High Nutritional Vulnerability and Associated Risk Factors of Bangladeshi Wetland Community People Aged 50 Years and Older

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Abstract: People aged 50 years and over often show nutritional vulnerability in South Asia, including Bangladesh. Consequently, they present physical weakness and illness that escalate overtime. Community-focused investigations have the potential to inform healthcare interventions in Bangladesh, but current studies examine older adults’ nutrition status which are not all-encompassing (e.g., wetland communities). We, therefore, assessed the malnutrition status among wetland community-dwelling older adults aged ≥50 years in Bangladesh. A cross-sectional survey was conducted with 400 older adults living in the north-eastern wetland community of the country through simple random sampling. Demographics and general health information were collected using a structured questionnaire, and the Nestlé Mini Nutrition Assessment—Short Form was used to assess nutrition status. Respondents’ socio-demographic and health profiles were assessed, and the Pearson Chi-square test was performed to identify the associated risk factors of malnutrition. The prevalence of malnutrition and risk of malnutrition were 59.75 and 39.75 percent, respectively. The malnutrition prevalence rate was higher with increasing of age and females were more malnourished than males. Age, gender, educational status, occupation, and income were significantly associated with the participants’ malnutrition. The wetland community-dwelling people suffering from sleep disorders and having poor health condition, were found to be more malnourished. The findings confirm that the prevalence of malnutrition and risk of malnutrition are high among the wetland community-dwelling people aged ≥50 years. Our findings suggest health professionals to implement public health nutrition surveillance and clinical interventions simultaneously in wetland elderly to improve nutritional status of this cohort.

Keywords: wetland community; older adults; malnutrition; socio-demographic and health factors; Bangladesh

1. Introduction

Malnutrition among older adults is coming to surface at a higher rate where most of them are from South Asian countries [1]. The burden of malnutrition has been characterized by a massive decline and deterioration of the physical and psychological components of health [2]. Many people are being exposed to under-nutrition because of food shortage and obesity due to changing eating habits, where the wetland community-dwelling older
adults are more vulnerable to malnutrition. To eliminate malnutrition in these countries, it is important to understand: Who are the malnourished? Where are they located? Lastly, why are they malnourished?

People aged 50 years and over are generally inclined to malnutrition because of their physiological, psychological, and functional changes that occur with aging [3–7]. As noted earlier, this prevalence is high in South Asia that results in negative health effects among old age, such as reduced immunity, physical and intellectual disability, and compromised productivity [3,8]. According to Spencer et al. (2012) and Vafaei et al. (2013), the physical and psychological health problems, including anemia, poor memory, weak immune system, infections, muscle weakness, tiredness, unintentional weight loss, depression and anxiety, are closely related to malnutrition and common in older adults [9,10]. Malnutrition also places older adults at risk of comorbid and chronic conditions, for instance, overweight and obesity are major causes of type-II diabetes, respiratory and cardiovascular diseases, various cancers, and multiple organ failure [11–16]. Such morbidity and comorbidity patterns among the adults inform a stipulation of community-based investigation of malnutrition risks in South Asia.

Our study focuses on Bangladeshi wetland community-dwelling older adults’ (≥50 years referred as older adults in this paper) malnutrition risks and their associated factors. Bangladesh is a lower-middle income country in South Asia. Bangladesh has also been identified as having one of the largest river deltas in the world. The total area of the country’s wetlands (generally referred as rivers and streams, freshwater lakes, marshes, haors, baors, and beels) is estimated to be eight million acres [17]. The major wetlands of the country include Hakaluki haor, Chalan beel, Atrai basin, Punarbhaba floodplain, Gopalganj-Khulna Beels, Arial Beel, and Surma-Kushiyara floodplain [17]. The country has been experiencing a rapid growth in the number of people aged 50 years and over, and the proportion of these people is 16 percent of the country’s total population [18]. About 73 percent of the older adults live in rural areas and, of them, 30 percent live in the wetlands [19].

Evidence shows that wetlands provide many benefits for local people, for example, fisheries and agriculture are the two major livelihoods for the wetland people. This access tells a story of high nutrient and fiber foods, but the reality is that these villages are perceived as the place of undernourished or malnourished [20–22]. Poor nutrition in early childhood and lifelong unhealthy food consumption habits exist in the wetlands, and this is related with a lack of education and awareness [23]. The general education and heath literacy rates are low, which, in combination with an inadequate nutritional programs and services, may impact significantly on their malnutrition [23–26].

According to the literature, older adults in the wetlands are vulnerable to malnutrition than the mainland population and other wetland groups for many reasons including hunger and low food in-take, physio-psychosocial and functional changes that occur with age, and inadequate access to food [16,27]. Their problem is compounded by poor nutrition together with physical illness, including both communicable and non-communicable diseases. In a study, it is also found that women of reproductive age and children live in wetlands are susceptible to malnutrition because of natural hazards, health illiteracy, and food insecurity, while nutrition-related data for the people aged 50 years and over is not well documented [18,19].

In Bangladesh, the aging and nutrition aspects in wetlands are often neglected in policy documents due to a shortage of survey budget. Most of the dietary programs intervened by the community clinics are directed toward infants, young children, adolescents, and pregnant women [28,29]. Little is known about the malnutrition of the communities’ older adults and how their physio-psychosocial and living circumstances affect them. Therefore, we aim to conduct a cross-sectional study to determine the prevalence of malnutrition, malnutrition risks, and the factors associated with malnutrition of wetland aging.
2. Materials and Methods

2.1. Ethics and Permission for Data Collection

In this study, the ethics approval was granted by the University Research Center, Shahjalal University of Science & Technology, Bangladesh, with grant number PS/2018/1/10, and formal permission for data collection was sought from Civil Surgeon Office, Bangladesh.

2.2. Research Design, Settings, Sampling, and Participants

We employed a cross-sectional research design, involving a socio-demographic survey and a formal questionnaire. Participants were recruited randomly from 10 wetland villages in the north-eastern region (wetland areas in Sylhet) of Bangladesh through simple random sampling. While the age cut-off for elderly in Bangladesh is 60 years [30], literature notes that people who live in this region have a lower life expectancy than the national average [31]. Wetlands are the most vulnerable disadvantage communities in Bangladesh where the aging and nutrition aspects are often neglected in policy documents [28,32]. Moreover, the health literacy is very low and the people are not aware of their healthcare needs until their problems are manifested [3,33]. The health condition or fitness of people living in these communities’ rapidly declines at old age and they start experiencing the signs of aging from 50 years [3,5,34,35]. Additionally, economic characteristics of the wetlands like lack of income/saving, lifelong deprivation, and stress of dependency at old age are responsible for early aging [36,37]. Under the given circumstances, we approached the people aged ≥50 years to participate in the study, and 400 older adults from the selected wetland villages agreed to attend a person-centered general health assessment and complete a survey questionnaire. Study sample size was calculated by considering 50% (optimum value to get maximum sample size) proportional value, 5% margin of errors and 5% non-response rate. Simple random sampling technique was applied in data collection and wetland villages were selected through random number generated by R-Programming language.

2.3. Data Collection

Following the guidelines of Helsinki Declaration of 2000, the socio-demographic, economic, health, and nutritional data were collected through a structure questionnaire including the Nestlé Mini Nutrition Assessment questions [38,39], after taking written informed consent from each participant. Necessary medical equipment (Table 1) were used by the trained public health data enumerator to collect anthropometric data from the participants.

Table 1. Outcome Measures of related health indicators.

| Indicators | Measurement Process                                                                 | Used Instruments                             |
|------------|-------------------------------------------------------------------------------------|----------------------------------------------|
| Height (m) | -Stand without shoes and simple summer clothes                                     | Height measuring scale (Stadiometer)         |
|            | -Look straight ahead and keep shoulders to level                                    |                                              |
|            | -Keeping normal summer clothes                                                     |                                              |
| Weight (Kg)| -Keeping the respondents simple as far as possible during the measurement          | Weight measuring scale (Seca Digital)        |
| BMI (Kg/m²)| \[BMI = \frac{\text{Weight (Kg)}}{\text{Height (m)}^2}\]                           | Computer                                     |
| BP (mmHg.) | -Well seated                                                                         | Electronic BP Monitor (OMB) Model: BP-1307  |
| RBS (mmol/L)| -Average of three consecutive readings                                               | Digital RBS Machine (Vivacheck\textsuperscript{TM} Ino.), Model: VGM01 |
|            | -Time between breakfast and lunch                                                   |                                              |
|            | -Time between lunch and dinner                                                      |                                              |

2.4. Outcomes Measures

The Nestlé Mini Nutrition Assessment—Short Form (MNA-SF) is a validated and widely used screening tool for identifying adults’ malnourishment and malnutrition risk [38,40]. We used Nestlé’s (2009-revised version) MNA-SF that comprised six items: food intake,
weight loss, mobility, psychological stress, neuropsychological problems, and BMI [39].

The MNA-SF score lies between 0 and 14, which is classified into three categories: well-nourished (12 ≤ MNA-SF score < 14), risk of malnutrition (8 ≤ MNA-SF score ≤ 11), and malnourished (0 ≤ MNA-SF score ≤ 7) [38,39].

2.5. Outcome Measures of Related Health Indicators

The outcome measures of participants’ height, weight, body mass index (BMI), blood pressure (low BP (diastolic, systolic: <80, <120), normal BP (diastolic, systolic: 80, 120), and high BP (diastolic, systolic: >80, >120)), and random blood sugar (Diabetic: RBS > 7.8 mmol/L, before meal) were measured using the necessary medical equipment described in the Table 1.

2.6. Data Analysis

We found no missing value in the dataset. Descriptive statistics were performed first and the MNA-SF short form technique was used to assess the participants’ malnutrition profile. The association between participants’ malnutrition and physio-psychosocial factors were examined by using bivariate analysis. The Pearson Chi-square test was performed to determine the associated significant risk factors of malnutrition. The project’s data management and statistical analyses were carried out through statistical software SPSS (version-20.0), (IBM, Armonk, NY, USA).

3. Results

3.1. Demographic Characteristics

The mean age was 62.35 years, with a range of 50–90 years. About 49.5 percent participants were young old (50–59 years) and the rest of them were 60 years and older. Most of the participants (59.5 percent) were male, with half of the participants (59.8 percent) illiterate. A large percentage (72 percent) were fishermen, farmers, or daily laborers. The average monthly family income was 13,868 Bangladeshi Taka (USD 163), where 33.3 percent participants had income less than BDT 10,000 (USD 117) and a small portion (5.9 percent) them had income more than BDT 20,000 (USD 236). More than half of them were living in a nuclear family and 10.9 percent were from extended family. About 25 percent participants were observed with a single living arrangement, followed by 70.9 percent and 3.8 percent were in double arrangement and extended living arrangement, respectively (Table 2).

Table 2. Socio economic and demographic characteristics of the elderly.

| Characteristics                  | Frequency | Percentage |
|----------------------------------|-----------|------------|
| **Age**                          |           |            |
| 50–59                            | 198       | 49.5       |
| 60–69                            | 143       | 35.8       |
| 70+                              | 59        | 14.8       |
| **Gender**                       |           |            |
| Female                           | 162       | 40.5       |
| Male                             | 238       | 59.5       |
| **Education**                    |           |            |
| Illiterate                       | 238       | 59.8       |
| Primary                          | 122       | 30.7       |
| Above Primary                    | 38        | 9.5        |
| **Occupation**                   |           |            |
| Public/Private Jobs              | 109       | 27.5       |
| Fishing/Agriculture/Other Works | 288       | 72.5       |
| **Family Type**                  |           |            |
| Joint                            | 129       | 32.2       |
| Extended                         | 43        | 10.7       |
| **Monthly Income in Taka (Dollars, considering $1 = 84.79 BDT, Accessed: 6 November 2020)** | | |
| <10,000 ($<117)                  | 126       | 33.3       |
| 10,000 to 19,999 ($118 to $235)  | 195       | 51.2       |
| >20,000 ($>236)                  | 59        | 5.9        |
| Single                           | 101       | 25.3       |
| **Double**                       | 283       | 70.9       |
| Extended                         | 15        | 3.8        |
3.2. Mini Nutrition Assessment of Young and Older Adults Lived in Wetland Community

The nutritional status of the participants has presented in Figure 1. Analysis found that 59.75 percent participants were malnourished, and the following 39.75 percent of the participants were at risk of malnutrition (Figure 1a). Overall, females were more malnourished than male. More specifically, 68.5 percent females were malnourished, and 31.5 percent of the female participants were at risk of malnutrition. On the other hand, 59.8 percent males were malnourished and 45.4 percent were at risk of malnutrition (Figure 1b). Although a small proportion of males (0.08 percent) were found to be well-nourished, no female respondents were found with normal nutritional status. Our study found an increased rate of malnutrition among the participants with the increasing of their age. As such, older adults who were 60–69 years old found a 12.1 percent malnourish rate, followed 11.1 percent malnourish in the pre-elderly (50–59 years) age group (Figure 1c). Income was found a significant factor of the older adult’s malnutrition. The pre-elderly and elderly people whose income is less than BDT 10,000 (USD 117) or more than BDT 20,000 (USD 236) were found more malnourished, but almost all them were found either malnourished or at risk of malnutrition (Figure 1d).

Figure 1. Mini-nutritional status of respondents lived in wetland community: (a). Overall Nutritional Status; (b). Mini-Nutritional Status by Gender; (c). Mini-Nutritional Status by Age; (d). Mini-Nutritional Status by Family Income.
3.3. Socio-Demographic Risk Factors Related to Wetland Community-Dwelling Older Adult’s Nutrition

The Pearson Chi-square test results on the participants’ socio-demographic risk factors of malnutrition are illustrated in Table 3. As the normal nutrition rate was very low (0.5 percent) in this dataset, we excluded these respondents from the dataset and assessed the respondents who were at risk of malnutrition and malnourished. From this table, respondent’s age, gender, educational status, occupation, family type, and income were found as significant risk factors of malnutrition (Table 3).

Table 3. Socio-demographic factors related to wetland community-dwelling older adults’ nutrition.

| Characteristics      | Malnutrition | At risk of Malnutrition |
|----------------------|--------------|-------------------------|
|                      | N  | % | N  | % | p-Value |
| Education            |    |   |    |   |         |
| Illiterate           | 167| 70.2| 71| 29.8| 0.0001 *** |
| Primary              | 48 | 40.0| 72| 60.0|         |
| Above Primary        | 23 | 60.5| 15| 39.5|         |
| Gender               |    |   |    |   |         |
| Female               | 111| 68.5| 51| 31.1|         |
| Male                 | 128| 45.8| 108| 54.2|         |
| Occupation           |    |   |    |   |         |
| Public/Private Jobs  | 44 | 41.1| 63| 58.9| 0.0001 *** |
| Fishing/Agriculture/Other Works | 193| 67| 95| 33.0|         |
| Monthly Income in Taka (Dollars, considering $1 = 84.79 BDT, Accessed: 6 November 2020) |    |   |    |   |         |
| <10,000 (<$117)      | 85 | 67.5| 41| 32.5|         |
| 10,000 to 19,999 ($118 to $235) | 95 | 49.0| 99| 51.0| 0.001 *** |
| >20,000 (>236)       | 41 | 69.5| 18| 30.5|         |

A significant test for the trend for all models \( p < 0.05 \). *** \( p < 0.001 \).

3.4. Health Factors Related to Wetland Community-Dwelling Older Adults’ Malnutrition

About 35.5 percent of older adults’ self-rated health status was not good, where 108 (77.1 percent) were malnourished and the remaining 32 (22.9 percent) of them were at risk of malnutrition. The malnourished older adults had experience of various comorbidities such as diabetes, hypertension, and sleeping disorders. The prevalence of diabetes, hypertension, and sleeping disorders in the community were found 18.75, 44.5, and 56.5 percent, respectively. The older adults suffering from malnutrition were 21.4 percent diabetic, 53.56 percent hypertensive, and 51.3 percent were facing severe sleep disorders. The older adults at risk of malnutrition were 15.1 percent diabetic, 56.7 percent hypertensive, and 65.4 percent with sleep disorders. The chi-square association test identified the self-rated health status and sleep disorders as the significant risk factors of malnutrition (Table 4).

Table 4. Health factors related to wetland community-dwelling older adults’ nutrition.

| Characteristics      | Screening Nutrition Status |
|----------------------|---------------------------|
|                      | Malnutrition | Risk of Malnutrition |
|                      | N  | % | N  | % | p-Value |
| Health Status        |    |   |    |   |         |
| Good                 | 131| 50.8| 127| 49.2| 0.000 |
| Not-good             | 108| 77.1| 32 | 22.9|         |
| Diabetes             |    |   |    |   |         |
| Yes                  | 51 | 68.0| 24 | 32.0| 0.073 |
| No                   | 187| 58.1| 135| 41.9|         |
| High                 | 36 | 53.7| 31 | 46.3|         |
| Blood Pressure       |    |   |    |   |         |
| Low                  | 92 | 60.9| 59 | 39.1| 0.507 |
| Normal               | 111| 61.7| 69 | 38.3|         |
| Sleeping             |    |   |    |   |         |
| Yes                  | 122| 53.2| 104| 46.8| 0.004 |
| No                   | 116| 66.0| 55 | 34.0|         |

A significant test for the trend for all models \( p < 0.05 \).
4. Discussion

Our cross-sectional survey was conducted among wetland community-dwelling people aged 50 years and above living in the north-east region of Bangladesh to understand the prevalence of malnutrition, malnutrition risks, and the factors associated with malnutrition of wetland aging. This study has some limitations: Firstly, this was a cross-sectional study that has lack strength in cause–effect analysis. Secondly, the sample size was not representative for the wetland communities in Bangladesh; although the cut-off for old age is 60 years in Bangladesh, we considered 50 years for wetland people. Finally, we did not check the dietary intake which may have direct effect on the nutrition status of older adults. However, it is the first study of its kind in wetland villages that generates several interesting findings; therefore, we compare and discuss the prevalence of malnutrition and risk factors of the wetland community-dwelling older adults with mainland people in Bangladesh and other South Asian countries in the following sections.

Most of the older adults were found in the pre-elderly age group (50–59 years), where the average age of the participants was sixty-two years. This aging pattern in wetlands is similar to a study conducted among the older adults live in the mainland of the region by Rahman and colleagues in 2021 [3]. Male older adults were higher in proportion than female in the wetland community, and this result is comparable with the findings of some other community-based studies and the latest census report of Bangladesh [3,12,16,41]. The majority of the older adults were illiterate and involved in fishing, agricultural work, daily labor, or no job sectors. The average monthly income was very low (BDT 13,863 or nearly USD 163) and a majority number older adult’s living arrangement was single. These findings are consistent with some other studies conducted in the north-eastern part of Bangladesh [3,16,42–45].

We found a higher prevalence of malnutrition among the wetland community-dwelling older adults. The results are reasonable for the older adults because wetland community is one of the most vulnerable disadvantage communities in Bangladesh [32]. Health literacy is very low here and people are not aware of their healthcare needs until their problems are manifested [3,33]. Additionally, several socio-demographic and economic characteristics like high illiteracy rate, lack of income/saving, stress, and health unawareness are responsible for high malnutrition [36,37].

In other studies, conducted among the older persons in other care settings of Bangladesh, Kabir and his colleagues reported 26 percent prevalence of malnutrition using MNA-SF as the measurement tool, following 40 percent and 53.8 percent malnutrition rates reported by Masum et al., (2015) and Hasan et al., (2020) respectively [40,46,47]. Comparing our results with the recent studies conducted on the overall community in other South-Asian countries, the prevalence of malnutrition was reported as over 20 percent by India, Nepal, Sri Lanka, and Pakistan [4,48–50]. Our study also showed the prevalence of malnutrition was higher among females, old age, and elderlies with low family income compared to their counterparts. These findings are consistent with other recent studies [40,50,51]. While no published studies were found that assessed nutritional status of the wetland community-dwelling older adults in South-Asian countries like Bangladesh, the comparison based on our study findings strongly suggests a higher prevalence of malnutrition among the wetland community-dwelling older adults.

Socio-demographic and economic profiles of elderly are the influential factors for elderly malnutrition. Relating to this, our study found age, education, gender, occupation, family type, and income as the significantly associated risk factors. Some studies conducted in older adults’ malnutrition status also predicted age, gender, education, occupation, and income as the potential socio-demographic and economic factors of malnutrition [49,50,52]. It can be explained by the fact that an unemployed or isolated older adult possibly could have low financial status or unhealthy food habits, resulting in low access to nutritional foods. Due to a higher illiteracy and unemployment rates, the older persons economically and emotionally depend on their family caregivers and most of the caregivers in the wetland community do not have ongoing employment as they are engaged in fishing and
It is interesting to note that older adults with low-income and those in high-income group both presented high malnourishment. According to the existing literature and our study, it is understandable that older adults who have lack of access to income/saving and welfare schemes did not get sufficient nutrient-dense food and healthcare that increase the risk of malnutrition [53–55]. In this study, the older adults with high income showed their poor nutritional knowledge about food choices and dietary intake that caused a nutritional vulnerability in this cohort. Consistent to our findings, studies from India and Nepal have reported illiteracy and unemployment as the influential risk factors for older adults’ malnutrition [50,56].

Health factors are also responsible for the older adults’ malnutrition. Elderly who are suffering from one or more comorbidities tends to be more prone to nutritional deficiencies [12,57–61]. Moreover, aging may come with an accumulation of diseases and impairments including cognitive and physical decline, depressive symptoms, emotional variations, and poor oral health [7,61,62]. In our study, we found sleeping disorder and poor health condition that were significantly associated with the nutritional status of wetland community-dwelling older adults which consistent with the existing literature. Several studies reported that elderly sleeping disorder may bring the negative outcome like weakness and nutrition [63–68].

5. Conclusions

In conclusion, this is the first study on malnutrition conducted among community-dwelling older adults in the wetland area of Bangladesh, where internationally recognized instrument is used. The prevalence of malnutrition and risk of malnutrition found very high among the wetland community-dwelling older adults where respondent’s age, gender, education, occupation, and income are significantly associated with malnutrition. Elderly malnutrition also found higher with the advancement of age and female elderly are more vulnerable than male. Older persons who are suffering from sleeping disorders and whose self-rating health status is poor are suffering from more malnutrition problems than their counterparts. According to the identified vulnerability factors, public health professionals should be encouraged by developing screening strategies to improve the nutritional status of the wetland community-dwelling older population in Bangladesh.

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Informed Consent Statement: Informed consent was obtained from each participant involved in the study. Formal permission for data collection was sought from district civil surgeon office, Bangladesh.

Data Availability Statement: The datasets of the current study are available from the corresponding author on reasonable request to meshbahur.rahman@nipsom.gov.bd.

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