | 0 | 3 |
| | % | 0.0% | 2.0% | 0.0% | 2.0% |
| Total | N | 9 | 72 | 68 | 149 |
| | % | 6.0% | 48.3% | 45.7% | 100.0% |

Pearson Chi-Square $\chi^2 = 19.270; (6): p < .421$
Fisher's Exact Test = 22.527

Source: Field Survey, 2017

Table 10. Correlation and Its Covariates

| Independent Variables | Dependent Variables | | | | | |
|-------------------------------------|--------------------------------|----------|---------------------------------------|----------|-----------------------------|---------|
| | Level of Health Care Knowledge | | Socio-economic Factors Affecting HCSB | | Cost of Treatment | |
| | Pearson Correlation (r) | P- value | Pearson Correlation (r) | P- value | Pearson Correlation (r) | P value |
| Year of Schooling of the Respondent | .185** | .035 | .876* | .017 | .085 | .336 |
| Education of Mother | .347** | .076 | -.112 | .164 | .223 | .098 |
| Size of Family | .534 | .050 | .247* | .093 | .907* | .009 |
| Household Income | .197 | .013 | -.105 | .190 | .577*** | .000 |

*** Correlation is significant at the 0.01 level (2-tailed); ** Correlation is significant at the 0.05 level (2-tailed); * Correlation is significant at the 0 level.

Discussion

The health care seeking behavior is the improvement of sound body for the purpose of finding an appropriate ways or remedy as this study particularly focused on adolescent girls (Aktar, 2020). This study indicates that nature and pattern of health care seeking behavior, socio-economic factors which influence the health care seeking behavior as well as the level of health care knowledge of adolescent girls in the countryside of Khulna district. However, lack of knowledge and activities, the health care seeking behavior is not so favorable for the adolescents. For this reason, most of the adolescent girls remain silent without seeking health care because of shyness or consciousness (Mollah, 2014).

This study was conducted on the adolescent girls aged between 13 to 19 years of age where higher portions of the respondents belonged to the age group of 15 to 16 in rural areas under Batiaghata Upazilla of Khulna district. Otherwise another study showed that adolescent girls evolved within age range of 11-19 years in rural areas (Busari, 2012). As education is measured as year of schooling which is most valuable for increasing level of knowledge associated with of health care seeking behavior among adolescent girls. Most of the respondents completed higher secondary education and few dropped out for many reasons. Besides majority of the respondents were the follower of Islam and fathers were household head. The highest portion of adolescent girls were victim from gastrointestinal illness. On the other hand, the findings of another study were highlighted common problems of health to increase risk of infectious diseases (Hesketh *et al.*, 2013). Moreover, the highest percentage practiced allopath and pharmacy in different reasons especially for low cost and available health facilities. Otherwise almost one-third of the study participants visited the private health facilities including pharmacies. The study highlights that pharmacy treatments were most available (Chauhan *et al.*, 2015). In a modern time most of the respondents used sanitary napkin that is available in shops and different market place. In fact, religious values and practices discourage adolescents to share about this issues (Ajuwon *et al.*, 2016). The knowledge and health seeking behavior about menstruation and menstrual knowledge positively associated with parental education and majority of the girls using modern absorbent (sanitary pad) while those from the illiterate mothers still using clothing materials as absorbent (Muriithi, 2013).

In the study identified that socio economic factors influenced adolescent girls' knowledge and mentioned the nature and pattern of health services which are badly needed for the respondents. This factors includes family size, healing practices, income, parental education, living environment facility, proper communication system and medical facilities etc. which impact the adolescent girl's health. Otherwise, another study factors that indicate health behavior may be socio- economic, physical, cultural, political, educational levels and daily practices etc. (Shaikh & Hatcher, 2014). Apart from the higher portion of the respondent's cost equal or less than 500 BDT that is budgeted for the health facilities. The lack of proper management and female doctors are the main barriers for the discrimination. The main barrier was remaining the enough doctors which indicated the lack of mainstream of medical treatment. It is identified that there are maximum respondents having to be medium level of health care knowledge which is the higher portions perception in the study area.

The findings clearly show that there is a positive relationship between household income and place of treatment of respondents as well as the differences was statistically significant. It is shown that there is a strong relationship between education of mother and level of health care knowledge of respondents as well as the differences was statistically significant. These findings complement the previous studies that adolescent's knowledge was positively associated with parental education, especially, mother's education (Adinew, 2013, Shiferaw, 2014). Besides there is a weak relationship between household income and nature of treatment of respondents as well as the differences was statistically insignificant. Moreover, the correlation presents that year of schooling of the respondent, education of mother, size of family, household income followed by the P-value were associated with level of health care knowledge, socio-economic factors affecting HCSB, cost of

treatment with correlation coefficients. However, in different studies maintained that some variables are affecting positively and some are negatively in various purposes (Sing, 2016.)

Conclusion

The health care seeking behavior of the adolescent girls is an important concern to human development which is the foundation for a wealthy and successful life. The rural adolescent girls don't get proper medical facilities, educational awareness, sanitation and economic support. Besides they face different complex situations in their family life as well as hospital in the case of taking health facilities. Most of the adolescents were suffering illnesses frequently in which majority multiple illnesses had the prevalence increased with age. The majority took treatment from government hospital and received allopathic as well as homeopathic. Education status, income, living arrangement and others socio-economic factors of adolescent girls were found to influence medium level of health consciousness. It can be concluded that socio economic factors determine the health care seeking behavior of adolescent girls in *Batiaghata* Upazilla largely. In addition, the policy makers must train adolescent and greater focus on the health care seeking behavior of adolescent girls.

Acknowledgement

In completing this research over the last several months, many people helped and supported me in various ways. Among them first and foremost, I am greatly obliged to my supervisor, Nusrat Jahan, Assistant Professor, Sociology Discipline, Khulna University for her kind supervision, intellectual motivation, valuable advice and continuous guidance. I would not be able to accomplish this work without her careful readings of my drafts, sharp and practical feedback, and guidance that she provided. Alongside I am grateful to all my teachers of sociology discipline who have supported me by their advices and guidance many times in my study period. I would like to thank earnestly to Rahul Halder, Suriya Yeasmin, Pulock Chandro and Sharmistha Rani especially who have provided their support and effort during data collection. I am also thankful to my batch mates for their unforgettable support during my research work.

References

- Abraham, C. & Sheeran, P. (2020). The health belief model. *Predicting health behavior: Research and practice with social cognition models* (2nd ed.). Open University Press, Maidenhead.
- Adinew, A. (2013). *Economic reform, poverty and equity in access to health care: Case studies in Vietnam* Research Report 34. IDS.
- Ajuwon, I. M. (2016). Historical origins of the health belief model. *Health Education Monographs*, 2(4), 328-335.
- Aktar, S. (2020). Health care seeking Behavior for safe motherhood: Findings from Rural Bangladesh. *Bangladesh e-Journal of Sociology*, 9(2), 23-35.
- Bangladesh Bureau of Statistics (BBS). (2020). Population and housing census. *Bangladesh Bureau of Statistics*, Ministry of Planning, Dhaka.
- Busari, A. O. (2012). Menstrual knowledge and health care behavior among adolescent girls in rural Nigeria. *International Journal of Applied*, 2(4), 42-51.
- Chauhan, R. C., Kandan, M., Purty, A. J., Samuel, A., & Singh, Z. (2015). Determinants of health care seeking behavior among rural population of a coastal area in South India. *International Journal of Scientific Reports*, 1(2), 118-122.
- Davey, S., Raghav, S. K., Muzammil, K., Singh, J. V., & Davey, A. (2014). Study of rural health centre services utilization by adolescents in district Muzaffarnagar (Uttar Pradesh-India).

- Ekong, S. (2016). Adequacy of adolescent healthcare services available for adolescent girls in a Southern Nigerian environment.
- Farotimi, A. A., Esike, J., Nwozichi, C. U., Ojediran, T. D., & Ojewole, F. O. (2015). Knowledge, attitude, and healthcare-seeking behavior towards dysmenorrhea among female students of a private university in Ogun State, Nigeria. *Journal of Basic and Clinical Reproductive Sciences*, 4(1), 33-38.
- Hesketh, T., Ding, Q. J., & Tomkins, A. M. (2013). Health and health care-seeking behavior of adolescents in urban and rural China. *Journal of Adolescent Health*, 33(4), 271-274.
- Jain, M., Nandan, D., Misra, S. K. (2020). Qualitative assessment of health seeking behaviour and perceptions regarding quality of health care services among rural community of district Agra. *Indian Journal of Community Medicine* Vol. 31, No. 3, Deptt. Of Social & Preventive Medicine, S. N. Medical College, Agra.
- John, G. & Annear, P. (2020). Health-seeking behaviour studies: A literature review of study design and methods with a focus on Cambodia. *Health policy and health knowledge of adolescent girls in health care services*, Nossal Institute for Global Health, The University of Melbourne.
- Katung, P. Y. (2010). Socio-economic factors responsible for poor utilization of the primary health care services in a rural community in Nigeria. *Nigerian journal of medicine: journal of the National Association of Resident Doctors of Nigeria*, 10(1), 28-29.
- Kumar, R., Prinja, S., & Lakshmi, P. V. M. (2018). *School of public health*, Post Graduate Institute of Medical Education and Research, Chandigarh, India.
- Mollah, C. A. (2014). *Survey methods in social investigation* (2nded.). Gower Publishing Company, Aldershot, England.
- Muriithi, M. K. (2013). The determinants of health-seeking behavior in a Nairobi slum, Kenya. *European Scientific Journal, ESJ*, 9(8), 23-32.
- Musoke, D., Boynton, P., Butler, C., & Musoke, M. B. (2014). Health seeking behaviour and challenges in utilising health facilities in Wakiso district, Uganda. *African Health Sciences*, 14(4), 1046-1055.
- Patil, B. T., Pokharel, H. P., Hatcher, J. (2017). Health problems amongst adolescent girls in rural areas of Ratnagiri district of Maharashtra India. *Journal of Public Health*, 27(1), 49-54.
- Population and Housing Census Report, (2021). *Bangladesh Bureau of Statistics. Source: Projections as per previous report*, Bangladesh Bureau of Statistics.
- Pradhan, S. K. (2013). *Health and health seeking behaviour among the tribals: a case study in Sundargarh district of Odisha* (Doctoral dissertation). India.
- Sapkota D., Sharma, D., Pokharel, H. P., Budhathoki, S. S., & Khanal, V. K. (2016). Knowledge and practices regarding menstruation among school going adolescents of rural Nepal. *Journal of Kathmandu Medical College*, 2(3), 122-128.
- Shaikh, B. T., & Hatcher, J. (2014). Health seeking behaviour and health service utilization in Pakistan: challenging the policy makers. *Journal of Public Health*, 27(1), 49-54.
- Shifnew, S. and Field, D. (2014). *Sociology of health and health care* (4thed.). Wiley and Sons.
- Sing, Y. K. (2016.) *Fundamentals of research methodology and statistics* (3rded.). News Age International Publishers, New Delhi.
- Walliman, N. (2020). *Research methods: The basics* (1sted.). Taylor and Francis e-library, New Work.



NEXUS BETWEEN EDUCATIONAL ATTAINMENT AND INCOME IN KHULNA CITY: AN EMPIRICAL EXPLORATION

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KUS: 21/52: 301121

Manuscript submitted: November 30, 2021

Accepted: May 30, 2022

Abstract

The economic development of any country not only depends on physical capital but also human capital. Education is an important and valuable factor of human capital development and overall improvement of society. This paper aims to examine the determinants of education and its effect on income level in Khulna city. The sample size is 250 service holders. Therefore, the study estimates are based on the method of ordinary least squares (OLS) and two stage least squares (2SLS). The results suggest that parents' education is important factors of education attainment. Moreover, education and experience are positively correlated with the income. This study has recommended that the parents should be educated and conscious about the educational environment for their child. Moreover, it is essential to improve the cognitive ability, training facilities, institutional opportunities, result which also affect the income level. To get a good atmosphere, different education policies should be taken by the authority like – inclusive policy, mandatory higher secondary education and subsidy for students.

Keywords: Education, experience, income, Khulna.

Introduction

Education is the process of facilitating learning. Knowledge, skills, values, beliefs, and habits of a group of people are transferred to other people, through story-telling, discussion, teaching, training, or research. According to the US Census Bureau, educational attainment refers to the highest degree of education an individual has completed (Arcidiacono, 2010). At a higher education level, participating students expect certain gains from attending universities as opposed to working immediately out of school. Income is the amount of money or its equivalent which is received during a period of time in exchange for labor or services, from the sale of goods or property, or as profit from financial investments. As per the latest literacy survey report of Bangladesh, the country's literacy rate of the population aged above 15 years reached 75.6 percent (BBS, 2021). There are lots of socio-economic and legal factors which can influence the literacy rate as well as the opportunity of education attainment for an individual. The family background, family type, educational level of mother and family head, family income level, mandatory primary education law – those can affect the education. Besides education and experience, major choice, result, employment type, cognitive ability, working duration, institute type, training duration help to predict percentage increase/decrease in income (Babones, et

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DOI: <https://doi.org/10.53808/KUS.2022.19.01.2152-ss>

al., 2007). In 1974, Mincer agreed with Becker and Collins (1964) that the productivity and upward sloping income profile occur as human capital, or skills, increase with education, training and experience. (Mincer, 1984). A study examines the effect of education and experience on income of workers in Thailand and the result suggests that both are positively correlated with the income (Wannakraioj, 2013). The other research shows that college major choice, academic performance, natural ability, and industry selection do have a significant impact on earnings (Kimbrough and Arcidiacono, 2012). A paper explains the effect of education and cognitive ability on the income of educated people and finds a correlation between education and income in Khartoum where $P = 0.012$ (Salih, 2007). Previous literatures have shown the separate results about the effect of education on income and the major factors of education. But this paper has aimed to find out the determinants of education and to explore the impact of education on income simultaneously. Moreover, it has focused on some education policy related opportunities to enhance the literacy rate of Khulna city. This article has incorporated the introductory speech, detailed methods and materials used in this paper including the sample size and sampling techniques. Moreover, it has mentioned the estimated techniques as well as equations of OLS, 2SLS models and hypothesis. In addition, the results have been described properly and some education related policies of Bangladesh are given for the improvement of law about education. The present results are explained and previous finding are compared in the discussion part with the recommendations. Last of all, the summary of the paper and what should be done have been elucidated in the conclusion.

Materials and Methods

This is cross-sectional research where information had collected in one time period of survey. The information of 250 samples has been collected through multi-stage judgmental sampling design. Firstly, the different areas of Khulna i.e. *Daulatpur, Khalishpur, Shonadanga, Gollamari* and *Rupsba* were selected purposively. Exactly 50 respondents were collected from each study area. Then, the service holders who were (30-60) years old, had education level above 12 years of schooling were also selected purposively for this study. At first, for the purpose of primary data collection in Khulna region, an interview schedule had been prepared which had been pre-tested on the basis of pilot survey findings and experience. Based on the final interview schedule, primary data had been collected through interviewing process at the time of field survey, where person to person interaction was occurred. Besides, secondary data had been taken from published articles, working papers, Bangladesh Bureau of Statistics (BBS), Bangladesh Economic Review, Bangladesh Bureau of Education and Information Statistics (BANBEIS). The multiple regression model has applied to find out the determinants of education. Mincerian model proved the positive relationship between education and experience with income. To prove the Mincerian model, another multiple regression has used in this paper, including other socio-economic and education related factors like result, family income, parents' education etc. The result of the Mincerian model has estimated through OLS and quantile regression (25th - lower income group, 50th - middle income group, 75th - high income group) model to compare the difference of various income group easily. At last, the results of OLS and 2SLS models have compared to understand the reliability and robustness of the model estimation.

Variables

There are basically two multiple regression models. Firstly, education is the dependent variable which was measured by schooling year. The independent variables are gender of the participants, fathers' education, mothers' education, family income, family type, education level of the head of a family, the respondents' family has migrated from one place to another or not, cost behind education and knowledge about educational policies. Secondly, Mincerian model has included the income of the service holder (BDT) as the dependent variable. The corresponding explanatory variables are education, experience, age, gender, major (humanities, science, business background), institute type (public or private), result, employment type, cognitive ability, in-job training and duration of work in their career. These variable are also applied in the 2SLS model.

Estimation of Multiple Regression Model of Education

This model has shown the factors which have encouragement on education attainment.

$$E_i = \beta_0 + \beta_1 S_i + \beta_2 FE_i + \beta_3 ME_i + \beta_4 FI_i + \beta_5 FT_i + \beta_6 EH_i + \beta_7 MS_i + \beta_8 EC_i + \beta_9 L_i + u_i$$

Where E corresponds to education as dependent variable. Moreover, explanatory variables are S for gender, FE for fathers' education, ME for mothers' education, FI for family income, FT for family type, EH for education of head, MS for migratory status, EC for education cost, L for knowledge about education policy and u is disturbance term.

Estimation of Mincerian Model of Income Incorporating Other Factors

The Mincer model was proposed by Jacob Mincer in 1974. The general Mincerian income model is:

$$\ln Y_i = \beta_0 + \beta_1 E_i + \beta_2 X_i + \mu_i$$

Where Y_i corresponds to individual i's income, E_i is his/her education and X_i his/her working experience and μ_i a disturbance term. But authors would like to extend the equation by including some other educational and skill based variables.

$$\ln Y_i = \beta_0 + \beta_{11} E_i + \beta_{22} EX_i + \beta_1 A_i + \beta_2 A_i^2 + \beta_3 S_i + \beta_4 M_i + \beta_5 IT_i + \beta_6 R_i + \beta_7 ET_i + \beta_8 CA_i + \beta_9 IJ_i + \beta_{10} WD_i + u_i$$

Where, E corresponds to education, EX is experience, A is age, A^2 is age², S is gender, M is major, IT is institute type, R is result, ET is employment type, CA is cognitive ability, IJ is in-job training, WD is duration of work and u is disturbance term.

Two Stage Least Squares (2SLS) Model

Assuming education as an instrumental variable, authors try to compare the results of OLS and 2SLS to identify the reliable results of the research. Estimating the first stage (reduced form) equation with only exogenous regressors,

$$y_2 = x_0'\alpha_0 + x_1'\alpha_1 + x_2'\alpha_2 + x_3'\alpha_3 + x_4'\alpha_4 + x_5'\alpha_5 + x_6'\alpha_6 + x_7'\alpha_7 + x_8'\alpha_8 + x_9'\alpha_9 + x_{10}'\alpha_{10} + e$$

Where x_1 corresponds to age, x_2 is age², x_3 is employment type, x_4 is experience, x_5 is experience², x_6 is duration of work, x_7 is gender, x_8 is education of family head, x_9 is members of family, x_{10} is mother's education and e is disturbance term.

Calculating the predicted values of y_2 and substituting them in the structural equation model,

$$y_1 = x_0'\beta_0 + y_2'\beta_1 + x_1'\beta_2 + x_2'\beta_3 + x_3'\beta_4 + x_4'\beta_5 + x_5'\beta_6 + x_6'\beta_7 + x_7'\beta_8 + x_8'\beta_9 + u$$

Where y_2 is education, x_1 corresponds to age, x_2 is age², x_3 is employment type, x_4 is experience, x_5 is experience², x_6 is duration of work, x_7 is gender, x_8 is cognitive score and u is disturbance term.

Hypothesis Testing

H_0 : There is no difference in income level between the students of public and private institution

H_A : There is difference in income level between the students of public and private institution.

Results

Estimation of Education Analysis

The result of education multiple regression model is estimated in Table 1. It has been seen that gender has significant influence on education attainment in Khulna city. Due to the prejudice of having boy child and over caring on them, a family may provide proper educational facilities to the boy child than the girl. Furthermore, the educational qualification of child' father and mother has positive and significant effect on the respondents.

Generally, when the parent of a child is being educated, he/she can understand the necessity of education and focus on their child's mental, physical and learning skills. When a family is poor, it is tough for them to manage all the basic needs for the family members. Ultimately, the child of the family does not get proper opportunities to be educated. In the same time, joint family contains more members, so the head of the family cannot take care on their educational system. In Khulna city, there are many schools, colleges and universities which have high cost of study. Sometimes, people cannot avail the cost, as a result, they are bound to stop going to educational institutions. Although, Bangladesh is signatory to major international declarations of inclusive education and it has enacted policies and legislation in favor of inclusive education (Malak, 2013) to remove the disparities in education but the implementation of inclusive education is yet at an early stage in Bangladesh. The education policy of Bangladesh prescribes mandatory primary education, free education, food for education and so on. But, the people of Khulna city are not yet conscious about their rights to education. Thus, the knowledge of the policy has a positive and significant impact on education.

Table 1. Multiple Regression Analysis on Education

| Education (Schooling Year) | Unit of Measurement | Sign | Coefficients of OLS |
|----------------------------------|------------------------|-----------|---------------------|
| Gender (S) | Male = 0, Female = 1 | β_1 | -3.059** (5.537) |
| Father's Education (FE) | Schooling Year | β_2 | 2.180* (3.109) |
| Mother's Education (ME) | Schooling Year | β_3 | 3.007*** (5.088) |
| Family Income (FI) | BDT | β_4 | 5.001* (8.001) |
| Family Type (FT) | Nuclear = 0, Joint = 1 | β_5 | 6.882* (11.471) |
| Education of Head of Family (EH) | Schooling Year | β_6 | 2.577*** (4.084) |
| Migratory Status (MS) | Rural = 0, Urban = 1 | β_7 | 4.092 (7.396) |
| Education Cost (EC) | BDT | β_8 | -3.001* (6.001) |
| Knowledge of Education Policy | No = 0, Yes = 1 | β_9 | 5.101** (6.321) |
| Constant | | β_0 | 6.388 (9.735) |
| Number of Observations | | | 250 |
| R ² | | | 0.60 |

N.B.: Robust standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ Source: Authors Estimation, 2021

Estimation of Income Analysis (Extending the Mincerian Model)

In Mincerian model estimation, it is also proved that the income is positively influenced by education and experience. Among 250 participants in this study, it has been again accomplished that the more schooling year and long years of experience, both have significant influence over the income. The result of the income model equation is estimated through multiple regression (OLS) and quantile regression (25th, 50th, 75th quantile) model in table 2. It can be explained the coefficient results of OLS, 25th, 50th and 75th quantile and can be compared easily the differences of these two models. The variable age is significant in OLS, 50th and 75th

quantile and the effect of age is more for the people who are in upper income group. Though income is increased with the increasing age of people but after a certain period of time, considering other variables constant, when age of a respondent is increased in 1 year, his/her income is decreased. Gender discrimination is more in median income group. The significant effect of major background on income is high in upper income group. The respondents who have completed their education from public institute earn more than the respondents who have completed from private institute. The consequence of result is more for the people who are in middle income group. The outcome of cognitive ability on income is high in upper income group. Actually, female people have low income opportunities in Khulna city than the male. Moreover, at the job market, the demand for the employee who has science and business background is high. The students of public universities get more facilities in the job market than the private institutional students. But in the field of own business or entrepreneurship business, the students of private institutions are doing well in Khulna. Additionally, the good result, cognitive ability, creativity and in –job training- all those things work for the better job and enhancement of income level.

Table 2. Comparison of OLS and Quantile Regression Model (ii) of Income

| In Income | Unit of Measurement | Sign | Coefficients of OLS | 25 th | 50 th | 75 th |
|------------------------------------|---|--------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Education | Schooling Year | β_{11} | 0.090*** (0.021) | 0.102*** (0.035) | 0.050** (0.023) | 0.085** (0.039) |
| Experience | Year | β_{22} | 0.004** (0.007) | 0.001 (0.008) | 0.001 (0.005) | 0.009** (0.008) |
| Age (A) | Year | β_1 | 0.022** (0.048) | 0.019 (0.055) | 0.056*** (0.059) | 0.067* (0.078) |
| Age ² (A ²) | Year | β_2 | -0.011 (0.001) | -0.021 (0.006) | -0.040* (0.001) | -0.031 (0.001) |
| Gender (S) | Male = 0, Female = 1 | β_3 | -0.052** (0.086) | -0.047 (0.100) | -0.138*** (0.107) | 0.004* (0.144) |
| Major (M) | Humanities = 0, Others (Business + Science) = 1 | β_4 | 0.045* (0.041) | 0.026 (0.047) | 0.075* (0.051) | 0.079 (0.069) |
| Institute Type (IT) | Private = 0, Public = 1 | β_5 | 0.042*** (0.076) | 0.043*** (0.088) | 0.078*** (0.094) | 0.087** (0.127) |
| Result (R) | Division | β_6 | 0.030** (0.065) | 0.049** (0.075) | 0.075** (0.080) | 0.031 (0.108) |
| Employment Type (ET) | Private = 0, Public = 1 | β_7 | 0.55 (0.077) | 0.082 (0.089) | 0.043*** (0.095) | 0.020* (0.128) |
| Cognitive Ability (CA) | Has not Ability = 0, Has Ability = 1 | β_8 | 0.039* (0.086) | 0.066 (0.099) | 0.035* (0.106) | 0.138** (0.143) |
| In-job Training (IJ) | Yes = 1, No = 0 | β_9 | 0.020* (0.074) | 0.031 (0.085) | 0.079** (0.091) | 0.051 (0.122) |
| Duration of Work (WD) | Hour | β_{10} | 0.121 (0.019) | 0.216*** (0.023) | 0.110 (0.024) | 0.169** (0.033) |
| Cons | | β_0 | 9.244*** (1.043) | 9.832*** (1.209) | 8.636*** (1.289) | 7.923 (1.734) |
| Number of Observations = 90 | | | R ² = 0.44 | R ² = 0.33 | R ² = 0.22 | R ² = 0.27 |

N.B.: Robust standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ Source: Authors Estimation, 2021

Tests for Ordinary Least Square

Some specification tests have been performed to check the results of the model. These are - test for normality (Shapiro-Wilk test, normal probability plotting, Kernel density plotting, quantile normal plotting tests), test for multi-colinearity (variance inflating factor-VIF), test for specification error (link test), test for omitted variable bias (Ramssey test). In Table 3, it can be said that the residual of income and education is normally distributed but experience is not. On the other hand, the residuals of age, age2, sex, major, institute type, result, employment type, cognitive ability, in-job training and duration are normally distributed and the data are randomly collected. From the Figure 1 (a), it has seen that the income line is close to normality line, so the residual is normally distributed. Additionally, it can be commented from the Figure 1 (b), the income curve is close to normal distribution curve. So, error term is normally distributed and stable; and if the sample size is changed there is no change in normality. The Figure 1 (c), has shown that the quantile curve of income is close to the normality line, so there is high normality. From Table 4, it can be disclosed that the mean VIF of multiple regression is 1.37 which is less than 10 and all the variable's 1/VIF values are greater than 0.10 separately, so there is also no multi-colinearity. The P-value of hat square in link test is 0.559, which are greater than 0.05.

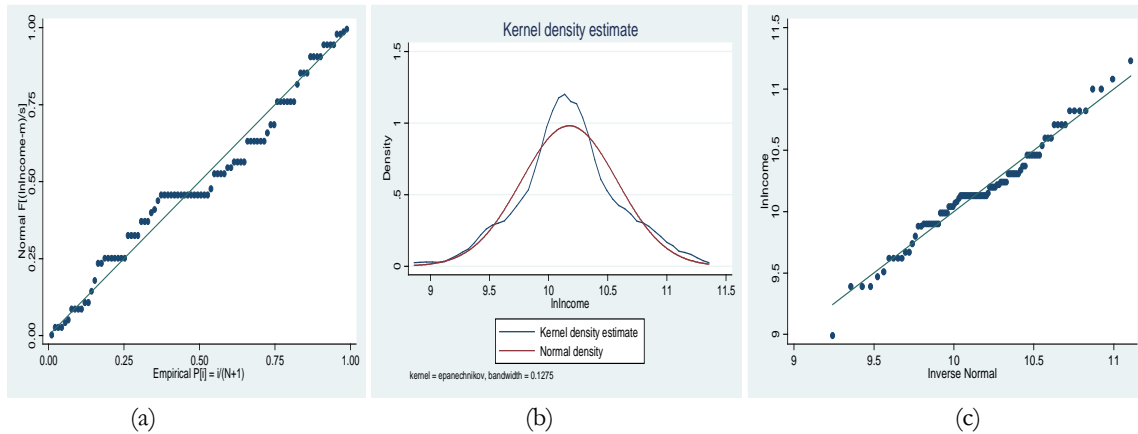


Figure 1. (a) Normal Probability Plotting, (b) Kernel Density Plotting, (c) Quantile Normal Plotting

Table 3. Shapiro-Wilk Test

| Variables | Observation | P-Value |
|-------------------|-------------|---------|
| lnIncome | 250 | 0.423 |
| Education | 250 | 0.319 |
| Experience | 250 | 0.030 |
| Age | 250 | 0.120 |
| Age ² | 250 | 0.171 |
| Sex | 250 | 0.159 |
| Major | 250 | 0.315 |
| Institute Type | 250 | 0.999 |
| Result | 250 | 0.700 |
| Employment Type | 250 | 0.999 |
| Cognitive Ability | 250 | 0.634 |
| In-job Training | 250 | 0.847 |
| Duration of Work | 250 | 0.790 |

So, the null hypothesis is accepted in both models, i.e. there is no specification error. Furthermore, the P-value is 0.36 in Ramssey test which is greater than 0.05. As a result, the null hypothesis is accepted, i.e. there is no omitted variable bias. The existing variables are explained the model moderately.

Table 4. Multi-collinearity Test (VIF)

| Variables | VIF | 1/VIF |
|-------------------|------|-------|
| Education | 1.01 | 0.81 |
| Experience | 2.03 | 0.78 |
| Age | 1.11 | 0.16 |
| Age ² | 1.39 | 0.26 |
| Sex | 1.23 | 0.73 |
| Major | 1.37 | 0.76 |
| Institute Type | 1.24 | 0.78 |
| Result | 1.31 | 0.80 |
| Employment Type | 1.28 | 0.81 |
| Cognitive Ability | 1.22 | 0.82 |
| In-job Training | 1.07 | 0.83 |
| Duration of Work | 1.20 | 0.93 |
| Mean VIF | 1.37 | |

Table 5. Determinant of Education (First Stage)

| Education (Schooling Year) | Coefficient |
|---|-------------|
| Age (Year) | 0.311 |
| Age ² (Year) | -0.013 |
| Employment Type (Private = 0, Public = 1) | 0.019 |
| Experience (Year) | 0.354* |
| Experience ² (Year) | -0.002 |
| Duration of Work (Hour) | 0.130 |
| Gender (Male = 0, Female = 1) | -0.339 |
| Education of Family Head (Schooling Year) | 0.433*** |
| Members of Family (Number) | -0.223** |
| Mother's Education (Schooling Year) | 0.072*** |
| Constant | 14.980 |
| Observations | 250 |
| R ² | 0.39 |

N.B.: Robust standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ Source: Authors Estimation, 2021

Estimation of 2SLS and Comparison the Outcome with OLS

In this section, the first stage result of 2SLS for income and \ln income is estimated, where instrumented variable is education and instruments are age, age², employment type, experience, experience², duration of work, gender, education of head of the family, members of family, mother's education (Table 5). It can be found that experience, education of family head, member of family and mother's education have significant contribution in education attainment in Khulna city. The result of OLS and 2SLS coefficients of age, age², employment type, experience, experience², duration of work, gender, education and cognitive score is estimated in Table 6. The employment type, experience, duration of work and education variables has significant impact of income for both level-level and log-level of OLS and 2SLS. Here, government job

holders have high income than the private employee, because there are little opportunities of private job in Khulna city. Experience has significant effect on income. But after a certain period of time, the impact of experience is being negative. In addition, there are some scope of working overtime, that's why the duration of work has positive influence on income. Unfortunately, the gender discrimination in income level is high in Khulna city. Education has significant impact on level-level and log-level models of OLS and 2SLS. The variable cognitive ability is significant in level-level model of OLS. Here, the test of over-identification problem and F-value are measured. F-value is greater than 10, so, 2SLS is appropriate in this perspective but where the p-value of endogeneity test is greater than 0.05, i.e. we accept null hypothesis (the variable is exogenous) and conclude that there is no endogenous variable. So, the OLS is well-explained and it has given the most robust, reliable and consistent result for this research.

Table 6. Comparison between OLS and 2SLS and Result of Test

| Variables | OLS Coefficient | | 2SLS Coefficient | |
|---|-------------------------|---------------------|---------------------------|---------------------|
| | Level-level | Log-level | Level-level | Log-level |
| Income (BDT) | | | | |
| Age (Year) | 1266.237 (1699.78) | 0.040 (0.054) | 1279.952 (1638.765) | 0.040 (0.052) |
| Age ² (Year) | -12.521 (19.48) | -0.003 (0.006) | -12.956 (18.842) | -0.003 (0.005) |
| Employment Type (Private = 0, Public = 1) | -4639.643* (2890.17) | -0.148* (0.093) | -4158.508* (2744.663) | 0.140* (0.087) |
| Experience (Year) | 822.926 (745.07) | 0.023* (0.023) | 919.369* (715.946) | 0.024 (0.022) |
| Experience ² (Year) | -26.893* (20.54) | .008 (0.006) | -29.51414 (19.737) | -0.001 (0.004) |
| Duration of Work (Hour) | 782.443 (690.44) | 0.029* (0.022) | 919.977* (646.948) | 0.032* (0.020) |
| Sex (Male = 0, Female = 1) | -3051.348 (2956.43) | -0.109 (0.094) | -3020.41 (2843.25) | -0.110 (0.090) |
| Education (Schooling Year) | 2195.601*** (664.43) | 0.084*** (0.021) | 2767.061*** (1081.533) | 0.093*** (0.034) |
| Cognitive Score (Number) | 2071.429 (2068.02) | 0.037 (0.066) | 2105.036** (1836.471) | 0.235 (0.457) |
| Constant | 43519.79 (39796.89) | 7.616 (1.274) | 48680.600 (42564.330) | 7.552 (1.353) |
| (Test of Endogeneity) | | | 0.398 | 0.099 |
| Durbin (score) chi2(1) | | | (p = 0.527) | (p = 0.752) |
| Wu-Hausman F(1,80) | | | 0.355 | 0.088 |
| | | | (p = 0.552) | (p = 0.767) |
| (Test of Over identification) | | | 6.711 | 7.523 |
| Sargan (score) chi2(2) | | | (p = 0.034) | (p = 0.023) |
| Basman chi2(2) | | | 6.366 | 7.206 |
| | | | (p = 0.041) | (p = 0.027) |
| F-Value | | | 13.703 | 13.703 |
| Observations | 250 | 250 | 250 | 250 |
| R ² | 0.24 | 0.29 | 0.22 | 0.29 |

N.B.: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1 Source: Authors Estimation, 2021

Hypothesis Testing of Income Level between ‘Public’ and ‘Private’ Institution

In this research, 250 educated and service holder respondents are taken as sample. The hypothesis (two-sample t test) is tested that there is any difference or not in income between the students of public and private institution (Table 7). The obtained t-value (t) is 5.19, the degrees of freedom (n-2) are 248, and the statistical significance (2-tailed p-value) of the two-sample t-test ($\Pr(|T| > |t|)$) under H_a : mean (diff) \neq 0, in which p value is 0.00. As the p-value is less than 0.05 (i.e., $p < .05$), it can be concluded that there is a statistically significant difference between two income groups of people from different institution. In other words, it can be explored that there is a significant difference in income level between the students of public and private institution. The difference is about BDT 11862.57 which is significant at 1 percent level because the p value (0.00) is less than 0.01.

Table 7. Two-sample t Test

| Variable | Observation | Mean | Std. Err. | Std. Dev. | [95 percent Interval] | Conf. |
|------------|-------------|----------|-----------|-----------|-----------------------|----------|
| Public | 178 | 33891.84 | 1795.33 | 12567.33 | 30282.08 | 37501.60 |
| Private | 72 | 22029.27 | 1274.72 | 8162.21 | 19452.96 | 24605.58 |
| Combined | 250 | 28487.78 | 1292.79 | 12264.44 | 25919.04 | 31056.52 |
| Difference | | 11862.57 | 2283.83 | | 7323.93 | 16401.21 |

diff = mean (Public) – mean (Private) t = 5.19
 Ho: diff = 0 degrees of freedom = 248

Ha: diff < 0 Ha: diff \neq 0 Ha: diff > 0
 Pr (T < t) = 1.00 Pr (|T| > |t|) = 0.00 Pr (T > t) = 0.00

Source: Authors Estimation, 2021

Specific Education Policies in Bangladesh

Bangladesh has a good number of legal instruments to provide equity and access of all children to education. The constitution of Bangladesh ensures the need for universal education for all regardless of any special circumstances. Article 17 and 28 of the Constitution of the People’s Republic of Bangladesh clearly mandates that the state should provide education to all without making any discrimination. Complying with all the international treaties, Bangladesh has committed to address inclusive education within the existing education policy. According to the UNESCO report, Bangladesh is signatory to the declaration of Education For All (EFA) in 1990, the Salamanca Statement and Framework for Action on Special Needs Education in 1994, the Dakar Framework for Action in 2000 and the UN Convention on the Rights of Persons with Disabilities-UNCRPD in which education is to be provided to all children with an inclusive approach (Ahsan & Burnip, 2007). Besides, Bangladesh also promised to achieve Millennium Development Goals (MDGs), which also enunciated the rights of all children into education through uniform system. The dominant legislations regarding education policy of Bangladesh are the Compulsory Primary Education Act, 1990, National Education Policy for the Disabled, 1995, Bangladesh Persons with Disability Welfare Act, 2001 and the National Education Policy, 2010. These instruments are considered as official commitment of the government towards education in Bangladesh.

Discussion

The result of the study has shown that education and experience has positive impact on income level of the service holder of Khulna region. But education has much effect on income than experience because the coefficient of education is higher than experience. The literature has also provided the same outcome that the

education has more influence on income level than the experience, because education is the first step to prove the skill of individual through the certificates, presentation power and instant idea generation capacity (Jiménez, et al., 2011). The lower income group people have more impact of education on income than the middle or higher income group of people. The income of service holder is also influenced positively by their major choice, institution type of education, result of the respondents, employment type of them and duration of work per day, their age, cognitive ability and in-job training. Previous studies have examined that good result, major choice, cognitive ability, duration of work, training are important for the enhancement of income, but employment type has no effect on income (Salih, 2007). Father's and mother's education, family income, family type, migratory status has positive impact on education but the monthly education cost has negative impact on it. The outcome is similar to the analysis of previous study about how to create capital through education. Here, parents' education, family income, education cost are focused the major influential determinants of education (Schultz, 1960). The OLS is well-explained and provides consistent result than 2SLS. Furthermore, there is statistically significant difference in income level between the students of public and private institution. For the economic growth as well as development, it is always essential to improve the quality of education in public and private institution simultaneously (Yanez, 2012). This research has recommended that the educational facilities should be improved for attracting the people of Khulna to avail higher level of education. Not only the public institute, but also private institute should provide advance and systematic education as well as proper schools, college, concentrate teachers, scholarship facilities and so on. The cost of education in public and private college, universities should be reduced in order to ensure inclusive education. The service holder should be provided much in-job training for gathering more experience and the government should announce some improvement program of cognitive ability and different types of training. Father's and mother's education level should be enhanced to improve their consciousness and the educational career of their children. The education policies should be implemented in practical life through avoiding the corruption and discrimination. Lastly, the expenditure budget on education should be enhanced to introduce the digital education for all and to ensure inclusive education in Khulna.

Conclusion

The present study on factors of education and its impact on income provides the empirical evidences based on the cross-sectional data. The OLS and 2SLS regression of Mincerian income equation has estimated which supports the significant correlations between education and experience on income. The empirical results have also demonstrated that an additional year of education has stronger correlations with percentage change in income than an additional year of experience. It can be summarized that employment indirectly suggests that the students who underperform can correlate to lower incomes because these students do not have the same opportunities as those who are high performers in more education and experience. The relationship between education and cognitive ability and their interactions on income are indeed complex but provide positive result. Testing the hypotheses with the results shows that completing education from public institute provides higher income than private institute. Additionally, the socio-economic factors and policies are essential for education attainment which are identified in this study. Mainly, the reduction in education cost and enhancement of parents' education should be concentrated as major determinants of education attainment. The consciousness about education policies should be enhanced, so that people can understand what types of opportunities they can avail.

The previous literature has traditionally modeled a single academic variable with several demographic covariates to predict income. Building on past theoretical work, these existing studies focus on evaluating academic (education + employment) factors and their effects on income. However, there needs to be a model that captures multiple variables (along with demographic co-variables) and apply them on income. Given student preferences in major and employment choices, it is pertinent to determine which educational variables have strong impacts on earnings. This model distinguishes itself from past empirical work as it incorporates factors that labor and education economists have regressed separate into different models. This is the research

gap of this paper. Moreover, there is rarely any combined study on factors of education as well as the impact of education on income in Khulna city. Specifically, adding employment related variables change the weights of the major variables coefficients. This difference in coefficients implies that there is an effect between majors and employment selection. The effect implies that people who choose science or business majors are more likely to select employment that are higher paying, which is something that has not been previously studied. Having a higher result also predicts percent increases in income.

The models used in this research helps to explain the effects of education and experience as well as the other academic variables which factors are integral in getting into higher paying job. By studying this, we can have a better understanding of the relationships and be able to implement and support the investment in education and policy into the right direction. To this end, as the results contribute positively by incorporating new methods of depicting earnings, they can offer new bases for further research in the field of labor, inclusive education policy and economics.

Conflict of interest

This is a self-financed study and does not receive any form of grant. The purpose of the study is specially focused on identifying the factors and policies of education and its effect on the income level of people of Khulna city. Authors beware of not asking any type of sensitive questions to the respondents and their identity is not even disclosed in any stages throughout the study.

References

- Ahsan, M. T., & Burnip, L. (2007). Inclusive education in Bangladesh. *Australasian Journal of Special Education*, 31(1), 61-71.
- Arcidiacono, P. (2010). Beyond signaling and human capital: education and the revelation of ability, *American Economic Journal: Applied Economics* 2, 2(4), pp. 76-104.
- Babones, S., Felmet, K. and Hwang, J. (2007). Investigating the Lag Structure of the Education-Income Inequality Relationship, *Michigan Sociological Review*, 21, pp. 179-191.
- Becker, G., & Collins, R. A. (1964). Human capital investment.
- BBS (2021). 'Statistical Year of Book of Bangladesh 2021', Bangladesh Bureau of Statistics (BBS), Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka.
- Jiménez, M.S., Artes, J. and Jiménez, J.S. (2011). Education as a Positional Good: A Life Satisfaction Approach, *Social Indicators Research*, 103(3), pp. 409-426.
- Kimbrough, K. and Arcidiacono, P. (2012). *Capturing a College Education's Impact on Industry Wages Across Time: An Analysis of Academic Factors that Affect Earnings*, Unpublished Undergraduate Thesis, Trinity College of Duke University, Duke University, Durham, North Carolina.
- Malak, M. (2013). Inclusive Education in Bangladesh: Policy and Practice. *Australian Association for Research in Education*.
- Mincer, J. (1984). Human Capital and Economic Growth, *Economics of Education Review*, 3(3), pp. 195-205.
- Salih, M. (2007). *Relation between Education, Cognitive Abilities and Wages in the Informal Sector in Greater Khartoum (Sudan)*, Unpublished Undergraduate Degree Thesis, SLU, Institutionen för Ekonomi, Uppsala.
- Schultz, T. (1960). Capital Formation by Education, *Journal of Political Economy*, 68(6), pp. 571-583.
- Wannakraioj, W. (2013). The Effect of Education and Experience on Wages: The Case Study of Thailand in 2012, *Southeast Asian Journal of Economics*, 1(1), pp. 27-48.
- Yanez, A.A. (2012). *The Effect of Education on Economic Growth*, Unpublished Master Degree Thesis, Economics Department, Tohoku University, Sendai.

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