ASSESSMENT OF COGNITION AND PSYCHOLOGICAL CAPACITY OF OLDER ADULTS: A CROSS-SECTIONAL STUDY

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Declaration

I, Aysha Anan, hereby declare that this thesis entitled "Assessment of cognition and psychological capacity of older adults: A cross-sectional study" is an original work submitted in partial fulfilment of the requirements for the degree of Master of Public Health (MPH) at the James P. Grant School of Public Health (JPGSPH), BRAC University, Dhaka, Bangladesh.

I further declare that this work has not been submitted previously, in whole or in part, for any other degree or examination at this or any other university or institution.

All sources used in this thesis have been duly acknowledged and cited. Any assistance received has been mentioned in the acknowledgements section.

I have also added a separate declaration on GenAI use at the end of this work.

Aysha Anan

Date: 02.06.2026

Approval

The thesis/project titled “Assessment of cognition and psychological capacity of older adults: A cross-sectional study”, submitted by

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Of the academic session 2025-2026 has been accepted as satisfactory in partial fulfilment of the requirements for the degree of Master of Public Health

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Ethics Statement

The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and the guidelines of the Institutional Review Board (IRB) of the BRAC James P Grant School of Public Health, BRAC University. Ethical approval was taken before data collection (IRB Reference No: MPH-2025-003)

Written informed consent was obtained from all study participants before data collection, following a thorough explanation of the study purpose, procedures, and potential risks and benefits, as well as the voluntary nature of participation and their right to withdraw without consequence.

Confidentiality and anonymity of all participants were maintained throughout the study. Data were anonymised using a unique ID. All data were stored on password-protected devices, and servers were accessible to only the senior research team.

Participants who screened positive for cognitive decline or depressive symptoms during the study were informed of their results and referred to the appropriate health facilities. No financial incentives were provided.

Abstract

Background: The ageing population is increasing globally, with the number of older adults aged 60 years or more expected to reach 2.1 billion by 2050. Bangladesh is no exception, with a current older population of approximately 15.3 million, projected to double by 2050. Cognitive decline and reduced psychological capacity are two important yet under-recognised challenges of ageing. However, no assessment of these domains using the World Health Organization's Integrated Care for Older People (ICOPE) has been conducted in Bangladesh.

Objectives: To assess the status of cognition and psychological capacity in older adults in rural Bangladesh and identify factors associated with the decline of these domains.

Methods: A cross-sectional study was conducted among 402 older adults aged ≥ 60 years in three wards within the Sujalpur union of Birganj subdistrict, Dinajpur, Bangladesh, from March to April 2026. A simple random sampling technique was used to select the study participants. Bangla adaptation of the Mini-Mental State Examination (BAMSE) and Patient Health Questionnaire-9 (PHQ-9) were used to assess cognitive status and depressive symptoms. A score of less than 24 on the BAMSE was considered to indicate cognitive decline, and a score of more than 10 on the PHQ-9 was considered to indicate depressive symptoms. Data were analysed using Stata V.17.0, and descriptive and multivariable logistic regression analyses were performed.

Results: The prevalence of cognitive decline was 41.8 % (n=168), and the prevalence of depressive symptoms was 46.8% (n=188). Female sex (adjusted odds ratio (aOR): 2.84, 95% CI: 1.57-5.12) and adequate physical activity (aOR: 0.59, 95% CI: 0.37-0.95) were associated with cognitive decline. Socio-economic factors related to depressive symptoms were the highest household wealth tertile (aOR: 0.57, 95% CI: 0.32-0.99) and female sex (aOR: 2.14, 95% CI: 1.17-3.93), malnutrition (aOR: 3.42, 95% CI: 1.65-7.12), and adequate sleep ≥7 hours (aOR: 0.40, 95% CI: 0.24-0.66) were associated with depressive symptoms.

Conclusions: A high prevalence of cognitive decline and depressive symptoms was observed among older adults in rural Bangladesh. Factors such as sex, household wealth, physical activity, sleep, and nutritional status emerged as key determinants and should be considered when developing targeted interventions for older adults. These findings underscore an urgent need to integrate cognitive and psychological care into primary healthcare using the ICOPE framework.

Keywords: Cognition, psychological capacity, ICOPE, WHO, Older adult, Bangladesh

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List of Acronyms

Acronyms	Full form
ADL	Activities of Daily Living
aOR	Adjusted Odds Ratio
BAMSE	Bangla Adaptation of the Mini-Mental State Examination
BMI	Body Mass Index
BRAC	Bangladesh Rural Advancement Committee
CNCDN	Centre for Non-Communicable Diseases and Nutrition
CI	Confidence Interval
cOR	Crude Odds Ratio
CRD	Chronic Respiratory Disease
DDS	Dietary Diversity Score
DQQ	Diet Quality Questionnaire
IADL	Instrumental Activities of Daily Living
ICOPE	Integrated Care for Older People
JPGSPH	James P Grant School of Public Health
LMIC	Low- and Middle-Income Country

MET	Metabolic Equivalent of Task
MNA-SF	Mini Nutritional Assessment Short Form
MPH	Master of Public Health
NCD	Non-Communicable Disease
PHC	Primary Healthcare
PHQ-9	Patient Health Questionnaire-9
SD	Standard Deviation
STATA	Statistics and Data (software)
UHFPO	Upazila Health and Family Planning Officer
WHO	World Health Organization
UN	United Nation

Chapter 1: Introduction

1.1 Background and Rationale

Bangladesh is experiencing a rapid demographic transition, with a significant increase in the projected older adult population (DGHS, 2024). It has 15.3 million older people, one of the largest older populations globally, and is projected to double to approximately 36-40 million between 2001 and 2050 (Haque & Afrin, 2022; Kabir R et al., 2013). Between 2000 and 2050, the median age of the Bangladeshi population is expected to increase by 15 years (UN, 2023). As the ageing population is rapidly growing, they are experiencing a higher risk of a wider range of noncommunicable diseases, creating a sharp rise in dependency. In 2020, the traditional formula, which counted 60-64 as "working age", suggested 13 working-age people per older adult, but the modified formula showed only five economically active adults per older adult (Islam et al., 2022). This contraction of the support ratio creates pressure on the economy of both families and the country.

While longevity in Bangladesh is increasing, it is not inevitably accompanied by physical or mental well-being; older adults often live extended periods with multimorbidity and require care(WHO SEARO, 2024). It is essential to maintain the physical and mental wellness of older adults to keep them active and productive members of society. This highlights the urgent need to develop a future-ready health and social system to achieve the United Nations Decade of Healthy Ageing vision to create a better world where people can live longer and healthier (WHO SEARO, 2024). Bangladesh's national policy on geriatric care attempts to ensure older adult care within the primary healthcare (PHC) framework (NCDC, 2022). In Bangladesh, the active ageing index (AAI) revealed that 48.1% of older adults scored lower in the health dimension, 28.9% in participation, 48.5% in security, with 62.7% moderately active and 34.4% poorly active (Haque & Afrin, 2022). This implies that there is scope for improvement in the health and functional status of older adults in Bangladesh. The country is lagging behind due to some persistent challenges, including inadequate funding and an acute illness-focused PHC system, rather than integrated long-term, people-centred care for older adults (HEU, 2012).

In Bangladesh, mental health conditions in older adults are common yet severely under-recognised. The prevalence of depression is 36.9 to 45%, while dementia affects 3.6 to 11.5% of the ageing

population (Mazumder et al., 2020). Determinants include malnutrition, low education, rural residence, living alone and limited social support (Mazumder et al., 2020). Yet national plans for geriatric policies have only begun to recognise cognitive and psychological needs, and there remains no routine assessment, standardised for these domains within primary care (Fottrell et al., 2025).

The Integrated Care for Older People (ICOPE) framework of the World Health Organisation is a comprehensive, person-centred approach designed to maintain older adults' intrinsic capacity and functional ability (WHO, 2024). The ICOPE framework targets six domains: cognition, psychological capacity, locomotion, vitality, vision, and hearing of intrinsic capacity. Among them, cognition and psychological capacity are important as they strongly influence overall functional ability and the risk of further decline (WHO, 2024). Within ICOPE, cognitive capacity is showcased as learning, memory, and decision-making, while psychological capacity includes mood and emotional regulation. Cognitive declines make persons dependent by undermining memory, executive function, self-management, and treatment adherence; early detection enables timely intervention (Fowler et al., 2025). Social activities and engagements are driven by psychological capacity that consists of mood and emotional well-being; depression, anxiety or low motivation reduces participation and worsens functional abilities (Mackenzie & Abdulrazaq, 2021). The ICOPE framework guides appropriate care through PHC by providing a screening tool, assessment protocol and care pathway that enables early detection and intervention to ensure active and healthy ageing (WHO, 2024). Global evidence suggests that the implementation of ICOPE screening and assessment in primary health care settings has proven feasible and effective in other countries, with high satisfaction rates among participants and providers and significant improvement in intrinsic capacity, including psychological (Yan Wang et al., 2024). Although intrinsic capacity concepts are reflected in Bangladesh's geriatric policy, a structured ICOPE-based assessment has not yet been operationalised at the community primary care level, particularly for cognition and psychological capacity in rural settings. This community-based study in three wards of Sujalpur Union, Birganj, aimed to identify factors associated with cognitive impairment and reduced psychological capacity among older adults to inform contextual application within primary healthcare.

1.2 Problem Statement

Despite the rising geriatric burden in Bangladesh, there remains a critical gap in epidemiological understanding. To date, no thorough assessment focusing on cognition and psychological capacity has been conducted among older Bangladeshi adults using the WHO ICOPE framework. Community-level data on cognitive function and psychological health are also limited in this study. Most existing studies are hospital-based or focused on urban areas. Rural community and primary health care-level data on functional status remain limited.

This study is the first comprehensive assessment of the status of cognition and psychological capacity and the identification of associated factors using the WHO ICOPE framework in rural Bangladesh. By generating data on the status of the current burden, as well as evidence on the specific factors associated with cognition and psychological capacity decline, we can tailor low-cost, high-impact interventions. These findings are essential for transforming resource-constrained PHC settings into integrated, person-centred care models, ensuring the goal of healthy and active ageing for older adults of Bangladesh

1.3 Research Questions

1 What is the status of cognition and psychological capacity in older adults aged 60 years and above living in rural areas of Bangladesh?
2 What are the factors associated with the decline in cognition and psychological capacity?

1.4 Study Objectives

The overall objective of this study was to assess the status of cognition and psychological capacity using the WHO ICOPE framework and identify factors associated with the decline of these domains among older adults in rural Bangladesh.

The specific objectives of this study were as follows:

1. To assess the status of cognition and psychological capacity in older adults (60 years and above) in rural Bangladesh

2. To identify factors associated with the decline of cognition and psychological capacity among older adults (60 years and above) in rural Bangladesh

1.5 Structure of the Thesis

This thesis is organised into six chapters. Chapter 1 provides the introduction, background, problem statement, research questions, and objectives of the study. Chapter 2 presents a comprehensive review of existing literature on cognitive decline, depressive symptoms, and ageing in global and Bangladeshi contexts, and introduces the conceptual framework. Chapter 3 outlines the methodology used in this study, including the study design, setting, sampling, data collection, and analysis procedures. Chapter 4 presents the study findings. Chapter 5 provides a discussion and interpretation of the results in light of the existing evidence, along with the strengths, limitations, and implications for public health policy and practice. Chapter 6 concludes the thesis with the key conclusions and recommendations.

Chapter 2: Literature Review

2.1 Global Evidence

Cognitive decline and depressive symptoms are among the leading mental health conditions affecting older adults worldwide (Jang et al., 2026). The prevalence of cognitive impairment among older adults varies, spanning from 5% to over 40%, heavily dependent on the chosen screening tool, cut-off values and socioeconomic conditions of the study population (Salari et al., 2025). In 2021, an estimated 57.4 million individuals were affected by a severe cognitive decline, called dementia, among them, more than 60% were from LMICs (WHO, 2025). There are 12 modifiable risk factors of dementia identified by the Lancet Commission on dementia that account for 40% of global dementia cases, including lower education level, physical inactivity, depression, social isolation and unhealthy diet (Livingston et al., 2020).

Depression is the most common psychological disorder that affects individuals at an older age globally, with a prevalence ranging from 7% to 30% or above (Fei et al., 2025). The cognitive decline and depressive symptoms share a bidirectional relationship; depression raises the risk of cognitive decline, and cognitive decline increases depression, creating a vicious cycle of functional deterioration (Ganguli, 2009). Both conditions reduce the quality of life and increase dependency on others.

Evidence showed that diverse, micronutrient-rich diets provide essential micronutrients that support neurological function and reduce oxidative stress, which prevents cognitive decline (Salwa AL Majali et al., 2025). Inadequate sleep disrupts the hypothalamic-pituitary-adrenal axis, promoting neuroinflammation, resulting in increased risk of both cognitive decline and depression (Hyndych et al., 2025).

2.2 Evidence from Bangladesh

Limited evidence on the cognition and psychological health of older adults in Bangladesh is available; some studies were conducted in hospitals and concentrated in urban settings. The prevalence of depression among the older adults ranged from 36.9% to 45%, and dementia from 3.6% to 11.5% (Mazumder et al., 2020). A systematic review and a nationwide survey reported that

mental health conditions are under-detected in the existing primary healthcare system (Hossain et al., 2014; Mridha et al., 2021).

The Bangladesh National Mental Health Survey 2019 reported an estimated prevalence of depression of 6.7% and any mental health condition of 18.7% (WHO, 2019). However, this survey did not report findings specifically for older adults. A study in rural Bangladesh assessing cognitive function using the BAMSE tool reported a prevalence of cognitive decline of 52% with identified risk factors: older age, lower level of education, lower wealth index, illiteracy and widowhood, physical inactivity, and betel consumption in females (Fottrell et al., 2025).

Identifying and managing intrinsic capacity within the primary health system using the WHO ICOPE framework has been recognised as a promising approach (Tavassoli et al., 2022). However, its implementation in Bangladesh remains nascent. Despite the acknowledgement of the growing burden of geriatric conditions by the National Strategy for NCD Prevention and Control 2022–2030, no standardised ICOPE-based community assessment protocol has been operationalised at the PHC level of Bangladesh (Gassner et al., 2022). This study provides the evidence needed for the adaptation and implementation of the ICOPE framework within the Bangladeshi PHC care system.

2.3 Conceptual Framework

The WHO ICOPE framework guided this study. Among the six domains of intrinsic capacity defined by the ICOPE framework, the study focused on two: cognition and psychological capacity (WHO, 2024).

Figure 1 presents the conceptual framework of this study. It demonstrated within the ICOPE framework, cognitive decline and reduced psychological capacity are influenced by a range of determinants, including demographic factors (age, sex, income, education, occupation, religion, marital status), behavioural risk factors (tobacco use, alcohol consumption, unhealthy diet, inadequate physical activity, air pollution, inadequate sleep), clinical medication and health seeking behaviour (hypertension, diabetes, nutritional status, health seeking behaviours) physical environment (housing condition, sanitation facilities, living arrangement), social care and support (home environment, financial situation, social isolation, loneliness, social engagement, risk of abuse). These determinants interact with each other and the healthcare environment. Independent

variables were selected from the framework, which informed the multivariable model selection as well.

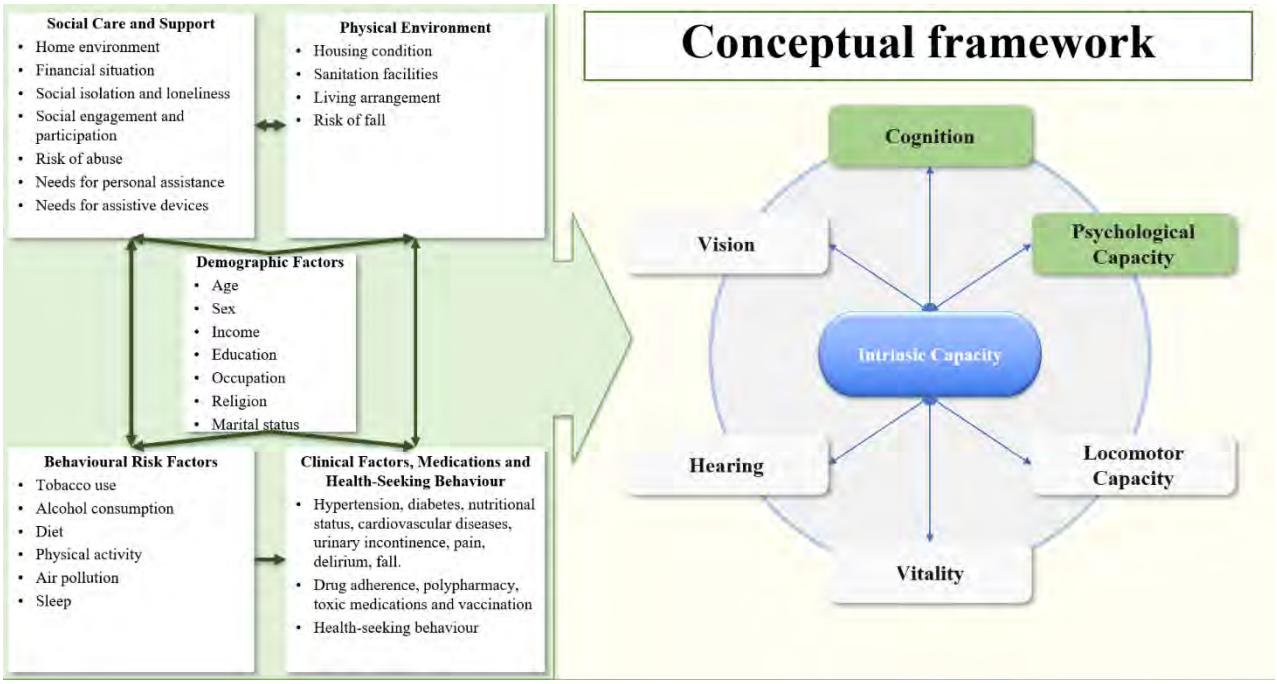


Figure 1: Conceptual framework based on WHO ICOPE

Chapter 3: Methods

3.1 Study Design

This was a community-based cross-sectional study. A cross-sectional study was adopted for its appropriateness of being used for prevalence estimation and examining the association between exposures and outcomes at a single point in time, which aligns with the objective of our study to describe the status of cognitive and psychological capacity and identify factors associated with the decline of those capacity domains in a defined population.

3.2 Study Area and Setting

The study was conducted in three wards (wards 7, 8, and 9) within Sujalpur union of Birganj sub-district, located in Dinajpur district, Bangladesh. Birganj is a rural sub-district in the Rangpur division of Bangladesh, where the majority of the population depends on subsistence agriculture for their livelihood.

3.3 Study Period

The overall study period spanned from January 2026 to June 2026. Data collection was conducted from March 1 to April 30, 2026. The study design, tool development, training of data collectors, and ethical clearance were completed before the commencement of data collection.

3.4 Study Population and Eligibility

3.4.1 Target population

The study population consisted of community-dwelling individuals aged ≥ 60 years who were permanent residents of wards 7,8 and 9 of Sujalpur Union, Birganj, Dinajpur, Bangladesh.

3.4.2 Inclusion and Exclusion Criteria

Inclusion criteria:

- Individuals aged 60 years or older

- Residing in the selected area for at least 12 months before data collection
- Provided written informed consent

Exclusion criteria:

- Individuals with severe disabilities (unable to speak, blind or deaf, or terminally ill) that prevent effective participation.
- Who had an acute illness requiring immediate hospitalisation.
- Who showed an unwillingness to participate.

3.5 Sample Size Calculation

The sample size was calculated separately for each primary outcome using Cochran's formula for estimating proportions (Lwanga & Lemeshow, 1991). The parameters used for calculations were z = 1.96 (at 95% confidence level) and 5% (margin of error). The sample size was calculated for each domain separately. The largest sample size (n=385) was selected for the study to ensure statistical power across all variables.

Table 1: Required sample size for two outcomes

Domain	**Prevalence (p)**	**Sample size(n)**
Cognitive deficiency (Fottrell et al., 2025)	0.52	385
Psychological capacity (depression) (Tasnim et al., 2023)	0.815	232

3.6 Sampling Technique

Participants were selected using a simple random sampling method. Wards 7, 8, and 9 of the Sujalpur Union of the Birganj sub-district were purposively selected. Household listings were conducted across the selected wards to create a sampling frame of older adults aged ≥60 years. From this sampling frame, 500 participants were randomly selected, and subsequently, 402 participants were

recruited directly from their households. A maximum of one participant was randomly selected from each household.

3.7 Variables

Dependent and independent variables in this study are described here. The dependent variables are the primary outcomes of interest (cognitive decline and psychological capacity decline), and the independent variables are sociodemographic, behavioural, nutritional and clinical factors based on the conceptual framework.

3.7.1 Dependent Variable

The status of cognition and psychological capacity of older adults were two outcomes or dependent variables of this study.

Cognition: Cognitive function was assessed using the Bangla Adaptation of Mini-Mental State Examination (BAMSE) questionnaire with permission of the author (Kabir & Herlitz, 2000). This tool is tailored to the socio-cultural context and minimises educational bias. This 12-question screening evaluates five domains of cognition: orientation, registration, attention and calculation, recall, and language skills. The highest score possible was 30. An indicative score of cognitive decline is with scores <24.

Psychological capacity: Psychological capacity was assessed using the Patient Health Questionnaire-9 (PHQ-9), a validated nine-item questionnaire for assessing depressive symptoms over the past two weeks (Kroenke et al., 2001). This assessment used a 4-point Likert scale (0-3). The overall score ranged from 0 to 27. A score ≥ 10 indicated moderate to severe depressive symptoms or decreased psychological capacity.

Table 2. Outcome variables details

Outcome variables	**Details**
Cognition	BAMSE: score 0-30, score < 24 categorised as cognitive decline.

Outcome variables	Details
Psychological capacity	PHQ9: score 0-27, score ≥ 10 indicates depression.

3.7.2 Independent Variables

Information was collected on sociodemographic, economic, nutritional, behavioural, diet-related, psychological, and clinical factors.

- **Socio-economic status:** Age, sex, education level, occupation/employment, and wealth status (derived from household wealth status, floors and walls material of house, electricity supply, and asset ownership) were collected.

- **Dietary habits:** The Diet Quality Questionnaire (DQQ) was used for standardised assessment of food group consumption and diet quality (Herforth et al., 2024).

- **Nutritional assessment:** The Mini Nutritional Assessment Short-Form (MNA-SF) tool was used to evaluate the nutritional assessment (Kaiser et al., 2009).

- **Behavioural risk factors:** Tobacco consumption, unhealthy diet, inadequate physical activity, indoor air pollution, alcohol consumption and sleep were collected using the WHO STEP tool (Riley et al., 2016).

- **Psychological and clinical factors**

  Anxiety: Assessed using the Generalised Anxiety Disorder-7 (GAD-7) (score 0-21). A score of ≥10 indicates moderate to severe anxiety (Spitzer et al., 2006).

  Comorbidity: Important comorbidities, as per the ICOPE guidelines, were assessed.

- **Physical Environment:** Housing conditions, sanitation facilities, living arrangements, and risk of falls (history) were assessed using an observation checklist based on ICOPE.

- **Functional ability:** Activities of Daily Living (ADL) were measured using the Katz index (Shelkey & Wallace, 1999). Instrumental Activities of Daily Living (IADL) was also measured using the Lawton index (Graf, 2008).

The details of all the independent variables are presented in Table 3.

Table 3. Independent variables details

Categories	Variables	Types	Details
A. Socio-demographic	Age	Continuous and categorical	Years (mean±SD), categories:60-64, 65-69, ≥70 years
	Sex	Categorical	Male, Female.
	Education level	Categorical	No formal schooling and formal schooling (any level).
	Marital status	Categorical	Currently married and other than currently married, divorced, widowed, separated, cohabiting, and never married.
	Religion	Categorical	Islam and other than Islam, comprising Hinduism and Christianity.
	Occupation	Categorical	Employed comprises government employees, non-government employees, self-employed, non-paid, and other than employed, comprising students, homemakers, retirees, unemployed (able to work), and unemployed (unable to work).
	Meal	Categorical	Alone, with others, with spouse.

Categories	Variables	Types	Details
	companionship		
B. Socioeconomic	Household monthly income	Continuous	Household monthly income in Taka (mean±SD).
	Wealth index	Categorical	Categorised into tertiles (lowest, middle and highest).
	Food security status	Categorical	Food secure, Food insecure (using a validated household food insecurity scale).
C. Nutritional	Nutritional status (MNA-SF)	Categorical	Normal (score 12 - 14), at risk of malnutrition (score 8 - 11), and malnourished (score 0 -7).
	Dietary diversity score	Continuous and categorical	Adequate (DDS ≥5 food groups) and inadequate (DDS <5 food groups) dietary diversity was assessed using the DDQ.
	NCD-protect score	Continuous	Derived from DQQ counts protective food groups (score0-9).
	NCD-risk score	Continuous	Derived from DQQ counts risk food groups (score0-9).
	Global dietary recommendation (GDR) score	Continuous	Calculated using NCD protect score - NCD risk score + 9 (score0-18).
	Body Mass Index (BMI)	Continuous and categorical	kg/m^2 (mean ± SD); grouped as underweight (<18.5), normal (18.5 - 24.9), and overweight/obese (≥25).
D. Behavioural	Tobacco	Categorical	Smoking, smokeless tobacco

Categories	Variables	Types	Details
and lifestyle variables	consumption		consumption, and tobacco consumption in any form.
	Alcohol consumption	Categorical	Yes, No.
	Physical activity	Categorical	Adequate (≥600 MET-minutes/week); Inadequate (<600 MET-minutes/week) using WHO STEPS.
	Fruits and vegetables intake	Categorical	Adequate (≥5 servings/day) and inadequate (<5 servings/day) according to the WHO STEPS.
	Composite salt behaviour score	Continuous	Calculated by WHO STEPS individual salt-use habits (scores 0-10).
	Sleep duration	Categorical	Adequate (≥7 h/night), Inadequate (<7 h/night).
	Cooking fuel use	Categorical	Unclean or clean.
E. Clinical and functional	Hypertension	Categorical	Yes (systolic ≥140 mmHg or diastolic ≥90 mmHg or on antihypertensive medication) or no.
	Diabetes	Categorical	Yes (fasting blood glucose ≥7.0 mmol/L or on diabetes medication) or no.
	Chronic respiratory disease	Categorical	Yes (bronchial asthma or COPD positive on measurement or on respiratory medication) or no.
	Anxiety	Categorical	Assessed using the Generalised Anxiety Disorder-7 (GAD-7). A score

Categories	Variables	Types	Details
			≥10 indicates moderate-to-severe anxiety.
	Any mental health disease	Categorical	Present depression or anxiety
	Activities of daily living (ADL)	Categorical	The Katz index was used to measure dependence (any dependence in ≥1 ADL item) and independence.
	Instrumental activities of daily living (IADL)	Categorical	Dependent (any dependence in ≥1 IADL item) and independent were measured using the Lawton index.

3.7.3 Clinical Measurements

Clinical measurements were performed following standard procedures and devices to minimise errors.

Blood pressure: Omron HEM-7120 digital machines were used in this study to measure the blood pressure of the participants. Measurements were obtained on the participants' right arm with palms facing upward after 30 min of resting. Participants' clothes over the arm were handled in a manner that did not exert pressure on the localised vessels of the arm. An appropriately sized cuff was placed approximately 2.5 cm above the elbow joint, gently wrapped around the arm, and kept at the participant's heart level while taking the measurement. For each participant, two blood pressure measurements were taken at 2-minute intervals. If the discrepancy between the two readings exceeded 10 mmHg, a third measurement was performed. The final blood pressure values were calculated as the average of the two closest readings.

Random Blood Glucose: The ACCU-CHECK Instant glucometers with compatible test strips and a sterile lancing device were used in this study to measure random blood sugar. Before starting the

measurements, the participants' fingers were cleaned with an alcohol swab and allowed to dry completely to avoid interference with the readings. The participants' hands were kept in a dependent position to promote adequate blood flow.

After inserting a new test strip and activating the glucometer, a finger-prick sample was obtained from the side of the fingertip using a firm, quick motion. The DOP was gently expressed and applied to the test strip. Glucometer readings were recorded. Following the test, pressure was applied to the puncture site with cotton, and the used lancet was disposed of immediately in a sharp container following standard biosafety procedures.

Weight: In this study, Omron BF511 devices were used to measure the body weight of the participants. Participants were instructed to remove their mobile phones, keys, money bags, shoes, socks, and belts, which might have caused a false measurement. The measurer ensured that the device was placed on a firm, flat surface. For each participant, weight was measured twice, and if the discrepancy between the two trials exceeded 100 g, a third measurement was performed. The average of the two closest recorded values was used to determine the final weight.

Height: Portable anthropometric height-measuring boards were used to measure the participants' stature. Footwear and headwear that might have caused inaccurate readings were removed before the measurement. For each participant, height was measured twice, and a third trial was conducted if the discrepancy between the two trials exceeded 50 mm. The arithmetic mean of the two closest values was used to calculate the height.

Arm span: When accurate height measurement was not possible, the arm span was measured using a measuring tape. The participants stood with their backs and heels flat against a flat wall, arms extended laterally, fully straightened, and parallel to the floor, and the maximum linear distance between the tips of their middle fingers was recorded. The procedure was conducted twice per participant, and a third measurement was required if the initial two readings differed by more than 50 mm. The average of the two closest arm span values was subsequently used to estimate the height of the participant (Aggarwal et al., 2000).

MUAC: Mid-upper arm circumference (MUAC) was measured using AnthroFlex MUAC tapes. Participants were assessed in a relaxed standing or sitting position, and measurements were taken from the non-dominant arm/least affected arm (in case of disability or prior stroke). To locate the midpoint, the participant's elbow was flexed at 90°, and the distance between the acromion and olecranon processes was measured and divided by two. The midpoint was marked using a skin-safe marker. The participants were asked to relax their arms and allow them to hang freely. The MUAC tape was wrapped around the arm at the marked midpoint, ensuring that it lay flat against the skin and was snug without compressing the soft tissue. The reading was taken to the nearest 10 m. The average of the two readings was used for the analysis.

Calf Circumference: Calf Circumference was measured using a measuring tape. The left calf was measured (standard WHO) at its widest point. The participants were seated with their knees bent at 90° and their feet flat on the floor. The tape was wrapped without compressing the soft tissue. Record measurement.

Peak flowmetry: Mini-Wright peak flow meters were used to record the Peak Expiratory Flow Rate (PEFR). Before measurement, the indicator was set to zero, and the device was held horizontally to ensure that the scale and air vent were not obstructed. The participants were assessed in a standing or sitting upright position to allow optimal lung expansion. The participants were instructed to breathe deeply and place the mouthpiece firmly in their mouths, sealing it tightly with their lips. Then, breathe out as hard and fast as possible in a single forceful blow. The experiment was repeated thrice, and the highest value was recorded. If the measured value was less than the calculated value, a reversibility test was performed by administering salbutamol, with an improvement of > 20% in the measured PEFR after 15 minutes, indicating a positive reversibility test.

Spirometry: Lung function was measured using a NuvoAir spirometer. Spirometry was only performed in participants with a negative reversibility test. A new recalibrated disposable turbine was inserted into the device before use. The participants were instructed to breathe normally for a few cycles, followed by maximum inhalation. They sealed the mouthpiece tightly with their lips and exhaled forcefully and rapidly as much as possible, continuing for at least 6 s. This procedure was

repeated thrice. The application recorded the best FEV1 and FVC values for analysis. Grade F test results were dropped from the analysis.

3.7.4 Operational Definitions

Cognitive decline: BAMSE score <24 out of 30.

Depressive symptoms: PHQ-9 score of ≥10.

Adequate dietary diversity: Dietary Diversity Score (DDS) ≥5 food groups out of 10 food groups.

Food insecurity: Household food insecurity was measured using a validated food insecurity scale and classified as food secure or food insecure.

Adequate physical activity: Total physical activity ≥600 MET-min/week (WHO STEPS).

Adequate sleep: Sleep duration of ≥7 hours per night.

Malnutrition: MNA-SF score: malnutrition 0-7.

IADL dependence: Lawton IADL score indicating dependence in one or more instrumental activities

ADL dependence: Katz ADL Index score indicating dependence in one or more basic activities of daily living

Hypertension: Raised blood pressure (SBP ≥ 140 and/or DBP ≥ 90 mmHg) or currently taking medication for high BP.

Diabetes: Elevated fasting blood glucose (FBS≥ 7.0 mmol/l), including those currently taking medication for elevated blood glucose.

3.8 Data Collection

3.8.1 Data Collection Tools

A structured, pretested Bangla questionnaire was administered through face-to-face interviews using the Kobo Toolbox application on mobile tablets. The questionnaire incorporates: The WHO STEPS questionnaire for behavioural risk factors, the Diet Quality Questionnaire for dietary diversity, the MINI Nutritional Assessment Short Form (MNA-SF) for nutritional assessment, the Katz ADL Index and Lawton IADL scale for functional ability, BAMSE for cognitive assessment, and the PHQ-9 for depressive symptoms. All tools were previously validated in Bangladesh.

3.8.2 Pretesting

The data collection tools were tested on ten older adults in a ward outside our study area before data collection began. Pretesting assessed the cultural appropriateness and completeness of all questionnaire items. Minor revisions were made to the wording based on feedback from the research team.

3.8.3 Data Collection Procedure

Data were collected in two stages. First, trained data collectors visited selected households from the randomisation list, verified participants using their national ID, obtained written informed consent, and conducted face-to-face interviews alongside an observational checklist of the physical environment and risk of abuse. Participants were then invited to a local makeshift clinic the next morning. At the clinic, the ICOPE basic assessments were conducted first. Participants who did not pass the basic assessment underwent an in-depth assessment. Other clinical measurements were obtained from all participants. Measurement data were initially recorded on structured paper forms and later entered into the Kobo Toolbox. Participants identified with potential abuse or clinical abnormalities were referred to the nearest local health facility.

The data collection team comprised six data collectors (three MPH student researchers and three research assistants) and one field supervisor. All team members underwent ten days of training, including two days of field testing to standardise interview techniques and measurement procedures.

Before commencing fieldwork, the local government, Civil Surgeon Dinajpur, and UHFPO Birganj were formally notified of our study.

3.9 Data Management and Quality Assurance

All study data were anonymised using unique identifiers on physical questionnaires and electronic files and stored in a secured password-protected server accessible only to authorised investigators. Built-in skip and range checks minimised data entry errors. In addition, regular data cleaning was performed to ensure integrity and logical consistency. Range and logic checks were conducted to identify outliers and data entry errors. Queries were generated and addressed, and no imputation of missing data was performed.

3.10 Data Analysis

Data analysis was conducted using STATA V.17.0 (StataCorp, TX, 77845, USA).

Descriptive analysis: To summarise the sociodemographic characteristics of our study population, descriptive statistics were used. The mean ± SD was reported for continuous variables. Frequencies and percentages for categorical variables were reported from the univariate analysis.

Bivariate analysis: For categorical variables, the Pearson Chi-square and independent t-test/ANOVA were performed for continuous variables to compare the characteristics between those with and without decreased intrinsic capacity.

Regression analysis: Binary logistic regression was used to evaluate the association between the outcome and explanatory variables. Predictors for the multivariable model were selected based on the conceptual framework and biological plausibility. The association among predictors in the final model was assessed using Variance Inflation Factors (VIF). If severe multicollinearity was found among the predictors, the predictor with the highest effect size was retained. Crude odds ratios (cOR) and adjusted odds ratios (aOR) with corresponding 95% confidence intervals (CI) were estimated. A p-value of 0.05 or less was considered statistically significant in the final model. The factors associated with the two outcomes were analysed separately.

3.11 Ethical Considerations

Ethical approval for this study was granted by the Institutional Review Board of BRAC James P Grant School of Public Health (JPGSPH), BRAC University (approval number: MPH-2025-003). An IRB application was submitted to the ethics committee, which was sent to peer researchers for review, and the application was presented in the form of an IRB meeting presentation. After addressing all the comments of the reviewer, the application form was resubmitted for approval.

Written informed consent was obtained from all the study participants before the interview, assuring voluntary participation and the right to withdraw from the study at any time without any consequences. Confidentiality was maintained by anonymising the data using a unique participant identifier. Data were stored in secure password-secured servers, with access granted only to the senior researcher on the team. Participants with cognitive decline or depressive symptoms were informed and referred to appropriate health facilities. No financial incentives were provided.

Chapter 4: Results

4.1 Background Characteristics of the Study Participants

Of the 457 older adults approached, 402 completed the interview and assessment, resulting in a response rate of 88%. The mean age of the participants was 68.3 years (±5.96), with the majority in the 65-69 years age group (39.1%), then in the age group 70 years and above (35.8%). Most participants were male (54.0%). Regarding marital status, 60.2% were currently married, and 39.8% were widowed, divorced, separated, or never married. Most participants (64.7%) had no formal schooling. Regarding occupation, 53.0% were employed, and 59.2% were involved in income-generating activities. The mean monthly household income was 19,100 (±17,190), with 41.3%, 26.4 %, and 32.3% in the lowest, middle, and highest wealth tertiles, respectively. Muslim participants accounted for 48% of the sample, and 52% were Hindu or Christian (Table 4).

Regarding behavioural and lifestyle risk factors, 64.7% reported consumption of tobacco in any form (27.9% smoking, 47.8% smokeless tobacco consumption). With respect to physical activity, 41.3% of participants reported inadequate physical activity (<600 MET-min/week), and 58.7% reported adequate physical activity. More than half (68.7%) had inadequate sleep duration (<7 h/night), with a mean sleep duration of 5.9 h (±1.3). The participants reported alcohol consumption of 4.2%. We found a mean dietary diversity score of 3.9 (±1.7) out of a maximum score of 10. Of the participants, 65.9% had inadequate dietary diversity (DDS< 5 food groups). The mean NCD-protect score was 2.1 (±1.3) out of 9 healthy food groups, and the mean score for the NCD-risk was 0.6 (±0.8) out of 9 food groups to avoid or limit. The majority of participants (89.6%) consumed inadequate amounts (<5 servings) of fruits and vegetables per day. Furthermore, the mean composite salt behaviour score among the participants was 7 (±2.0). Regarding nutritional status, 24.9 % were normal, 53.7% were at risk of malnutrition, and 21.4% were malnourished. Food-insecure households accounted for 38.6% of the total households. The mean BMI was 20.8 kg/m^2 (±3.5), and 27.9% of the sample were underweight, 46.5% were normal, and the remaining 25.6% were overweight or obese. Hypertension was present in 39.8%, diabetes in 8.5%, and chronic respiratory disease in 21.6% of participants. Mild anxiety was present in 21.4% of the participants, and moderate-to-severe anxiety was present in 5.2%. ADL dependency was 24.6%, and 84.3% were IADL dependent. Most of the participants

lived with their spouses (65.7 %), 28.4% lived with others, and 6% lived alone. While 39.3% of the participants took their main meal alone (Table 4).

Table 4: Background characteristics of the study participants, where the mean and standard deviation are presented for continuous variables and frequency and percentages for categorical variables.

Variables	**Categories/unit**	**Continuous (n=402)**	**Categorical (n=402)**	
		mean ± SD	**n**	**%**
Age	In years	68.3 ± 5.96		
Age categories	60-64 years		101	25.12
	65-69 years		157	39.05
	≥70 years		144	35.82
Sex	Male		217	53.98
	Female		185	46.02
Marital status	Currently married		242	60.20
	Other than currently married		160	39.80
Religion	Islam		193	48.01
	Other than Islam		209	51.99
Education	No formal schooling		271	67.41
	Formal schooling		131	32.59
Occupation	Employed		213	52.99
	Other than employed		189	47.01
	Alone		158	39.30

Variables	Categories/unit	Continuous (n=402)	Categorical (n=402)	
		mean ± SD	n	%
Meal companionship	With others		102	25.37
	With spouse		142	35.32
Monthly household income	In thousands	19.1 ± 17.19		
Household wealth tertile	Lowest		166	41.29
	Middle		106	26.37
	Highest		130	32.34
Involvement with income-generating activity	No		164	40.80
	Yes		238	59.20
Smoking	Yes		112	27.86
	No		290	72.14
Smokeless tobacco consumption	Yes		192	47.76
	No		210	52.24
Tobacco consumption in any form	Yes		260	64.68
	No		142	35.32
Physical activity	Inadequate (<600 MET-min/week)		166	41.29
	Adequate (≥600 MET-min/week)		236	58.71
Sedentary time	In Hours/day	7.4 ± 2.76		

Variables	Categories/unit	Continuous (n=402)	Categorical (n=402)	
		mean ± SD	n	%
Sedentary time category	≤7 hours/day		192	47.76
	>7 hours/day		210	52.24
Sleep	In hours	5.9 ± 1.33		
Sleep	Inadequate (<7 h/night)		276	68.66
	Adequate (≥7 h/night)		126	31.34
Alcohol consumption	Yes		17	4.23
	No		385	95.77
Cooking fuel	Unclean		384	95.52
	Clean		18	(4.48)
Fruits and vegetables consumption	Inadequate (<5 servings)		360	89.55
	Adequate (≥ servings)		42	10.45
Composite salt behaviour score	NA	7 ± 2.01		
Dietary diversity score (DDS)	NA	3.9 ± 1.65		
Dietary diversity	Inadequate (<5 food groups)		265	65.92
	Adequate (≥ 5food groups)		137	34.08
NCD-protect score	NA	2.1 ± 1.33		
NCD-risk score	NA	0.6 ± 0.82		

Variables	Categories/unit	Continuous (n=402)	Categorical (n=402)	
		mean ± SD	n	%
Global dietary recommendations (GDR) score	NA	10.5 ± 1.38		
Nutritional status	Normal (12-14 points)		100	24.88
	At risk of malnutrition (8-11 points)		216	53.73
	Malnourished (0-7 points)		86	21.39
Food security	Food insecure		155	38.6
	Food secure		247	61.4
BMI	In kg/m^2	20.8 ± 3.5		
BMI category	Underweight (<18.5)		112	27.86
	Normal (18.5-24.9)		187	46.52
	Overweight/Obese (>=25.0)		103	25.62
Hypertension	Yes		160	39.80
	No		242	60.20
Diabetes	Yes		34	8.46
	No		368	91.54
Chronic respiratory disease	Yes		86	21.55
	No		313	78.45
Anxiety levels	No anxiety		295	73.38
	Mild anxiety		86	21.39

Variables	Categories/unit	Continuous (n=402)	Categorical (n=402)	
		mean ± SD	n	%
	Moderate to severe anxiety		21	5.22
Any mental health disease	Absent		204	50.75
	Present		198	49.25
Activities of daily living	Dependent		99	24.63
	Independent		303	75.37
Instrumental activity of daily living	Dependent		339	84.33
	Independent		63	15.67

Note: n (%), frequency and percentage; mean ± SD, mean and standard deviation; NA, not applicable; BMI, body mass index; MET, metabolic equivalent of task. Grade F spirometry test results of spirometry were dropped from analysis, which made the sample size 399 for Chronic respiratory disease.

4.2 ICOPE Cognitive Status Assessment Pathway

Figure 2 illustrates the assessment of cognitive status in this study. Of the 402 enrolled participants, 27 passed the ICOPE basic cognitive screening (step 1) and were classified as having no cognitive decline. The remaining 375 participants proceeded to an in-depth cognitive assessment using the BAMSE (Step 2). Of the 207 participants, 24 or more scored and were classified as having no cognitive decline. Combining the basic and in-depth assessments, 234 (58.2%) were classified as having no cognitive decline, while 168 (41.8%) were identified as having cognitive decline.

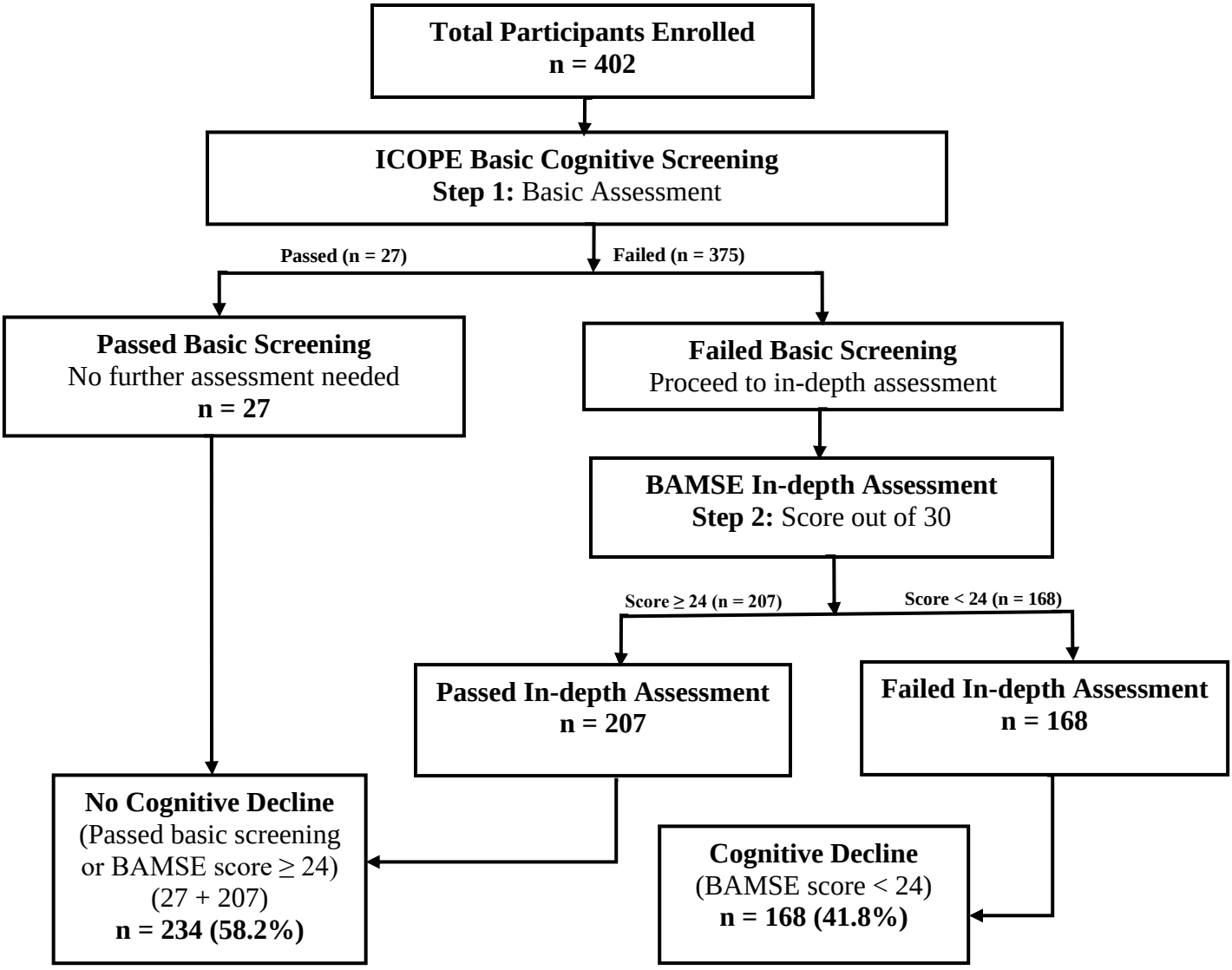


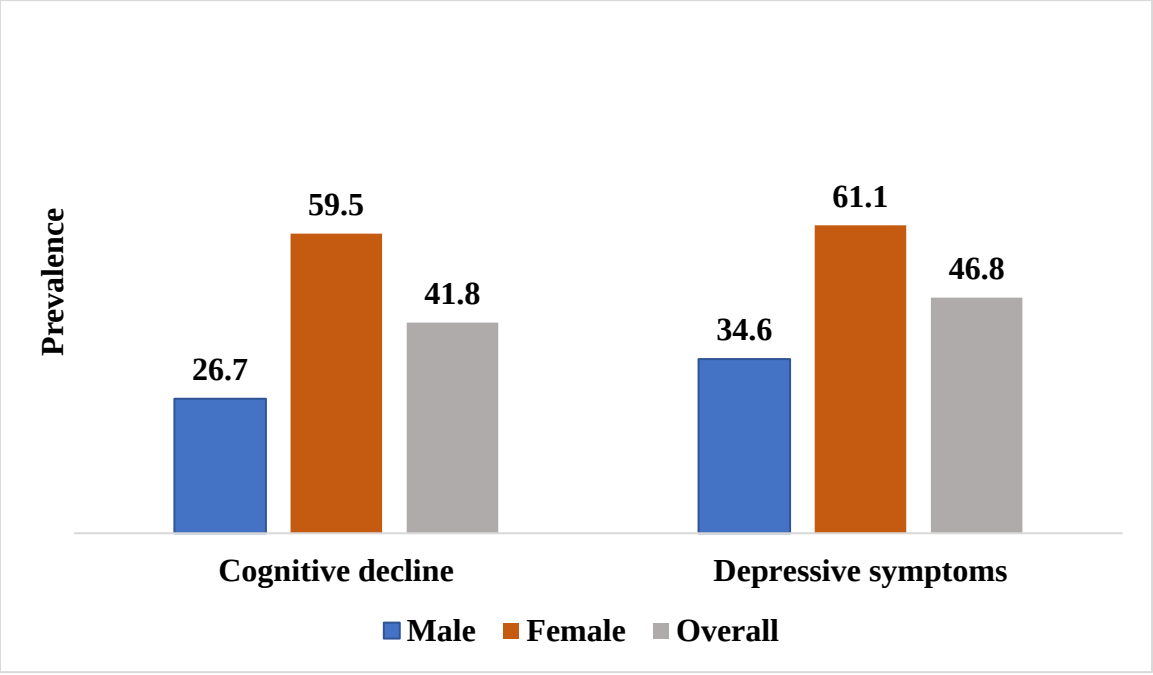
Figure 2: ICOPE cognitive assessment pathway

4.3 Prevalence of Cognitive Decline and Depressive Symptoms

The overall prevalence of cognitive decline was 41.8% (n=168), and the prevalence of depressive symptoms was 46.8% (n=188) (Figure 3). The prevalence of cognitive decline increased with age: 32.7% in 60-64 years, 43.3% in 65-69 years, and 45.5% in 70 years and above (Figure 4). A higher prevalence was found among female participants (59.5%) than among male participants (26.7%). Participants who were not currently married had a higher cognitive decline (56.9%). Similarly, those who were not employed had a higher prevalence (58.2%). Not being involved in income-generating activities was also associated with a higher cognitive decline (61.0%). The prevalence was higher

among participants with no formal education (48.0%). Adequate physical activity was associated with a lower prevalence of cognitive decline (33.9%). Malnourished participants had a higher cognitive decline (54.7%) than those with normal nutrition (33.0%). Participants with depression or anxiety had a higher prevalence of cognitive decline (51.0%) (Table 5).

The prevalence of depressive symptoms also varied. Female participants had more depressive symptoms (61.1%). Participants who were not currently married had a higher prevalence (61.3%). Not being employed (59.4%) or not being involved in an income-generating activity was associated with a higher prevalence. Being in the highest wealth tertile lowered the prevalence (33.1%). Malnourished participants had a markedly higher prevalence (73.3%) than those with normal status (29.0%). Food insecurity was associated with high levels of depressive symptoms (65.8%). Adequate sleep was associated with fewer depressive symptoms (32.5%) (Table 5, Figure 3).



Note: Values represent the column percentages within each sex category. Overall = all 402 participants (n=168 cognitive decline; n=188 depressive symptoms)

Figure 3: Prevalence of cognitive decline and depressive symptoms among older adults

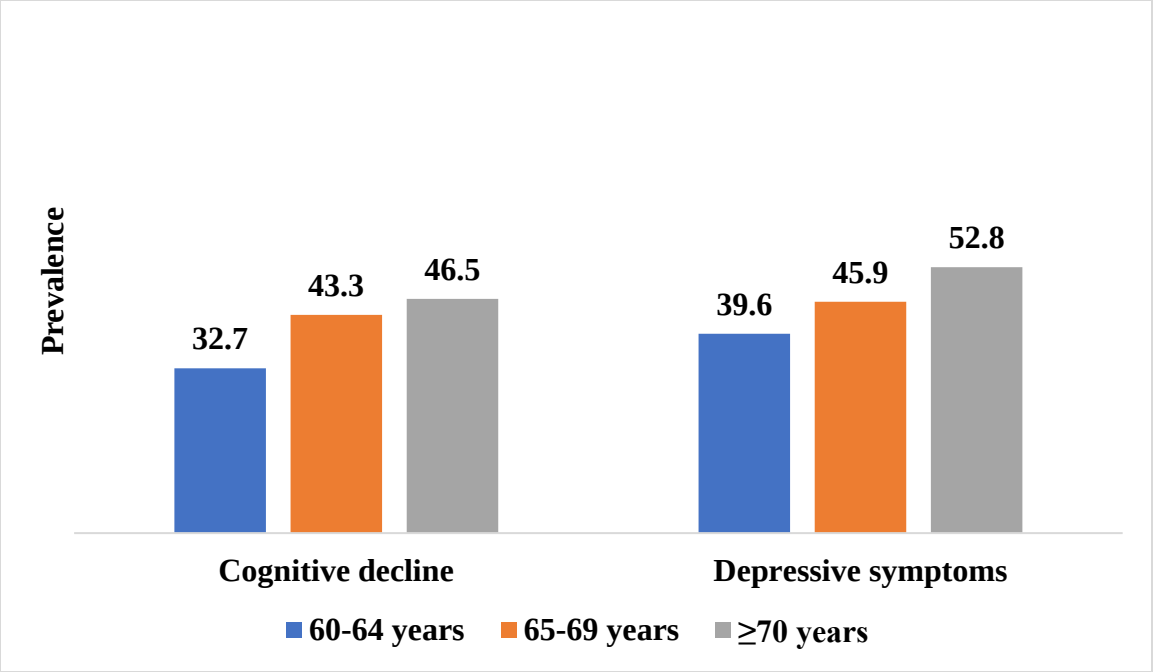


Figure 4: Prevalence of cognitive decline and depressive symptoms in different age groups of older adults

Table 5: Prevalence of cognitive decline and depressive symptoms by key characteristic

Variables	**Categories**	**Cognitive decline**	**Depressive symptoms**
		n (%)	n (%)
Overall		**n=168 (41.79)**	**n= 188 (46.77)**
Age categories	60-64 years	33 (32.67)	40 (39.60)
	65-69 years	68 (43.31)	72 (45.86)
	≥70 years	67 (46.53)	76 (52.78)
Sex	Male	58 (26.73)	75 (34.56)
	Female	110 (59.46)	113 (61.08)
Marital status	Currently married	77 (31.82)	90 (37.19)

Variables	Categories	Cognitive decline	Depressive symptoms
		n (%)	n (%)
	Other than currently married	91 (56.88)	98 (61.25)
Religion	Islam	76 (39.38)	97 (50.26)
	Other than Islam	92 (44.02)	91 (43.54)
Education	No formal schooling	130 (47.97)	138 (50.92)
	Formal schooling	38 (29.01)	50 (38.17)
Occupation	Employed	58 (27.23)	76 (35.68)
	Other than employed	110 (58.20)	112 (59.26)
Meal companionship	Alone	69 (43.67)	74 (46.84)
	With others	54 (52.94)	59 (57.84)
	With spouse	45 (31.69)	55 (38.73)
Household wealth tertile	Lowest	78 (46.99)	89 (53.61)
	Middle	47 (44.34)	56 (52.83)
	Highest	43 (33.08)	43 (33.08)
Involvement with income-generating activity	No	100 (60.98)	99 (60.37)
	Yes	68 (28.57)	89 (37.39)
Smoking	Yes	36 (32.14)	45 (40.18)
	No	132 (45.52)	143 (49.31)
Smokeless tobacco consumption	Yes	76 (39.58)	87 (45.31)
	No	92 (43.81)	101 (48.1)
	Yes	98 (37.69)	115 (44.23)

Variables	Categories	Cognitive decline	Depressive symptoms
		n (%)	n (%)
Tobacco consumption in any form	No	70 (49.30)	73 (51.41)
Physical activity	Inadequate (<600 MET-min/week)	88 (53.01)	87 (52.41)
	Adequate (≥600 MET-min/week)	80 (33.90)	101 (42.80)
Sedentary time category	≤7 hours/day	78 (40.63)	86 (44.79)
	>7 hours/day	90 (42.86)	102 (48.57)
Sleep	Inadequate (<7 h/night)	114 (41.3)	147 (53.26)
	Adequate (≥7 h/night)	54 (42.86)	41 (32.54)
Alcohol consumption	Yes	5 (29.41)	6 (35.29)
	No	163 (42.34)	182 (47.27)
Cooking fuel	Unclean	162 (42.19)	182 (47.40)
	Clean	6 (33.33)	6 (33.33)
Fruits and vegetables consumption	Inadequate (<5 servings)	151 (41.94)	171 (47.5)
	Adequate (≥5 servings)	17 (40.48)	17 (40.48)
Dietary diversity	Inadequate (<5 food groups)	121 (45.66)	137 (51.70)
	Adequate (≥ 5food groups)	47 (34.31)	51 (37.23)
Nutritional status	Normal (12-14 points)	33 (33.00)	29 (29.00)

Variables	Categories	Cognitive decline	Depressive symptoms
		n (%)	n (%)
	At risk of malnutrition (8-11 points)	88 (40.74)	96 (44.44)
	Malnourished (0-7 points)	47 (54.65)	63 (73.26)
Food security	Food insecure	73 (47.10)	102 (65.81)
	Food secure	95 (38.46)	86 (34.82)
BMI category	Underweight (<18.5)	46 (41.07)	62 (55.36)
	Normal (18.5-24.9)	85 (45.45)	86 (45.99)
	Overweight/Obese (>=25.0)	37 (35.92)	40 (38.83)
Hypertension	Yes	74 (46.25)	66 (41.25)
	No	94 (38.84)	122 (50.41)
Diabetes	Yes	14 (41.18)	14 (41.18)
	No	154 (41.85)	174 (47.28)
Chronic respiratory disease	Yes	34 (39.53)	45 (52.33)
	No	134 (42.81)	143 (45.69)
Depression levels	No depression	74 (34.58)	NA
	Mild depression	46 (43.81)	NA
	Moderate to severe depression	48 (57.83)	NA
Anxiety levels	No anxiety	108 (36.61)	91 (30.85)
	Mild anxiety	50 (58.14)	76 (88.37)

Variables	Categories	Cognitive decline	Depressive symptoms
		n (%)	n (%)
	Moderate to severe anxiety	10 (47.62)	21 (100)
Any mental health disease	Absent	67 (32.84)	NA
	Present	101 (51.01)	NA
Cognitive impairment levels	No impairment	NA	94 (40.17)
	Mild impairment	NA	78 (54.93)
	Severe impairment	NA	16 (61.54)
Activity of daily living	Dependent	41 (41.41)	50 (50.51)
	Independent	127 (41.91)	138 (45.54)
Instrumental activity of daily living	Dependent	153 (45.13)	168 (49.56)
	Independent	15 (23.81)	20 (31.75)

Note: Values represent n (column %). NA, not applicable; BMI, body mass index; MET, metabolic equivalent of task.

4.4 Factors Associated with Cognitive Decline

A logistic regression model was developed and run to identify factors associated with cognitive decline. In the bivariate analysis, all independent variables were included and tested individually. Age, sex, marital status, religion, education, household wealth, tobacco use, physical activity, sleep duration, nutritional status, dietary diversity, comorbidities (hypertension, diabetes, and chronic respiratory disease), and any mental health disease were included in the adjusted model following the conceptual framework. After checking for collinearity, variables with greater conceptual relevance and stronger effect sizes were retained. Table 6 presents the crude and adjusted logistic regression analyses for cognitive decline.

In the unadjusted analysis, older age (≥ 70 years) (cOR: 1.79, 95% CI: 1.06-3.04, p=0.031), female sex (cOR: 4.02, 95% CI: 2.64-6.12, p<0.001), being other than currently married (cOR: 2.83, 95%

CI: 1.87-4.27, p<0.001), being other than employed (cOR: 3.72, 95% CI: 2.45-5.65, p<0.001), malnourished nutritional status (cOR: 2.45, 95% CI: 1.35-4.44, p=0.003), moderate-to-severe depression (cOR: 2.59, 95% CI: 1.54-4.36, p<0.001), mild anxiety (cOR: 2.40, 95% CI: 1.47-3.92, p<0.001), and any mental health disease (cOR: 2.13, 95% CI: 1.42–3.19, p<0.001) were significantly associated with higher odds of cognitive decline. Formal schooling (cOR: 0.44, 95% CI: 0.28-0.69, p<0.001), highest household wealth tertile (cOR: 0.56, 95% CI: 0.35-0.90, p=0.016), involvement in income-generating activities (cOR: 0.26, 95% CI: 0.17-0.39, p<0.001), tobacco consumption in any form (cOR: 0.62, 95% CI: 0.41-0.94, p=0.025), adequate physical activity (cOR: 0.45, 95% CI: 0.30-0.68, p<0.001), adequate dietary diversity (cOR: 0.62, 95% CI: 0.41-0.95, p=0.029), and IADL independence (cOR: 0.38, 95% CI: 0.20-0.70, p=0.002) were associated with lower odds of cognitive decline.

In the multivariable logistic regression model, sex and physical activity were significantly associated with cognitive decline. Females had higher odds (aOR: 2.84, 95% CI: 1.57-5.12, p=0.001) of cognitive decline than males. Adequate physical activity (≥600 MET-min/week) showed lower odds (aOR: 0.59, 95% CI: 0.37-0.95, p=0.030) of cognitive decline. Variables including age group, marital status, religion, education, tobacco consumption, sleep, dietary diversity, nutritional status, hypertension, diabetes, and mental health disease were not statistically significant.

Table 6: Unadjusted and adjusted odds ratios, corresponding confidence intervals and p values obtained from the logistic regression model considered for the cognitive decline state

Variables	**Categories/ unit**	**cOR (CI)**	**p value**	**aOR (CI)**	**p value**
Age	In years	1.04 (1.01, 1.08)	**0.011**	NA	NA
Age categories	60-64 years	Ref			
	65-69 years	1.57 (0.93, 2.65)	0.088	1.56 (0.87, 2.78)	0.132
	≥70 years	1.79 (1.06, 3.04)	**0.031**	1.49 (0.81, 2.76)	0.203
Sex	Male	Ref			
	Female	4.02 (2.64, 6.12)	**<0.001**	2.84 (1.57, 5.12)	**0.001**

Variables	Categories/ unit	cOR (CI)	p value	aOR (CI)	p value
Marital status	Currently married	Ref			
	Other than currently married	2.83 (1.87, 4.27)	<**0.001**	1.03 (0.58, 1.83)	0.908
Religion	Islam	Ref			
	Other than Islam	1.21 (0.81, 1.8)	0.346	1.22 (0.77, 1.93)	0.388
Education	No formal schooling	Ref			
	Formal schooling	0.44 (0.28, 0.69)	<**0.001**	0.71 (0.42, 1.2)	0.198
Occupation	Employed	Ref			
	Other than employed	3.72 (2.45, 5.65)	<**0.001**	NA	NA
Meal companionship	Alone	Ref			
	With others	1.45 (0.88, 2.39)	0.144	NA	NA
	With spouse	0.6 (0.37, 0.96)	**0.033**	NA	NA
Monthly household income	In thousands	0.98 (0.97, 0.99)	**0.007**	NA	NA
Household wealth tertile	Lowest	Ref			
	Middle	0.9 (0.55, 1.47)	0.669	0.91 (0.53, 1.56)	0.726
	Highest	0.56 (0.35, 0.9)	**0.016**	0.72 (0.41, 1.27)	0.255
Involvement with income generating activity	No	Ref			
	Yes	0.26 (0.17, 0.39)	<**0.001**	NA	NA
Smoking	Yes	0.57 (0.36, 0.9)	**0.015**	NA	NA

Variables	Categories/ unit	cOR (CI)	p value	aOR (CI)	p value
	No	Ref			
Smokeless tobacco consumption	Yes	0.84 (0.56, 1.25)	0.391	NA	NA
	No	Ref			
Tobacco consumption in any form	Yes	0.62 (0.41, 0.94)	**0.025**	0.85 (0.53, 1.36)	0.494
	No	Ref			
Physical activity	Inadequate (<600 MET-min/week)	Ref			
	Adequate (≥600 MET-min/week)	0.45 (0.3, 0.68)	**<0.001**	0.59 (0.37, 0.95)	**0.030**
Sedentary time	**hours/day**	1.04 (0.97, 1.12)	0.274	NA	NA
Sedentary time category	≤7 hours/day	Ref			
	>7 hours/day	1.1 (0.74, 1.63)	0.650	NA	NA
Sleep	**In hours**	1.1 (0.95, 1.27)	0.223	NA	NA
Sleep	Inadequate (<7 h/night)	Ref		Ref	
	Adequate (≥7 h/night)	1.07 (0.7, 1.63)	0.77	1.19 (0.73, 1.94)	0.484
Fruits and vegetables consumption	Inadequate (<5 servings)	Ref			
	Adequate (≥ servings)	0.94 (0.49, 1.8)	0.855	NA	NA

Variables	Categories/ unit	cOR (CI)	p value	aOR (CI)	p value
Composite salt behaviour score	NA	0.99 (0.9, 1.09)	0.853	NA	NA
Dietary diversity score (DDS)	NA	0.91 (0.8, 1.02)	0.116	NA	NA
Dietary diversity	Inadequate (<5 food groups)	Ref			
	Adequate (≥ 5food groups)	0.62 (0.41, 0.95)	**0.029**	0.71 (0.43, 1.17)	0.178
NCD-protect score	NA	0.96 (0.82, 1.11)	0.570	NA	NA
NCD-risk score	NA	0.79 (0.61, 1.01)	**0.064**	NA	NA
Global dietary recommendations (GDR) score	NA	1.04 (0.9, 1.2)	0.573	NA	NA
Nutritional status	Normal (12-14 points)	Ref			
	At risk of malnutrition (8-11 points)	1.4 (0.85, 2.3)	0.189	0.83 (0.47, 1.47)	0.526
	Malnourished (0-7 points)	2.45 (1.35, 4.44)	**0.003**	1.06 (0.51, 2.17)	0.881

Variables	Categories/ unit	cOR (CI)	p value	aOR (CI)	p value
Food security	Food insecure	Ref			
	Food secure	0.7 (0.47, 1.05)	0.088	NA	NA
BMI	In Kg/m^2	0.98 (0.93, 1.04)	0.571	NA	NA
BMI category	Underweight (<18.5)	Ref			
	Normal (18.5-24.9)	1.2 (0.74, 1.92)	0.460	NA	NA
	Overweight/Obese (>=25.0)	0.8 (0.46, 1.4)	0.439	NA	NA
Hypertension	Yes	1.35 (0.9, 2.03)	0.141	1.43 (0.91, 2.26)	0.122
	No	Ref		Ref	
Diabetes	Yes	0.97 (0.48, 1.99)	0.939	1.18 (0.53, 2.61)	0.688
	No	Ref		Ref	
Chronic respiratory disease	Yes	0.87 (0.54, 1.42)	0.586	NA	NA
	No	Ref			
Depression levels	No depression	Ref			
	Mild depression	1.48 (0.92, 2.38)	0.111	NA	NA
	Moderate to severe depression	2.59 (1.54, 4.36)	**<0.001**	NA	NA
Anxiety levels	No anxiety	Ref			
	Mild anxiety	2.4 (1.47, 3.92)	**<0.001**	NA	NA
	Moderate to severe anxiety	1.57 (0.65, 3.83)	0.317	NA	NA
	Absent	Ref			

Variables	Categories/ unit	cOR (CI)	p value	aOR (CI)	p value
Any mental health disease	Present	2.13 (1.42, 3.19)	**<0.001**	1.53 (0.95, 2.45)	0.08
Activity of daily living	Dependent	Ref			
	Independent	1.02 (0.64, 1.62)	0.930	NA	NA
Instrumental activity of daily living	Dependent	Ref			
	Independent	0.38 (0.2, 0.7)	**0.002**	NA	NA

Note: NA, not applicable; bold p-values indicate p≤0.05. aOR, adjusted odds ratio; CI, confidence interval; cOR, crude odds ratio; MET, metabolic equivalent of task.

4.5. Factors Associated with Depressive Symptoms

To identify factors associated with depressive symptoms, a logistic regression model was developed and run. Initially, the bivariate analysis was conducted with all independent variables to evaluate the crude association. Age, sex, marital status, religion, education, household wealth, tobacco use, physical activity, sleep duration, nutritional status, dietary diversity, and comorbidities (hypertension, diabetes and Chronic respiratory disease) were included in the adjusted model following the conceptual framework. After checking for collinearity using VIF, Chronic respiratory disease was dropped, and variables with greater conceptual relevance and stronger effect sizes were retained. Table 7 presents the crude and adjusted logistic regression for depressive symptoms.

In the unadjusted model, older age (≥ 70 years) (cOR: 1.70, 95% CI: 1.02-2.85, p=0.043), female sex (cOR: 2.97, 95% CI: 1.98-4.46, p<0.001), being other than currently married (cOR: 2.67, 95% CI: 1.77 -4.03, p<0.001), being other than employed (cOR: 2.62, 95% CI: 1.75-3.93, p<0.001), at-risk nutritional status (cOR: 1.96, 95% CI: 1.18–3.26, p=0.010), malnutrition (cOR: 6.71, 95% CI: 3.52–12.77, p<0.001), mild cognitive impairment (cOR: 1.82, 95% CI: 1.19–2.77, p=0.006), severe cognitive impairment (cOR: 2.38, 95% CI: 1.04–5.48, p=0.041), and mild anxiety (cOR: 17.04, 95% CI: 8.43–34.45, p<0.001) were significantly associated with higher odds of depressive symptoms.

Formal schooling (cOR: 0.59, 95% CI: 0.39-0.91, p=0.017), being involved in income generation (cOR: 0.39, 95% CI: 0.26-0.59, p<0.001), adequate sleep (cOR: 0.42, 95% CI: 0.27-0.66, p<0.001), adequate dietary diversity (cOR: 0.55, 95% CI: 0.36-0.84, p=0.006), and food security (cOR: 0.28, 95% CI: 0.18-0.42, p<0.001) were associated with lower odds.

In the multivariable logistic regression model, female sex (aOR: 2.14, 95% CI: 1.17-3.93, p=0.014) and malnutrition (MNA-SF score 0–7) (aOR: 3.42, 95% CI: 1.65-7.12, p=0.001) were significantly associated with a higher likelihood of depressive symptoms. Adequate sleep (≥ 7 h/night) (aOR: 0.40, 95% CI: 0.24-0.66, p<0.001) and the highest household wealth tertile (aOR: 0.57, 95% CI: 0.32-0.99, p=0.047) were associated with significantly lower odds of depressive symptoms. Variables including age group, marital status, religion, education, tobacco use, physical activity, dietary diversity, food security, cognitive impairment levels, hypertension, and diabetes were not statistically significant.

Table 7: Unadjusted and adjusted odds ratios, corresponding confidence intervals and p values obtained from the logistic regression model considered for depressive symptoms

Variables	**Categories/ unit**	**cOR (CI)**	**p value**	**aOR (CI)**	**p value**
Age	**In years**	1.03 (1, 1.07)	0.057	NA	NA
Age categories	60-64 years	Ref			
	65-69 years	1.29 (0.78, 2.15)	0.323	1.53 (0.85, 2.74)	0.154
	70 years and above	1.7 (1.02, 2.85)	**0.043**	1.58 (0.85, 2.95)	0.147
Sex	Male	Ref			
	Female	2.97 (1.98, 4.46)	**<0.001**	2.14 (1.17, 3.93)	**0.014**
Marital status	Currently married	Ref			

Variables	Categories/ unit	cOR (CI)	p value	aOR (CI)	p value
	Other than currently married	2.67 (1.77, 4.03)	**<0.001**	1.3 (0.73, 2.33)	0.377
Religion	Islam	Ref			
	Other than Islam	0.76 (0.52, 1.13)	0.178	0.69 (0.43, 1.09)	0.111
Education	No formal schooling	Ref			
	Formal schooling	0.59 (0.39, 0.91)	**0.017**	1.25 (0.74, 2.1)	0.406
Occupation	Employed	Ref			
	Other than employed	2.62 (1.75, 3.93)	**<0.001**	NA	NA
Meal companionship	Alone	Ref			
	With others	1.56 (0.94, 2.57)	0.084	NA	NA
	With spouse	0.72 (0.45, 1.14)	0.157	NA	NA
Monthly household income	**In thousands**	0.98 (0.97, 1.00)	**0.009**	NA	NA
Household wealth tertile	Lowest	Ref			
	Middle	0.97 (0.59, 1.58)	0.899	1 (0.58, 1.73)	0.996
	Highest	0.43 (0.27, 0.69)	**<0.001**	0.57 (0.32, 0.99)	**0.047**
	No	Ref			

Variables	Categories/ unit	cOR (CI)	p value	aOR (CI)	p value
Involvement with income-generating activity	Yes	0.39 (0.26, 0.59)	**<0.001**	NA	NA
Smoking	Yes	0.69 (0.44, 1.07)	0.101	NA	NA
	No	Ref			
Smokeless tobacco consumption	Yes	0.89 (0.6, 1.32)	0.577	NA	NA
	No	Ref			
Tobacco consumption in any form	Yes	0.75 (0.5, 1.13)	0.168	1.02 (0.63, 1.66)	0.921
	No	Ref			
Physical activity	Inadequate (<600 MET-min/week)	Ref			
	Adequate (≥600 MET-min/week)	0.68 (0.46, 1.01)	0.058	0.93 (0.57, 1.52)	0.771
Sedentary time	In hours/day	1.02 (0.95, 1.09)	0.649	NA	NA
Sedentary time category	≤7 hours/day	Ref			
	>7 hours/day	1.16 (0.79, 1.72)	0.448	NA	NA
Sleep	In hours	0.65 (0.55, 0.76)	**<0.001**	NA	NA
Sleep	Inadequate (<7 h/night)	Ref			

Variables	Categories/ unit	cOR (CI)	p value	aOR (CI)	p value
	Adequate (≥7 h/night),	0.42 (0.27, 0.66)	**<0.001**	0.4 (0.24, 0.66)	**<0.001**
Fruits and vegetables consumption	Inadequate (<5 servings)	Ref			
	Adequate (≥5 servings)	0.75 (0.39, 1.44)	0.389	NA	NA
Composite salt behaviour score	NA	1.02 (0.93, 1.13)	0.672	NA	NA
Dietary diversity score (DDS)	NA	0.91 (0.81, 1.03)	0.125	NA	NA
Dietary diversity	Inadequate (<5 food groups)	Ref			
	Adequate (≥ 5food groups)	0.55 (0.36, 0.84)	**0.006**	0.63 (0.38, 1.04)	0.068
NCD-protect score	NA	0.92 (0.8, 1.07)	0.302	NA	NA
NCD-risk score	NA	0.84 (0.66, 1.07)	0.161	NA	NA
Global dietary recommendations (GDR) score	NA	0.99 (0.86, 1.14)	0.877	NA	NA
Nutritional status	Normal (12-14 points)	Ref			

Variables	Categories/ unit	cOR (CI)	p value	aOR (CI)	p value
	At risk of malnutrition (8-11 points)	1.96 (1.18, 3.26)	**0.010**	1.45 (0.82,2.56)	0.203
	Malnourished (0-7 points)	6.71 (3.52, 12.77)	**<0.001**	3.42 (1.65,7.12)	**0.001**
Food security	Food insecure	Ref			
	Food secure	0.28 (0.18, 0.42)	**<0.001**	NA	NA
BMI	**In kg/m^2**	0.93 (0.88, 0.99)	**0.014**	NA	NA
BMI category	Underweight (<18.5)	Ref			
	Normal (18.5-24.9)	0.69 (0.43, 1.1)	0.117	NA	NA
	Overweight/ Obese (>=25.0)	0.51 (0.3, 0.88)	**0.016**	NA	NA
Hypertension	Yes	0.69 (0.46, 1.03)	0.072	0.67 (0.42, 1.06)	0.084
	No	Ref			
Diabetes	Yes	0.78 (0.38, 1.59)	0.496	0.93 (0.41, 2.09)	0.857
	No	Ref			
Chronic respiratory disease	Yes	1.3 (0.81, 2.1)	0.275	NA	NA
	No	Ref			
	No impairment	Ref			

Variables	Categories/ unit	cOR (CI)	p value	aOR (CI)	p value
Cognitive impairment levels	Mild impairment	1.82 (1.19, 2.77)	**0.006**	1.25 (0.76, 2.04)	0.379
	Severe impairment	2.38 (1.04, 5.48)	**0.041**	1.5 (0.58, 3.91)	0.403
Anxiety levels	No anxiety	Ref			
	Mild anxiety	17.04 (8.43, 34.45)	**<0.001**	NA	NA
Activity of daily living	Dependent	Ref			
	Independent	0.82 (0.52, 1.29)	0.391	NA	NA
Instrumental activity of daily living	Dependent	Ref			
	Independent	0.47 (0.27, 0.84)	**0.010**	NA	NA

Note: NA, not applicable; bold p-values indicate p≤0.05. aOR, adjusted odds ratio; CI, confidence interval; cOR, crude odds ratio; MET, metabolic equivalent of task.

Chapter 5: Discussion

5.1 Summary of Key Findings

In this community-based cross-sectional study, we found a high prevalence of both cognitive decline (41.8%) and depressive symptoms (46.8%) among older adults aged ≥ 60 years. After adjusting for related factors, female sex (aOR: 2.84, 95% CI: 1.57-5.12) and adequate physical activity (aOR:0.59, 95% CI: 0.37-0.95) were the two significant factors associated with cognitive decline. Female sex (aOR: 2.14, 95%CI: 1.17-3.93), being in the highest tertile (aOR:0.57, 95% CI: 0.32-0.99), malnutrition (aOR:3.42, 95% CI: 1.65-7.12), and adequate sleep (aOR:0.40, 95% CI: 0.24-0.66) were the four significant factors associated with depressive symptoms.

5.2 Discussion of Findings

Prevalence of cognitive decline: The prevalence of cognitive decline reported in our study (41.8%) was slightly lower than an earlier community-based study in rural Bangladesh, also using the BAMSE tool, which reported a cognitive deficiency prevalence of 52.25% (Fottrell et al., 2025). The difference reflects variations in ward-level characteristics, sample composition, or age distribution. Globally, the prevalence ranges from 5% to over 40%, with higher rates observed in LMICs, rural settings and low educational attainment (Livingston et al., 2020). Our findings underscore that cognitive decline is a substantial public health burden among rural older adults that warrants urgent attention at the PHC level.

Prevalence of depressive symptoms: The prevalence of depressive symptoms (46.8%) observed in our study is slightly higher than other study findings from Bangladesh, which reported depressive symptoms for older adults (36.9%-45%) (Mazumder et al., 2020). These findings are consistent with broader literature, which reports a higher prevalence of depressive symptoms among older adults in LMICS (Das et al., 2025). Depressive symptoms and cognitive decline co-occur. Our study reports that 60.7% of participants with cognitive decline also had depressive symptoms, which is consistent with the interdependence of intrinsic capacity domains.

Female sex and cognitive decline: Female sex was significantly associated (aOR: 2.84, 95% CI: 1.57–5.12, p=0.001) with cognitive decline. This finding is consistent with the evidence from South

Asia and globally (Sharma & Goswami, 2025). In LMICs, including Bangladesh, older women are disproportionately affected by lifetime disadvantages in education, socio-economic participation, and social isolation from widowhood, all of which increase the risk of cognitive decline (Naheed et al., 2023; Zhang et al., 2025). Our findings, with 59.5% of women having cognitive decline compared with 26.7% of men, highlight the need for gender-sensitive approaches in cognitive screening and care within PHC settings.

Physical activity and cognitive decline: Adequate physical activity (≥600 MET-min/week) was the second significant predictor of cognitive decline in the adjusted model (aOR: 0.59, 95% CI: 0.37-0.95, p=0.030), indicating that adults with adequate physical activity had 41% lower odds of cognitive decline than those with inadequate physical activity. In our study, 41.3% of older adults had inadequate physical activity, which is a modifiable risk factor. Our study's findings are consistent with other study evidence that states physical activity protects against cognitive decline through multiple biological mechanisms, including increased cerebral perfusion (Mandolesi et al., 2018). Counselling on physical activity and physical activity promotion programmes can be a scalable component of cognitive health promotion within the PHC settings of Bangladesh.

Household wealth and depressive symptoms: Participants in the highest household wealth tertile had significantly lower odds of depressive symptoms in the adjusted model (aOR: 0.57, 95% CI: 0.32-0.99, p=0.047) compared with those in the lowest tertile. In our findings, 33.1% of those in the highest tertile had depressive symptoms, but in the lowest tertile, 53.6% had depressive symptoms. Our findings are consistent with evidence from LMICs linking lower socioeconomic status with higher mental health burden(Ettman et al., 2022). Food security showed a significant unadjusted association (cOR: 0.28, 95% CI: 0.18–0.42, p<0.001) but was not included in the adjusted model because household wealth captures a broader socioeconomic dimension that subsides the food security effect. This finding underscores the need for social protection measures, including older age allowance and livelihood support, as components of an integrated mental health strategy for rural older adults in Bangladesh.

Malnutrition and depressive symptoms: Malnutrition was the strongest predictor of depressive symptoms in the adjusted model (aOR: 3.42, 95% CI: 1.65 to 7.12, p<0.001), with malnourished individuals having three times higher odds of having depressive symptoms compared to those with

normal nutritional status. At-risk nutritional status was significant in the unadjusted analysis (cOR: 1.96, 95% CI: 1.18–3.26, p=0.010) but did not retain significance in the adjusted model (aOR: 1.45, 95% CI: 0.82-2.56, p=0.203). In our study, 73.3% of malnourished participants had depressive symptoms, compared with only 29.0% of those with a normal nutritional status. The relationship between malnutrition and depression is bidirectional and well established. Malnutrition impairs neurotransmitter synthesis and hormonal regulation, increasing the risk of depression, while depression reduces appetite and worsens nutritional status(Kris-Etherton et al., 2021).

Sleep duration and depressive symptoms: Adequate sleep (≥7 h/night) was significantly associated with 60% lower odds of depressive symptoms (aOR: 0.40, 95% CI: 0.24-0.66, p<0.001). Adequate sleep maintains the normal hypothalamic-pituitary-adrenal axis activity, reduces neuroinflammation, resulting in a decreased risk of depression (Hyndych et al., 2025). Sleep health counselling should be incorporated in geriatric care and counselling at the PHC settings of Bangladesh.

5.3 Strengths and Limitations of the Study

This study had several strengths. To our knowledge, this was the first community-based study to assess both cognitive decline and psychological capacity using the WHO ICOPE framework among older adults in rural Bangladesh. The use of validated, contextually adapted tools, BAMSE for cognition and PHQ-9 for depressive symptoms, strengthened the acceptability of the findings. Community-based simple random sampling and household listing ensured the replicability of the study and the representativeness of the study population in the findings.

This study also had several limitations. First, this was a cross-sectional study, which could not confirm a causal relationship between the identified factors and outcomes. Second, the behavioural and lifestyle factor data were self-reported, which can be over- or under-reported by the participant due to social desirability. Third, the tools used in this study did not provide a clinical diagnosis of cognitive decline or depression. Fourth, the study was conducted in three wards of a single union, which may limit the generalisability of the findings. Fifth, social support networks, caregivers' burden, and coping mechanisms were not explored in this study.

5.4 Implications for Public Health Policy and Practice

Systemic integration of the WHO ICOPE framework: The study findings highlight several key implications for improving public health practice. First, the prevalence of both cognitive decline and depressive symptoms underscores the urgent need to integrate the WHO ICOPE framework-guided geriatric care into routine primary healthcare services in Bangladesh. The stepwise ICOPE assessment, basic screening followed by in-depth assessment for those who failed the basic screening, represents a feasible, low-cost model for the PHC structure of Bangladesh.

Deploying gender sensitive care: a significantly higher burden of both cognitive decline and depressive symptoms among older women indicates that programmes should prioritise and support older women in rural Bangladesh. National ageing strategies must move from gender-neutral designs to address lifelong socioeconomic disparities.

Targeted lifestyle and nutritional intervention: A significant association between modifiable risk factors and negative outcomes, specifically malnutrition, inadequate sleep, and inadequate physical activity, demands behavioural intervention at the PHC level. Counselling should be incorporated into the protocol, and healthcare providers must be trained in lifestyle modification counselling or interventions.

Expanding social safety nets: Lower household wealth increases the odds of depressive symptoms, demonstrating that financial distress drives psychological deterioration in older adults. Existing national safety nets, specifically old-age allowance and food assistance schemes, must be expanded to target the lowest wealth tertile.

Chapter 6: Conclusion and Recommendations

6.1 Conclusion

The study found a high prevalence of both cognitive decline (41.8%) and depressive symptoms (46.8%) among older adults aged ≥ 60 years. After adjusting for other factors, older women had 2.84 times higher odds of developing cognitive decline than men, and engaging in adequate physical activity was associated with a 41% reduction in the odds of cognitive decline. Psychological health was associated with female sex, household wealth, nutritional status, and sleep. Older females had 2.14 times higher odds of developing depressive symptoms than men, living in the highest household wealth tertile, and adequate sleep lowered depression risk by 43% and 60%, respectively. Conversely, malnutrition increased the risk of depressive symptoms by 3.42 times.

The findings show that the cognitive and psychological burdens of older adults in Bangladesh are under-addressed within the existing PHC system. ICOPE-based screening, physical activity promotion, nutritional support, sleep health counselling and social protection measures targeting household wealth security should be prioritised, as identified in this study. These evidence-based recommendations are essential for informing the geriatric care model to advance Bangladesh towards the UN Decade of Healthy Ageing vision.

6.2 Recommendations

For policymakers:

- There is already a guideline for primary health care on geriatric care, the "National guideline on integrated geriatric care for primary care physicians in Bangladesh", which incorporates the WHO ICOPE framework into PHC and should be deployed and fully operationalised.
- A national health policy should be developed that addresses cognitive decline and depression as public health priorities, with dedicated budget allocation for community-level screening and care.
- Existing social safety net programmes, including the old-age allowance and food assistance schemes, should be expanded and optimised to address food insecurity.

For program implementers:

- Proper training and support should be provided to union-level community health workers to enable them to identify and refer at-risk older adults within existing PHC settings.
- Dietary diversity education and supplementation should be prioritised in nutrition promotion programs targeting older adults.
- Sleep health and physical activity counselling should be integrated into community-level geriatric assessment and care.
- Gender-sensitive outreach and home screening by community health workers should be developed to bypass traditional mobility barriers.

For future research:

- Longitudinal studies are required to establish a causal pathway.
- Mixed methods research is required to explore social support, coping mechanisms, and caregiver dynamics.

Declaration of GenAI Use

I, Aysha Anan, declare that in preparing this assignment, I used Grammarly and Gemini (Google, May 2026) as a support tool to assist with brainstorming ideas, organising the structure of my writing, correcting spelling and grammatical errors, overcoming writer's block, and improving clarity and language in the text that I drafted myself. GenAI was not used to generate original arguments, interpret the results, or produce the final academic content. All substantive ideas, judgments, references, and conclusions are my own and have been independently verified in accordance with the JPGSPH academic integrity guidelines.

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Appendices

Appendix A: Data Collection Instrument

Assessment of cognition and psychological capacity of older adults: A cross-sectional study

Conducted by: BRAC James P Grant School of Public Health

Questionnaire administration Be completed by the Researcher administering the questionnaire after participant consented		
Admin0	Questionnaire version	1.0
Admin1	Interviewer name	
Admin2	Interviewer ID	
Admin3	Date	DD / MM / YYYY
Admin4	Time interview started	HH : MM
Admin15	Household number	
Admin14	Do you agree to participate in this study?	1. Yes 2. No
STUDYID	Participant ID *Instructions: 10 digits*	_____
Admin5	Participant name	
Admin6	Participant NID	
Admin7	Participant's father's name	
Admin8	Participant's spouse's name	
Address and contact of the participant		
Admin 9	Ward	
Admin10	Village	
Admin10	Contact number	
Sociodemographic characteristics *Hello, my name is X. I have some questions to go through with you. This questionnaire will take about 2 hours to complete. First, I would like to ask you about your background and personal circumstances*		
Demo1	What is your date of birth? *[Check participant ID if available. If the participants cannot recall their birthday, probe, and try to make a best guess using anchoring historical events, or other approaches as appropriate]*	DD / MM / YYYY

Demo2	Age [PROGRAM: calculate age based on the interview date and DOB]	_____Years
Demo3	Gender	☐ 1. Male ☐ 2.Female ☐ 3.Other
Demo4	The division you were born	[PROGRAM: Pre-specified list of all states in Bangladesh], Others_____
Demo5	The district you were born	[PROGRAM: Pre-specified list of districts in Bangladesh], Others_____
Demo6	In total, how many years have you spent at school in full- time study (excluding pre-school)?	_____Years [PROGRAM: Trigger hard check if Demo8 > age, show warning message: "The number of years spent at school is greater than current age, please check if this is correct"] [PROGRAM: Trigger soft check if Demo8 > (age - 4) & Demo8 < age, show warning message: "Based on the reported number of years spent at school, you started primary school before age 4, please check if this is correct"]
Demo7	What is the highest level of education you have completed? *[chose one that apply]*	☐ 1. No formal schooling ☐ 2. Less than primary school ☐ 3. Primary school completed ☐ 4. Secondary school completed ☐ 5. High school completed ☐ 6. College/University completed ☐ 7. Postgraduate degree
Demo8	What is your current marital status? *[chose one that apply]*	☐ 1. Never married ☐ 2. Currently married ☐ 3. Divorced ☐ 4. Widowed ☐ 5. Separated (without getting divorced) ☐ 6. Cohabiting
Demo9	What is your religion? *[chose one that apply]*	☐ 1. Muslim ☐ 2. Hindu ☐ 3. Buddhist ☐ 4. Christian ☐ 5. Other → specify _____

Demo10	Which of the following best describes your main work status over the past 12 months? *[chose <u>one</u> that apply]*	☐ 1. Government employee ☐ 2. Non-government employee ☐ 3. Self-employed ☐ 4. Non-paid ☐ 5. Student ☐ 6. Homemaker ☐ 7. Retired ☐ 8. Unemployed (able to work) ☐ 9. Unemployed (unable to work) ☐ 99. Refused to answer	
Demo11	Where do people cook in your living space? *[chose <u>one</u> that apply]*	☐ 1. In a room use for living or sleeping ☐ 2. In a separate room ☐ 3. In a separate building ☐ 4. Outdoors ☐ 5. Not cooking at home ☐ 4. Not known	
Demo12	What ventilation is there in the area where the cooking is done? *[chose <u>one</u> that apply]*	☐ 1. Stove has chimney or exhaust fan ☐ 2. Window used for ventilation ☐ 3. No ventilation ☐ 4. Not known ☐ 5. Other → Specify _____	
Demo13	What is the <u>primary</u> fuel used for cooking in your household? *[chose one that apply, use showcard]*	☐ 1. Electricity ☐ 2. Natural gas ☐ 3. Liquified petroleum gas (LPG) ☐ 4. Cow dung ☐ 5. Coal/Lignite ☐ 6. Charcoal ☐ 7. Wood ☐ 8. Straw/shrubs/grass ☐ 9. Agricultural crop ☐ 10. Biogas ☐ 11. Other, specify_____	
Demo14	Does your household have the following items?	Demo14a. Electricity Demo14b. Television Demo14c. Electric fan Demo14d. Wardrobe/Amirah Demo14e. Refrigerator	☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No
Demo15	Does any of member of the household own the following items?	Demo15a. Watch Demo15b. Mobile phone Demo15c. Bicycle Demo15d. Motorcycle Demo15e. Car/truck	☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No

Demo16	With whom do you live?	☐ 1. Living alone ☐ 2. Living with spouse/family	
Demo17	How many people live in your household	☐ 1. Less than 1year _____ ☐ 2. 1–3-year _____ ☐ 3. 4–6-year _____ ☐ 4. 7–10-year _____ ☐ 5. 11 years or more _____	
Demo18	What is the monthly income of your household? (Reflecting the past 12 months) This question aims to understand the monthly income of your household/household members. The total monthly income of all earning members of the household should be recorded. Additionally, you should ask whether there is any other source of income.	⌊_⌊_⌊_⌊_⌊_⌊_⌊_⌊_⌋ Taka	
Tobacco use *Now I am going to ask you some questions about tobacco use.*			
Tob1	Do you currently smoke any tobacco products, such as cigarettes, cigars, or pipes? *[use showcard]*	☐ 1. Yes ☐ 2. No *[go to Tob6]*	
Tob2	How old were you when you first started smoking?	_____Years ☐ 99. Don't know [PROGRAM: Trigger hard check if Tob2 > Demo2 (age), show warning message: "Age first started smoking is greater than current age, please check if this is correct"]	
Tob3	Do you currently smoke tobacco products daily?	☐ 1. Yes ☐ 2. No	
	On average, how many of the following products do you smoke each day? *[If products are smoked less than daily by daily smokers, enter weekly consumption.]*		
Tob4		☐ 1. Daily users [PROGRAM: Tob1=1 & Tob3=1]	☐ 2. Non-daily users [PROGRAM: Tob1=1 & Tob3=2]
Tob4a	Manufactured cigarettes	_____ per day	_____ per week
Tob4b	Hand-rolled cigarettes	_____ per day	_____ per week
Tob4c	Pipes full of tobacco	_____ per day	_____ per week

Tob4d	Cigars, cheroots, cigarillos	_____ per day	_____ per week
Tob4e	Number of Shisha sessions	_____ per day	_____ per week
Tob4f	Others (please specify_____)	_____ per day	_____ per week
Tob5	During the past 12 months, have you tried to stop smoking?	☐ 1. Yes ☐ 2. No	
Tob5a	During the past 12 months, how many times did you try to quit smoking?	_____ times *[go to Tob9 – regardless of the answer to this question]*	
Tob6	In the past, did you ever smoke any tobacco products?	☐ 1. Yes ☐ 2. No *[go to Tob9]*	
Tob6a	In the past, did you ever smoke any tobacco products <u>daily</u>?	☐ 1. Yes ☐ 2. No	
Tob7	How old were you when you first started smoking?	_____Years ☐ 99. Don't know [PROGRAM: Trigger <u>hard check</u> if Tob7 > age, show warning message: "Age first started smoking is greater than current age, please check if this is correct"]	
Tob8	How old were you when you stopped smoking?	_____Years ☐ 99. Don't know [PROGRAM: Trigger <u>hard check</u> if Tob8 > age, show warning message: "Age stopped smoking is greater than current age, please check if this is correct"] [PROGRAM: Trigger <u>hard check</u> if Tob8 < Tob7, show warning message: "Age stopped smoking is younger than age first started smoking, please check if this is correct"]	
Smokeless tobacco use			
Tob9	Do you currently use any smokeless tobacco products, such as snuff, chewing tobacco, or betel with tobacco? *[use showcard]*	☐ 1. Yes ☐ 2. No *[go to Tob13]*	
Tob10	How old were you when you first started using these?	_____Years ☐ 99. Don't know [PROGRAM: Trigger <u>hard check</u> if Tob2 > age, show warning message: "Age first started smoking is greater than current age, please check if this is correct"]	
Tob11	Do you currently use any smokeless tobacco products <u>daily</u>?	☐ 1. Yes ☐ 2. No	

	On average, how many of the following products do you use each day?		
Tob12		☐ 1. Daily users [PROGRAM: Tob9=1 & Tob11=1]	☐ 2. Non-daily users [PROGRAM: Tob9=1 & Tob11=2]
Tob12a	Snuff (Nossi), by mouth	_____ per day	_____ per week
Tob12b	Snuff (Nossi), by nose	_____ per day	_____ per week
Tob12c	Chewing tobacco / Gul	_____ per day	_____ per week
Tob12d	Betel with *Zorda* or other forms of tobacco	_____ per day	_____ per week
Tob12e	Other	_____ per day	_____ per week
Tob12f	Other, specify	_____ *[Specify smokeless tobacco not listed above]*	
Tob13b	During the past 12 months, have you tried to stop smokeless tobacco?	☐ 1. Yes ☐ 2. No	
Tob13c	During the past 12 months, how many times did you try to quit smokeless tobacco?	_____ times *[go to Tob15b – regardless of the answer to this question]*	
Tob13	In the past, did you ever use smokeless tobacco products?	☐ 1. Yes ☐ 2. No *[go to Tob16, regardless of the answer to this question]*	
Tob13a	In the past, did you ever use smokeless tobacco products <u>daily</u>?	☐ 1. Yes ☐ 2. No *[go to Tob15b]*	
Tob14	How old were you when you first started using smokeless tobacco?	Tob14a. _____Years ☐ 99. Don't know [PROGRAM: Trigger <u>hard check</u> if Tob7 > age, show warning message: "Age first started smoking is greater than current age, please check if this is correct"]	
Tob15	How old were you when you stopped using smokeless tobacco?	Tob15a. _____Years ☐ 99. Don't know [PROGRAM: Trigger <u>hard check</u> if Tob8 > age, show warning message: "Age stopped smoking is greater than current age, please check if this is correct"] [PROGRAM: Trigger <u>hard check</u> if Tob8 < Tob7, show warning message: "Age stopped smoking is younger than age first started smoking, please check if this is correct"]	
Tob15b	On the scale of 10 where 0 is no motivation and 10 is full motivation, at this time how motivated are you to quit tobacco?	0-1-2-3-4-5-6-7-8-9-10	

Second-hand smoke exposure		
Tob16	During the past 30 days, did someone smoke tobacco near you, in a closed area of your home?	☐ 1. Yes ☐ 2. No
Tob17	During the last 30 days, did someone smoke near you, in a closed area of your workplace (e.g., in the office)?	☐ 1. Yes ☐ 2. No
Alcohol consumption *The next questions ask about consumption of alcohol*		
Alc1	Do you consume any alcoholic products (such as beer, wine, whisky, brandy, rum, vodka or locally prepared alcoholic drinks)?	☐ 1. Yes, within the last 12 months ☐ 2. Yes, not in the last 12 months *[go to Diet1]* ☐ 3. Never *[go to Diet1]*
Alc2	How frequently have you had at least one standard drink? *[use showcard]*	☐ 1. Less than once / month ☐ 2. 1-3 days per month ☐ 3. 1-4 days per week ☐ 4. 5-7 days per week
Alc3	Have you consumed any alcohol within the past 30 days?	☐ 1. Yes ☐ 2. No *[go to Diet1]*
Alc4	During past 30 days, when you drink alcohol, on average, how many standard drinks do you have during one occasion?	_____Drinks
Dietary intake *The next questions ask about the fruits and vegetables that you usually eat. I have a nutrition card here that shows you some examples of local fruits and vegetables. Each picture represents the size of a serving. As you answer these questions please think of a typical week in the last year.*		
Diet1	In a typical week, on how many days do you eat fruit? *[use showcard]*	_____Days [If 0 → go to Diet3]
Diet2	How many servings of fruit do you eat on one of those days?	_____Servings
Diet3	In a typical week, on how many days do you eat vegetables? *[use showcard]*	_____Days [If 0 → go to Diet5]
Diet4	How many servings of vegetables do you eat on one of those days	_____Servings
Diet5	Do you have sugary drinks (for Do you have sugary drinks (for example, soda/coke/sprite/fanta etc. or other carbonated drink, juice (not pure fruit juice but juice drink or flavoured juice drinks,	☐ 1. Yes ☐ 2. No

	sweetened milk, sweetened tea or coffee) on most days.	
Diet6	How often do you eat foods high in sugar (e.g., sweets, desserts)?	☐ 1. Always ☐ 2. Often ☐ 3. Sometimes ☐ 4. Rarely ☐ 5. Never ☐ 99. Don't know
Diet7	How often do you eat oily foods or deep fried snacks (e.g., Paratha, Luchi, Singara, Samucha, Piyaju,Beguni) ?	☐ 1. Always ☐ 2. Often ☐ 3. Sometimes ☐ 4. Rarely ☐ 5. Never ☐ 99. Don't know
Dietary salt *With the next questions, we would like to learn more about salt in your diet. Dietary salt includes ordinary table salt, unrefined salt such as sea salt, iodized salt, salty stock cubes and powders, and salty sauces such as soy sauce or fish sauce (see showcard). The following questions are on adding salt to the food right before you eat it, on how food is prepared in your home, on eating processed foods that are high in salt such as [insert country specific examples], and questions on controlling your salt intake. Please answer the questions even if you consider yourself to eat a diet low in salt.* *[Read this opening statement out loud. Don't forget to use the showcard which will help the respondent when answering to the questions.]*		
Salt1	How often do you add salt or a salty sauce such as soy sauce to your food right before you eat it or as you are eating it? *[select only one, use showcard]*	☐ 1. Always ☐ 2. Often ☐ 3. Sometimes ☐ 4. Rarely ☐ 5. Never ☐ 99. Don't know
Salt2	How often is salt, salty seasoning or a salty sauce added in cooking or preparing foods in your household?	☐ 1. Always ☐ 2. Often ☐ 3. Sometimes ☐ 4. Rarely ☐ 5. Never ☐ 99. Don't know
Salt3	How often do you eat processed food high in salt? By processed food high in salt, I mean foods that have been altered from their natural state, such as packaged salty snacks, canned salty food including pickles and preserves, salty food prepared at a fast-food restaurant, cheese, bacon, and processed meat [add country specific examples, use showcard].	☐ 1. Always ☐ 2. Often ☐ 3. Sometimes ☐ 4. Rarely ☐ 5. Never ☐ 99. Don't know

Salt4	How much salt or salty sauce do you think you consume?	☐ 1. Always ☐ 2. Often ☐ 3. Sometimes ☐ 4. Rarely ☐ 5. Never ☐ 99. Don't know
Salt5	How much salt you need in your household for food or food preparation in one week?	_____spoon Or _____gram
Physical activity Next I am going to ask you about the time you spend doing different types of physical activity in a typical week. Please answer these questions even if you do not consider yourself to be a physically active person. Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, study/training, household chores, harvesting food/crops, fishing or hunting for food, seeking employment. *[Insert other examples if needed].* In answering the following questions 'vigorous-intensity activities' are activities that require hard physical effort and cause large increases in breathing or heart rate, 'moderate-intensity activities' are activities that require moderate physical effort and cause small increases in breathing or heart rate. *Read this opening statement out loud. It should not be omitted. The respondent will have to think first about the time he/she spends doing work (paid or unpaid work, household chores, harvesting food, fishing or hunting for food, seeking employment [Insert other examples if needed]), then about the time he/she travels from place to place, and finally about the time spent in vigorous as well as moderate physical activity during leisure time.* *Remind the respondent when he/she answers the following questions that 'vigorous-intensity activities' are activities that require hard physical effort and cause large increases in breathing or heart rate, 'moderate-intensity activities' are activities that require moderate physical effort and cause small increases in breathing or heart rate. Don't forget to use the showcard which will help the respondent when answering to the questions.*		
PA1	Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like *[carrying or lifting heavy loads, digging or construction work]*? *[INSERT EXAMPLES] (USE SHOWCARD)* *Ask the participant to think about vigorous-intensity activities at work only. Activities are regarded as vigorous intensity if they cause large increases in breathing and/or heart rate.*	☐ 1. Yes ☐ 2. No *[go to PA4]*
PA2	In a typical week, on how many days do you do vigorous-intensity activities as part of your work? *"Typical week" means a week when the participant is engaged in his/her usual activities. Valid responses range from 1-7.*	_____Days [PROGRAM: Range 0 - 7]
PA3	How much time do you spend doing vigorous-intensity activities at work on a typical day? *Ask the participant to think of a typical day he/she can recall easily in which he/she engaged in vigorous-intensity activities at*	_____Minutes [PROGRAM: Range 0 - 1440]

	work. The participant should only consider those activities undertaken continuously. Probe very high responses (over 4 hrs) to verify.	
PA4	Does your work involve moderate-intensity activity, that causes small increases in breathing or heart rate such as brisk walking *[or carrying light loads]*? *[INSERT EXAMPLES] (USE SHOWCARD)* *Ask the participant to think about moderate-intensity activities at work only. Activities are regarded as moderate intensity if they cause small increases in breathing and/or heart rate.*	☐ 1. Yes ☐ 2. No *[go to PA4]*
PA5	In a typical week, on how many days do you do moderate-intensity activities as part of your work? *"Typical week" means a week when the participant is engaged in his/her usual activities. Valid responses range from 1-7.*	_____Days [PROGRAM: Range 0 - 7]
PA6	How much time do you spend doing moderate-intensity activities at work on a typical day? *Ask the participant to think of a typical day he/she can recall easily in which he/she engaged in moderate-intensity activities at work. The participant should only consider those activities undertaken continuously. Probe very high responses (over 4 hrs) to verify.*	_____Minutes [PROGRAM: Range 0 - 1440]
The next questions exclude the physical activities at work that you have already mentioned. Now I would like to ask you about the usual way you travel to and from places. For example to work, for shopping, to market, to place of worship. *[Insert other examples if needed]* *The introductory statement to the following questions on transport-related physical activity is very important. It asks and helps the participant to now think about how they travel around getting from place-to-place. This statement should not be omitted.*		
PA7	Do you walk or use a bicycle *(pedal cycle)* to get to and from places? *Select the appropriate response.*	☐ 1. Yes ☐ 2. No *[go to PA10]*
PA8	In a typical week, on how many days do you walk or bicycle to get to and from places? *"Typical week" means a week when the participant is engaged in his/her usual activities. Valid responses range from 1-7.*	_____Days [PROGRAM: Range 0 - 7]
PA9	How much time do you spend walking or bicycling for travel on a typical day? *Ask the participant to think of a typical day he/she can recall easily in which he/she engaged in transport-related activities. The participant should only consider those activities undertaken continuously. Probe very high responses (over 4 hrs) to verify.*	_____Minutes [PROGRAM: Range 0 - 1440]

The next questions exclude the work and transport activities that you have already mentioned. Now I would like to ask you about sports, fitness and recreational activities (leisure) *[Insert relevant terms]*. *This introductory statement directs the participant to think about recreational activities. This can also be called discretionary or leisure time. It includes sports and exercise but is not limited to participation in competitions. Activities reported should be done regularly and not just occasionally. It is important to focus on only recreational activities and not to include any activities already mentioned. This statement should not be omitted.*		
PA10	Do you do any vigorous-intensity sports, fitness or recreational *(leisure)* activities that cause large increases in breathing or heart rate like *[running or football]*? *[INSERT EXAMPLES] (USE SHOWCARD)* *Ask the participant to think about recreational vigorous-intensity activities only. Activities are regarded as vigorous intensity if they cause large increases in breathing and/or heart rate.*	☐ 1. Yes ☐ 2. No *[go to PA13]*
PA11	In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational *(leisure)* activities? *"Typical week" means a week when the participant is engaged in his/her usual activities. Valid responses range from 1-7.*	_____Days [PROGRAM: Range 0 - 7]
PA12	How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day? *Ask the participant to think of a typical day he/she can recall easily in which he/she engaged in recreational vigorous-intensity activities. The participant should only consider those activities undertaken continuously. Probe very high responses (over 4 hrs) to verify.*	_____Minutes [PROGRAM: Range 0 - 1440]
PA13	Do you do any moderate-intensity sports, fitness or recreational *(leisure)* activities that cause a small increase in breathing or heart rate such as brisk walking, *[cycling, swimming, volleyball]*? *[INSERT EXAMPLES] (USE SHOWCARD)* *Ask the participant to think about recreational moderate-intensity activities only. Activities are regarded as moderate intensity if they cause small increases in breathing and/or heart rate.*	☐ 1. Yes ☐ 2. No *[go to PA16]*
PA14	In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational *(leisure)* activities? *"Typical week" means a week when the participant is engaged in his/her usual activities. Valid responses range from 1-7.*	_____Days [PROGRAM: Range 0 - 7]
PA15	How much time do you spend doing moderate-intensity sports, fitness or recreational *(leisure)* activities on a typical day? *Ask the participant to think of a typical day he/she can recall easily in which he/she*	_____Minutes [PROGRAM: Range 0 - 1440]

	engaged in recreational moderate-intensity activities. The participant should only consider those activities undertaken continuously. Probe very high responses (over 4 hrs) to verify.	
This section is about your sleep. Please consider typical days in the previous 30 days. Do not consider nights when sleep is disrupted by special events (e.g., attending funeral, marriage, etc.)		
Sleep1	During past month, what time have you usually gone to bed at night?	_____:_____ Hr : mm [use 24 hr format]
Sleep2	During past month, what time have you usually gotten up in the morning?	_____:_____ Hr : mm [use 24 hr format]
Sleep3	During past month, how long (in minutes) has it usually taken you to fall asleep each night?	_____ minutes
Sleep4	During past month, how many hours of <u>actual sleep</u> did you get at night?	_____ hours
Sleep5	During past month, how would you rate your sleep quality overall?	☐ 1. Very good ☐ 2. Fairly good ☐ 3. Fairly bad ☐ 4. Very bad
Sleep6	How often do you feel sleepy or drowsy during the daytime?	☐ 1. Always ☐ 2. Often ☐ 3. Sometimes ☐ 4. Rarely ☐ 5. Never ☐ 99. Don't know
Sleep7	Are you using any sleep medication or sleeping pills?	☐ 1. Yes ☐ 2. No

DIET QUALITY QUESTIONNAIRE (DQQ)

Read: Now I'd like to ask you some yes-or-no questions about foods and drinks that you consumed yesterday during the day or night, whether
you had it at home or somewhere else.
First, I would like you to think about yesterday, from the time you woke up through the night. Think to yourself about the first thing you ate or
drank after you woke up in the morning … Think about where you were when you had any food or drink in the middle of the day … Think about
where you were when you had any evening meal … and any food or drink you may have had in the evening or late-night... and any other snacks
or drinks you may have had between meals throughout the day or night.
I am interested in whether you had the food items I will mention even if they were combined with other foods.
Please listen to the list of foods and drinks, and if you ate or drank ANY ONE OF THEM, say yes.

	Yesterday, did you eat any of the following foods:	
DQQ1	Rice, paratha, or pa ruti?	YES or NO
DQQ2	Roti, corn, or popcorn?	YES or NO
DQQ3	Potato, plantain, arum, or sweet potato?	YES or NO
DQQ4	Daal, chickpeas, or khichuri	YES or NO
	Yesterday, did you eat any of the following vegetables:	
DQQ5	Carrots or pumpkin?	YES or NO
DQQ6.1	Lal shak, pui shak, amaranth, spinach, or any other shak?	YES or NO
DQQ7.1	Eggplant, lady finger, cauliflower, cabbage, long beans, green beans, or tomatoes?	YES or NO
DQQ7.2	Bottle gourd, pointed gourd, bitter gourd, bitter melon,	YES or NO
DQQ7.3	White radish, kohlrabi, taro shoots, or green papaya?	
	Yesterday, did you eat any of the following fruits:	YES or NO
DQQ8	Ripe mango, ripe papaya, or orange musk melon?	YES or NO
DQQ9	Orange, malta, or pomelo?	YES or NO
DQQ10.1	Guava, pineapple, ripe banana, watermelon, jackfruit, custard apple, or apple?	YES or NO

DQQ10.2	Jamrul, star fruit, koromcha, jujube, Java plum, litchi, or amra?	YES or NO
	Yesterday, did you eat any of the following sweets:	
DQQ11	Sweet biscuits, cakes, misti pitha, halwa, or jilapi?	YES or NO
DQQ12	Mishti, chocolate, or ice cream?	YES or NO
	Yesterday, did you eat any of the following foods of animal origin:	
DQQ13	Eggs?	YES or NO
DQQ14	Paneer or cheese?	YES or NO
DQQ15	Yogurt or lassi?	YES or NO
DQQ16	Sausages?	YES or NO
DQQ17	Beef or goat meat?	YES or NO
DQQ18	N/A	YES or NO
DQQ19	Chicken, chicken liver, pigeon, duck, or quail?	YES or NO
DQQ20	Fish or dried fish?	YES or NO
	Yesterday, did you eat any of the following other foods:	
DQQ21	Peanuts or jackfruit seeds?	YES or NO

DQQ22	Chips or chanachur?	YES or NO
DQQ23	Instant noodles such as Maggi noodles or Pran's Mr. Noodles?	YES or NO
DQQ24	Puri, singara, samucha, pakora, piaju, beguni, fried chicken, or chop?	YES or NO
	Yesterday, did you have any of the following beverages:	
DQQ25	Milk?	YES or NO
DQQ26	Tea with sugar, coffee with sugar, chocolate milk, Horlicks, Milo, Complan or Ovaltine?	YES or NO
DQQ27	Fruit juice, packet juice such as Frooto or Tang, or shorbot?	YES or NO
DQQ28	Soft drinks such as Pepsi, Mojo, Sprite, or Fanta, or energy drinks such as Tiger?	YES or NO
	Yesterday, did you get food from any place like...	
DQQ29	KFC, CP, Pizza Hut, Helvetia, Burger King, Herfy, or other places that serve pizza or burgers?	YES or NO

Comorbidity			
COM	Has a doctor, nurse or other health professional ever told you that you had any of the following conditions?	COM 1 Hypertension COM 2 Diabetes COM 3 asthma COM 4 Chronic obstructive lung disease (COPD) COM 5 Cancer COM 6 Stroke/ mini-stroke (TIA) COM7 Heart disease COM8 Depression/mental health condition COM9 Anxity/mental health condition COM10 Dementia/significant memory problems COM11 Delirum/being unable to think or speak clearly COM12 Arthritis or chronic joint disease	☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No

		COM13 Osteoporosis or fragile bones COM14 Anaemia COM15 Eye condition affecting vision (e.g., cataract, glaucoma)? COM16 Hearing loss COM17 Urinary incontinence COM18 Sarcopania COM19 Hypothyroidism COM20 Parkinson disease COM21 Inflammatory bowel diseases COM22 Peptic ulcers	☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No

SL#	Variable number	Question	Answer	Code
High blood pressure/Hypertension [if COM 1 =1]				
	HTN1	How old were you when a doctor first told you that you have high blood pressure/hypertension?	_____ years	
	HTN2	Do you seek care for hypertension?	1 = Yes 2 = No	[If 'No' please go to next section]
	HTN3	Where do you usually seek treatment for your high blood pressure/ hypertension?	1 = At home 2 = At nearby dispensary 3 = Physician chamber 4 = Private Clinic 5= Community Clinic 6= Union health and family planning center 7= Upazila Health Complex (UHC) 8= District hospital 9= Diabetic hospital 10= Government Medical College Hospital 99 = Others (specify) …….	

	HTN4	If yes, from whom did you seek care for your hypertension?	1 = Doctor 2 = SACMO 3 = Nurse 4 = Kabiraj 5 = Health assistant/CHW 6 = Pharmacist/Drug seller 7 = Rural medical practitioner 8 = Homeopathy 9 = Ayurveda 10 = CHCP 99 = Others (Specify)	
	HTN5	How often do you usually visit a health facility for follow-up?	1= Monthly 2= Every 3 months 3= Every 6–12 months 4= Only when symptoms worsen	
	HTN6	Are you currently taking any medicine according to the prescription of doctor or other health care provider to control hypertension/ raised blood pressure? *Instruction: Record correct answer*	1 =Yes 2= Stopped medication as per doctor's advice 3= No	[If '2' or '3' please go to next section]
	HTN7	In the last 30 days, have you missed taking your prescribed medicine? *Instruction: Medicine should be taken according to doctor's prescription or advice of registered health care provider only.*	1 = Yes, frequently 2 = Yes, occasionally 3= I was able to take regularly	[If '1' or '2' please go to 'HTN8']
	HTN8	What was the reason behind not taking the medications? *Instruction: Multiple responses possible.*	1 = Don't think taking drug is necessary 2 = Expensive 3 = Got side-effect or afraid of side-effect 4 = Blood pressure is now normal 5 = Medicine is not available 6 = Medicine not advised 7= Distance of healthcare facility 99 = Others (specify) …….	
Diabetes [if COM 2 =1]				
	DM1	How old were you when a doctor first told you that you have Diabetes?	_____ years	
	DM2	Do you seek care for Diabetes?	1 = Yes 2 = No	[If 'No' please go to next section]
	DM3	Where do you usually seek treatment for your Diabetes?	1 = At home 2 = At nearby dispensary 3 = Physician chamber 4 = Private Clinic 5= Community Clinic 6= Union health and family planning center 7= Upazila Health Complex (UHC) 8= District hospital	

			9= Diabetic hospital 10= Government Medical College Hospital 99 = Others (specify) …….	
	DM4	If yes, from whom did you seek care for your Diabetes?	1 = Doctor 2 = SACMO 3 = Nurse 4 = Kabiraj 5 = Health assistant/CHW 6 = Pharmacist/Drug seller 7 = Rural medical practitioner 8 = Homeopathy 9 = Ayurveda 10 = CHCP 99 = Others (Specify)	
	DM5	How often do you usually visit a health facility for follow-up?	1= Monthly 2= Every 3 months 3= Every 6–12 months 4= Only when symptoms worsen	
	DM6	Are you currently taking any medicine according to the prescription of doctor or other health care provider to control Diabetes? *Instruction: Record correct answer*	1 =Yes 2= Stopped medication as per doctor's advice 3= No	[If '2' or '3' please go to next section]
	DM7	In the last 30 days, have you missed taking your prescribed medicine? *Instruction: Medicine should be taken according to doctor's prescription or advice of registered health care provider only.*	1 = Yes, frequently 2 = Yes, occasionally 3= I was able to take regularly	[If '1' or '2' please go to 'DM8]
	DM8	What was the reason behind not taking the medications? *Instruction: Multiple responses possible.*	1 = Don't think taking drug is necessary 2 = Expensive 3 = Got side-effect or afraid of side-effect 4 = Blood pressure is now normal 5 = Medicine is not available 6 = Medicine not advised 7= Distance of healthcare facility 99 = Others (specify) ……..	
Asthma [if COM 3 =1]				
	Asthm1	How old were you when a doctor first told you that you have asthma?	_____ years	
	Asthm2	Do you seek care for asthma?	1 = Yes 2 = No	[If 'No' please go to next section]
	Asthm3	Where do you usually seek treatment for your asthma?	1 = At home 2 = At nearby dispensary 3 = Physician chamber 4 = Private Clinic 5= Community Clinic	

			6= Union health and family planning center 7= Upazila Health Complex (UHC) 8= District hospital 9= Diabetic hospital 10= Government Medical College Hospital 99 = Others (specify) …….	
	Asthm4	If yes, from whom did you seek care for your asthma?	1 = Doctor 2 = SACMO 3 = Nurse 4 = Kabiraj 5 = Health assistant/CHW 6 = Pharmacist/Drug seller 7 = Rural medical practitioner 8 = Homeopathy 9 = Ayurveda 10 = CHCP 99 = Others (Specify)	
	Asthm5	How often do you usually visit a health facility for follow-up?	1= Monthly 2= Every 3 months 3= Every 6–12 months 4= Only when symptoms worsen	
	Asthm6	Are you currently taking any medicine according to the prescription of doctor or other health care provider to control asthma? *Instruction: Record correct answer*	1 =Yes 2= Stopped medication as per doctor's advice 3= No	[If '2' or '3' please go to next section]
	Asthm7	In the last 30 days, have you missed taking your prescribed medicine? *Instruction: Medicine should be taken according to doctor's prescription or advice of registered health care provider only.*	1 = Yes, frequently 2 = Yes, occasionally 3= I was able to take regularly	[If '1' or '2' please go to 'Asthm8']
	Asthm8	What was the reason behind not taking the medications? *Instruction: Multiple responses possible.*	1 = Don't think taking drug is necessary 2 = Expensive 3 = Got side-effect or afraid of side-effect 4 = Blood pressure is now normal 5 = Medicine is not available 6 = Medicine not advised 7= Distance of healthcare facility 99 = Others (specify) …….	
Chronic Obstructive Pulmonary Disease (COPD) [if COM 4 =1]				
	COPD1	How old were you when a doctor first told you that you have COPD?	_____ years	
	COPD2	Do you seek care for COPD?	1 = Yes 2 = No	[If 'No' please go to next section]
	COPD3	Where do you usually seek treatment for your COPD?	1 = At home 2 = At nearby dispensary 3 = Physician chamber 4 = Private Clinic 5= Community Clinic 6= Union health and family planning center	

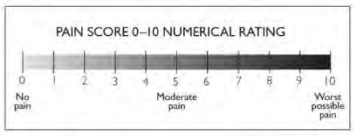
			7= Upazila Health Complex (UHC) 8= District hospital 9= Diabetic hospital 10= Government Medical College Hospital 99 = Others (specify) …….	
	COPD4	If yes, from whom did you seek care for your COPD?	1 = Doctor 2 = SACMO 3 = Nurse 4 = Kabiraj 5 = Health assistant/CHW 6 = Pharmacist/Drug seller 7 = Rural medical practitioner 8 = Homeopathy 9 = Ayurveda 10 = CHCP 99 = Others (Specify)	
	COPD5	How often do you usually visit a health facility for follow-up?	1= Monthly 2= Every 3 months 3= Every 6–12 months 4= Only when symptoms worsen	
	COPD6	Are you currently taking any medicine according to the prescription of doctor or other health care provider to control COPD? *Instruction: Record correct answer*	1 =Yes 2= Stopped medication as per doctor's advice 3= No	[If '2' or '3' please go to next section]
	COPD7	In the last 30 days, have you missed taking your prescribed medicine? *Instruction: Medicine should be taken according to doctor's prescription or advice of registered health care provider only.*	1 = Yes, frequently 2 = Yes, occasionally 3= I was able to take regularly	[If '1' or '2' please go to 'COPD8']
	COPD8	What was the reason behind not taking the medications? *Instruction: Multiple responses possible.*	1 = Don't think taking drug is necessary 2 = Expensive 3 = Got side-effect or afraid of side-effect 4 = Blood pressure is now normal 5 = Medicine is not available 6 = Medicine not advised 7= Distance of healthcare facility 99 = Others (specify) …….	
Cancer [if COM 5 =1]				
	Cancer1	How old were you when a doctor first told you that you have cancer?	_____ years	
	Cancer2	What was the cancer?	Select all the correct answers: 1 = Bladder 2 =Breast 3 = Brain 4 = Uterus / Fallopian tubes / Ovaries 5 = Intestines 6 = Esophagus 7 = Head and neck	

			8 = Liver 9 = lungs 10 = Face 11 = Pancreas 12 = Prostate 13 = Stomach 14 = Testicles 99=Other (please specify)	
	Cancer3	Do you seek care for cancer?	1 = Yes 2 = No	[If 'No' please go to next section]
	Cancer4	Where do you usually seek treatment for your cancer?	1 = At home 2 = At nearby dispensary 3 = Physician chamber 4 = Private Clinic 5= Community Clinic 6= Union health and family planning center 7= Upazila Health Complex (UHC) 8= District hospital 9= Diabetic hospital 10= Government Medical College Hospital 99 = Others (specify) ……..	
	Cancer5	If yes, from whom did you seek care for your cancer?	1 = Doctor 2 = SACMO 3 = Nurse 4 = Kabiraj 5 = Health assistant/CHW 6 = Pharmacist/Drug seller 7 = Rural medical practitioner 8 = Homeopathy 9 = Ayurveda 10 = CHCP 99 = Others (Specify)	
	Cancer6	How often do you usually visit a health facility for follow-up?	1= Monthly 2= Every 3 months 3= Every 6–12 months 4= Only when symptoms worsen	
	Cancer7	Are you currently taking any medicine according to the prescription of doctor or other health care provider to control cancer? *Instruction: Record correct answer*	1 =Yes 2= Stopped medication as per doctor's advice 3= No	[If '2' or '3' please go to next section]
	Cancer8	In the last 30 days, have you missed taking your prescribed medicine? *Instruction: Medicine should be taken according to doctor's prescription or advice of registered health care provider only.*	1 = Yes, frequently 2 = Yes, occasionally 3= I was able to take regularly	[If '1' or '2' please go to 'Cancer9']
	Cancer9	What was the reason behind not taking the medications? ***Instruction:*** *Multiple responses possible.*	1 = Don't think taking drug is necessary 2 = Expensive 3 = Got side-effect or afraid of side-effect 4 = Blood pressure is now normal	

			5 = Medicine is not available 6 = Medicine not advised 7= Distance of healthcare facility 99 = Others (specify) …….	
Mental Health [if COM 8 =1or COM 9 =1 or COM 10 =1 or COM 11 =1]				
	MHD1	How old were you when a doctor first told you that you have mental health disorder?	_____ years	
	MHD2	Do you seek care for mental health disorder?	1 = Yes 2 = No	[If 'No' please go to next section]
	MHD3	Where do you usually seek treatment for your mental health disorder?	1 = At home 2 = At nearby dispensary 3 = Physician chamber 4 = Private Clinic 5= Community Clinic 6= Union health and family planning center 7= Upazila Health Complex (UHC) 8= District hospital 9= Diabetic hospital 10= Government Medical College Hospital 99 = Others (specify) …….	
	MHD4	If yes, from whom did you seek care for your mental health disorder?	1 = Doctor 2 = SACMO 3 = Nurse 4 = Kabiraj 5 = Health assistant/CHW 6 = Pharmacist/Drug seller 7 = Rural medical practitioner 8 = Homeopathy 9 = Ayurveda 10 = CHCP 99 = Others (Specify)	
	MHD5	How often do you usually visit a health facility for follow-up?	1= Monthly 2= Every 3 months 3= Every 6–12 months 4= Only when symptoms worsen	
	MHD6	Are you currently taking any medicine according to the prescription of doctor or other health care provider to control mental health disorder? *Instruction: Record correct answer*	1 =Yes 2= Stopped medication as per doctor's advice 3= No	[If '2' or '3' please go to next section]
	MHD7	In the last 30 days, have you missed taking your prescribed medicine? *Instruction: Medicine should be taken according to doctor's prescription or advice of registered health care provider only.*	1 = Yes, frequently 2 = Yes, occasionally 3= I was able to take regularly	[If '1' or '2' please go to 'MHD8']

	MHD8	What **was the reason** behind not taking the medications? ***Instruction:*** *Multiple responses possible.*	1 = Don't think taking drug is necessary 2 = Expensive 3 = Got side-effect or afraid of side-effect 4 = Blood pressure is now normal 5 = Medicine is not available 6 = Medicine not advised 7= Distance of healthcare facility 99 = Others (specify) ……..	
Geriatric illness				
	GRI1	Are you undergoing treatment for any geriatric disorders (such as general cognitive impairment, reduced mobility, malnutrition, vision or hearing impairment, mental health disorder, etc.)?	1 = Yes 2 = No	[If 'No' please go to next section]
	GRI2	Where do you usually seek treatment for geriatric disorders?	1 = At home 2 = At nearby dispensary 3 = Physician chamber 4 = Private Clinic 5= Community Clinic 6= Union health and family planning center 7= Upazila Health Complex (UHC) 8= District hospital 9= Diabetic hospital 10= Government Medical College Hospital 99 = Others (specify) …….	
	GRI3	If yes, from whom did you seek care for your geriatric disorders?	1 = Doctor 2 = SACMO 3 = Nurse/ Physiotherapist 4 = Kabiraj 5 = Health assistant/CHW 6 = Pharmacist/Drug seller 7 = Rural medical practitioner 8 = Homeopathy 9 = Ayurveda 10 = CHCP 99 = Others (Specify)	
	GRI4	How soon do you usually seek care after noticing a health problem?	1= Immediately (within 24–48 hours) 2= Within 1 week 3= After symptoms worsen 4= Do not seek care	
	GRI5	Have you ever received any of the following services? ***Instruction:*** *Multiple responses possible.*	1= Blood pressure check 2= Blood sugar test 3= Assessment of cognition 4= Assessment of mobility 5= Nutritional assessment 6= Vision check 7= Hearing check 8= Mental health assessment 9= None	
	GRI6	How often do you usually visit a health facility for follow-up of geriatric illness?	1= Monthly 2= Every 3 months 3= Every 6–12 months 4= Only when symptoms worsen	

	GRI7	Are you currently taking any medicine according to the prescription of doctor or other health care provider to control geriatric disorder? *Instruction: Record correct answer*	1 =Yes 2= Stopped medication as per doctor's advice 3= No	[If '2' or '3' please go to next section]
	GRI8	In the last 30 days, have you missed taking your prescribed medicine? *Instruction: Medicine should be taken according to doctor's prescription or advice of registered health care provider only.*	1 = Yes, frequently 2 = Yes, occasionally 3= I was able to take regularly	[If '1' or '2' please go to 'GRI9']
	GRI9	What was the reason behind not taking the medications? ***Instruction:** Multiple responses possible.*	1 = Don't think taking drug is necessary 2 = Expensive 3 = Got side-effect or afraid of side-effect 4 = Blood pressure is now normal 5 = Medicine is not available 6 = Medicine not advised 7= Distance of healthcare facility 99 = Others (specify) …….	

Numerical Pain Rating Scale (NPRS) Now I will ask you about your **pain**.		
NPRS	Please rate your pain right now (on a scale from 0 to 10, where 0 means 'no pain at all' and 10 means 'the worst pain you can imagine.	_____ / 10 

Medications for chronic conditions *Now I am going to ask you again about the medications that you take regularly (at least once a week)?* *Please don't forget to tell me about drugs that you **inject** (like insulin) or that you **inhale** (eg for asthma). There is no need to tell me about ointments or creams.*		
MED1	Do you take any medications regularly (at least once a week)?	☐ 1. Yes ☐ 0. No *[go to VAC1]*

MED2	Add medication list *[please remind participant to bring the regularly used medication and/or prescription to examination. Please record the information carefully – an example was given]*	MED2a. Name & type 1. *Metformin* 2. 3. 4. 5. [add rows needed]	MED2b. Strength 1. *5 mg* 2. 3. 4. 5. [add rows needed]	MED2c. Dosage 1. *2 pills / time* 2. 3. 4. 5. [add rows needed]	MED3d. Frequency 1. *2 times / day* 2. 3. 4. 5. [add rows needed]

Medication adherence (for chronic disease like HTN/DM patients who are currently on Tx)

This section of questions is only applicable to those ever diagnosed with chronic and currently taken medication. [MED1=1]

MMAS1	Do you ever forget to take your medication?	☐ 1. Yes ☐ 2. No
MMAS2	Do you ever have problems remembering to take your medication?	☐ 1. Yes ☐ 2. No
MMAS3	When you feel better, do you sometimes stop taking your medicine?	☐ 1. Yes ☐ 2. No
MMAS4	Sometimes if you feel worse when you take your medicine, do you stop taking it/them?	☐ 1. Yes ☐ 2. No

Vaccination		
VAC1	Have you taken these vaccines? [Select multiple options that apply]	☐ Influenza (flu) vaccine ☐ Pneumonia vaccine ☐ COVID-19 vaccine
History of fall		
FALL1	How many times have you fallen during the last 12 months?	_____ Times

Social care and support		
PCG1	Do you have a primary caregiver? (Explain: Someone who provides regular assistance with your daily activities, health needs, or financial management.) [if PCG1=1 go for PCG2 and PCG3]	☐ 1. Yes ☐ 2. No
PCG2	**If yes**, who is your primary caregiver?	1. Spouse 2. Son 3. Daughter 4. Daughter-in-law 5. Son-in-law 6. Grandchild 7. Sibling 8. Other relative 9. Paid help 10. Friend/Neighbor
PCG3	Does your primary caregiver live in the same household with you?	1. Yes, lives in the same house 2. No, lives nearby/outside the house
SCS1	Do you have problems with your home, for example housing condition, location, or safety? (If YES, supplementary questions)	☐ 1. Yes ☐ 2. No
SCS1.1	**What concerns do you have?**	☐ Safety and security ☐ Housing condition including maintenance (repair, sanitation) ☐ Location (distance from services/family) ☐ Difficulty living independently ☐ Size of home (House too small/unsuitable)
SCS2	Do you often have insufficient money to pay for food, housing, or health care costs? (If YES, supplementary questions)	☐ 1. Yes ☐ 2. No
SCS2.1	☐ Are you able to manage your money yourself?	☐ 1. Yes ☐ 2. No
SCS2.2	☐ Would you like advice about financial support/benefits?	☐ 1. Yes ☐ 2. No
SCS3	Do you have difficulty in pursuing leisure interests and other activities that are important to you? (If YES, supplementary questions)	☐ 1. Yes ☐ 2. No
SCS3.1	You are unable to participate because of:	☐ Cost ☐ Transport problems ☐ Distance ☐ Lack of opportunities

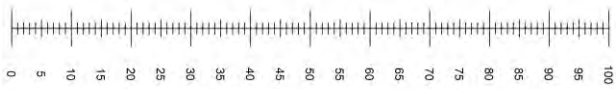
Use/practice of Assistive Products and Supports		
Cognition		
APS1	Do you use written notes to help you remember daily tasks or appointments?	☐ Yes ☐ No
APS2	Do you use written reminders to help you remember daily tasks or appointments?	☐ Yes ☐ No
APS3	Do you use calendars to help you remember daily tasks or appointments?	☐ Yes ☐ No
APS4	Do you need signs or labels inside your home to help you find places such as the toilet, bedroom, or exit?	☐ Yes ☐ No
APS5	Do you use pill box or organizer for remembering medication intake?	☐ Yes ☐ No
Psychological Capacity		
APS6	Do you have educational materials (leaflets, pictures, or visual aids) to better understand depressive symptoms?	☐ Yes ☐ No
APS7	Do you use any symptom monitoring sheets to help you tracking your mood or emotional changes over time?	☐ Yes ☐ No

Functional ability Now I will ask you some questions about your daily activities, such as bathing, dressing, cooking, or managing money. Please answer based on what you usually do by yourself, not what you could do on a very good day or with help. If you use any assistive device (like a stick, glasses, or help from someone), please answer based on your usual situation.		
ADL1	Do you need help to take a bath (sponge, shower, or tub)?	**1**. Bathes self completely or needs help cleaning only a single part of the body (e.g., back). **0**. Needs help with more than one part of the body, getting in/out, or cannot bathe self.
ADL2	Can you pick out your clothes and put them on by yourself?	**1**. Gets clothes and dresses without assistance (may use cane/walker for support). **0**. Needs help with buttons, zippers, shoelaces, or stays partly undressed.

ADL3	Can you go to the toilet, clean yourself, and arrange your clothes afterwards?	**1**. Goes to toilet, cleans self, and arranges clothes independently. **0**. Needs help transferring to the toilet, cleaning self, or uses bedpan/commode.
ADL4	Can you move from the bed to a chair and back without help?	**1**. Moves in and out of bed/chair independently (mechanical aids acceptable). **0**. Needs help to move or cannot get out of bed.
ADL5	Can you control your urination and bowel movements completely?	**1**. Controls bowels and bladder completely (no accidents). **0**. Has occasional or frequent accidents, or needs supervision (catheter/incontinence pads).
ADL6	Can you feed yourself food from a plate without help?	**1**. Feeds self without assistance (food may be prepared by others). **0**. Needs assistance in feeding or is fed intravenously/by tube.
IADL1	Ability to Use Telephone	1. Operates telephone on own initiative; looks up and dials numbers. 2. Dials a few well-known numbers. 3. Answers telephone, but does not dial. 4. Does not use telephone at all.
IADL2	Shopping	1. Takes care of all shopping needs independently. 2. Shops independently for small purchases. 3. Needs to be accompanied on any shopping trip. 4. Completely unable to shop.
IADL3	Food Preparation	1. Plans, prepares, and serves adequate meals independently. 2. Prepares adequate meals if supplied with ingredients. 3. Heats and serves prepared meals, or prepares meals but does not maintain adequate diet. 4. Needs to have meals prepared and served.
IADL4	Housekeeping	1. Maintains house alone or with occasional assistance (e.g., heavy work). 2. Performs light daily tasks such as dishwashing, bed making.

		3. Performs light daily tasks, but cannot maintain acceptable level of cleanliness. 4. Needs help with all home maintenance tasks. 5. Does not participate in any housekeeping tasks.
IADL5	Laundry	1. Does personal laundry completely. 2. Launders small items (rinses socks, stockings, etc.). 3. All laundry must be done by others.
IADL6	Mode of Transportation	1. Travels independently on public transportation or drives own car. 2. Arranges own travel via taxi, but does not otherwise use public transportation. 3. Travels on public transportation when assisted or accompanied by another. 4. Travel limited to taxi or automobile with assistance of another. 5. Does not travel at all.
IADL7	Responsibility for Own Medications	1. Is responsible for taking medication in correct dosages at the correct time. 2. Takes responsibility if medication is prepared in advance in separate dosages. 3. Is not capable of dispensing their own medication.
IADL8	Ability to Handle Finances	1. Manages financial matters independently (budgets, writes checks, pays rent/bills, goes to bank), collects and keeps track of income. 2. Manages day-to-day purchases, but needs help with banking, major purchases, etc. 3. Incapable of handling money.

Health-related quality of life **Finally for each of the following questions, choose the one option that best describes your health TODAY?**

EQ5D5L 1	Problems with your mobility (ability to walk about)	☐ 1. None ☐ 2. Slight ☐ 3. Moderate ☐ 4. Severe ☐ 5. Unable
EQ5D5L 2	Problems with your ability to self-care (wash and dress)	☐ 1. None ☐ 2. Slight ☐ 3. Moderate ☐ 4. Severe ☐ 5. Unable
EQ5D5L 3	Problems with your ability to do usual activities (work, study, family or leisure activities)	☐ 1. None ☐ 2. Slight ☐ 3. Moderate ☐ 4. Severe ☐ 5. Unable
EQ5D5L 4	Feelings of pain or discomfort	☐ 1. None ☐ 2. Slight ☐ 3. Moderate ☐ 4. Severe ☐ 5. Unable
EQ5D5L 5	Feelings of anxiety or depression	☐ 1. None ☐ 2. Slight ☐ 3. Moderate ☐ 4. Severe ☐ 5. Unable
EQ5D5L 6	How good or bad is your health TODAY 100 means the best health you can imagine. 0 means the worst health you can imagine	

Cognition **Basic assessment**		
Filter question [If YES (BCOG1=1), proceed for in-depth assessment (Step 2)]		
BCOG1	Do you have problems with memory or orientation (such as not knowing where you are or what day it is)?	☐ 1. Yes ☐ 2. No
Remember three words (use nouns, for example): flower, door, rice.		
BCOG2	**Orientation in time and space:** What is the full date today? Where are you now (home, clinic, etc.)?	☐ 1. Both correct ☐ 2. Wrong to either question or does not know
BCOG3	**Recalls all the three words?**	☐ 1. Yes ☐ 2. No
[If BCOG2=2 or BCOG3=2, proceed for in-depth assessment (Step 2)]		

BAMSE FOR THOSE WHO ARE ILLITERATE
Assessment of Cognitive Function

Now I am going to ask you some questions that may seem irrelevant to you. However, the purpose of these questions is to see how well you can remember things. I would be grateful if you answer my questions. [Write the respondent's full answer. Write 1 for a correct answer and 0 for an incorrect answer. If there is any uncertainty about coding, do not code. If the respondent gives a wrong answer or does not answer for any special reason, write that reason in the comment column.]

Question No.	**Questions**	**Interviewee's Response**	**Correct 1**	**Wrong 0**	**Interpretation**
Orientation to time:					
IBAMSE1A	What season/time of the year is it now?				
IBAMSE1B	Which month is it?				

IBAMSE1C	What part of the day is it now?				
IBAMSE1D	What day of the week is today?				
IBAMSE1E	What is today's date?				
Orientation to place:					
IBAMSE2A	Whose house is this?				
IBAMSE2B	What is the name of this area/street/neighborhood?				
IBAMSE2C	What is the name of this village/city?				
IBAMSE2D	What is the name of this district?				
IBAMSE2E	What is the name of our country?				

Registration:
I will now say the names of three things: mango, flower, fish. Can you repeat these names? "Pronounce one word per second. After saying all the words the first time, ask the respondent to repeat them and record their response. If the respondent cannot say them correctly, repeat the words up to a maximum of five times."

		Interviewee's Response	Correct	Wrong	Interpretation
IBAMSE3A	Mango		1	0	
IBAMSE3B	Flower		1	0	
IBAMSE3C	Fish		1	0	

Attention and Calculation:
Can you tell me the names of the days of the week in reverse order? For example, Saturday comes before Sunday. So which day comes before Saturday—, before that—, and before that—? [Ask in this manner.]

		Interviewee's Response	Correct	Wrong	Interpretation
IBAMSE4A	Friday		1	0	
IBAMSE4B	Thursday		1	0	
IBAMSE4C	Wednesday		1	0	
IBAMSE4D	Tuesday		1	0	
IBAMSE4E	Monday		1	0	

Now please do some calculations for me. Suppose I have 20 taka for rickshaw fare. Each day I spend 3 taka on rickshaw fare. After paying the fare on the first day, I have 17 taka left. After paying the fare the next day, how much will I have left? … and the next day? … and the next day? … [Ask in this way a total of five times.]

		Interviewee's Response	Correct	Wrong	Interpretation
IBAMSE5A	14		1	0	
IBAMSE5B	11		1	0	
IBAMSE5C	8		1	0	
IBAMSE5D	5		1	0	
IBAMSE5E	2		1	0	

Recall:
Can you again tell me the three things I mentioned earlier?

		Interviewee's Response	Correct	Wrong	Interpretation
IBAMSE6A	Mango		1	0	
IBAMSE6B	Flower		1	0	
IBAMSE6C	Fish		1	0	

Naming:
• (Showing a glass) What is this?

	Interviewee's Response	Correct	Wrong	Interpretation
IBAMSE7A		1	0	

• (Showing a stick) What is this?

IBAMSE7B	Interviewee's Response	Correct	Wrong	Interpretation
		1	0	

Repetition:
Listen carefully and repeat exactly: "Neither this nor that."

	Interviewee's Response	Correct	Wrong	Interpretation
IBAMSE8		1	0	

Visual Command:
Look at me and do exactly what I do. [Raise your hand and keep it raised for three seconds. Observe what the respondent does and record it. Write 1 for a correct response and 0 for an incorrect response. If the respondent does not understand your instruction, still write 0 and note this in the observation section.]

	Right	Wrong	Observation
IBAMSE9A	1	0	

If the respondent cannot see well, then ask them to listen carefully to what I say and do accordingly: raise your right hand.

	Right	Wrong	Observation
IBAMSE9B	1	0	

Three-Step Task:
[Give the respondent the following three instructions and observe what they do, then record it.]
a. Take this paper in your right hand.
b. Fold it in the middle.
c. Put the paper on the ground.

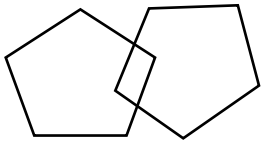
		Right	Wrong	Observation
IBAMSE10A	Step a	1	0	
IBAMSE10B	Step b	1	0	
IBAMSE10C	Step c	1	0	

Sentence:
If you do not know my name, how would you find it out? (Any complete sentence = 1)

	Complete Sentence	Incomplete Sentence	Interviewee's Response
IBAMSE11	1	0	

Copying a Figure:
I will make a picture using sticks. Now you make the same picture.

IBAMSE12	Picture correctly made	1

	Picture incorrectly made	0
Write down your observation:		
Draw below the figure made by the respondent using the sticks.		
Draw the picture shown here. 		

BAMSE FOR THOSE WHO ARE LITERATE

Assessment of Cognitive Function

Ask the remaining questions only to those who can read and write. Otherwise, thank the respondent and end the interview at this point.
Now I will ask you some questions, some of which I have asked before and some of which are similar in nature. However, I would be grateful if you would answer these questions once again.
[Write the respondent's full answer. Enter 1 for a correct answer and 0 for an incorrect answer. If the respondent gives an incorrect answer or does not provide an answer for any reason, write the reason in the comments column.]

Question No.	Questions	Interviewee's Response	Correct 1	Wrong 0	Comments
Orientation to time:					
LBAMSE1A	What year is it?				
LBAMSE1B	What season/time is it now?				
LBAMSE1C	What is today's date?				
LBAMSE1D	What day of the week is today?				
LBAMSE1E	What month is it?				
Orientation to place:					
LBAMSE2A	What is the name of this country?				
LBAMSE2B	What is the name of this district?				
LBAMSE2C	What is the name of this village/city?				
LBAMSE2D	What is the name of this area/road/neighborhood?				
LBAMSE2E	Whose house is this?				

Registration:
I will now name three objects: pot, bed, umbrella. Can you repeat these names?
"Pronounce one word per second. After saying all the words the first time, ask the respondent to repeat them and record their response. If the respondent cannot say them correctly, repeat the words up to a maximum of five times."

		Interviewee's Response	Correct	Wrong	Comment

LBAMSE3A	Pot		1	0	
LBAMSE3B	Bed		1	0	
LBAMSE3C	Umbrella		1	0	

Attention and Calculation:
Now please do some calculations for me again. If you subtract 7 from 100, what do you get? … Then subtract 7 from that. … Then subtract 7 again. … [Ask in this way a total of five times.]

		Interviewee's Response	Correct	Wrong	Interpretation
LBAMSE4A	93		1	0	
LBAMSE4B	86		1	0	
LBAMSE4C	79		1	0	
LBAMSE4D	72		1	0	
LBAMSE4E	65		1	0	

Spell a word backward:
Please spell the following word backward: "Ha- Ja- Ba- Ra- La".
Recall:
Can you again tell me the three things I mentioned earlier?

		Interviewee's Response	Correct	Wrong	Comment
LBAMSE5A	Pot		1	0	
LBAMSE5B	Bed		1	0	
LBAMSE5C	Umbrella		1	0	

Naming:
(Showing a pencil) What is this?

	Interviewee's Response	Correct	Wrong	Interpretation
LBAMSE6A		1	0	

(Showing a wristwatch) What is this?

Interviewee's Response	Correct	Wrong	Interpretation
LBAMSE6B	1	0	

Repetition:
Listen carefully and repeat exactly: "Neither this nor that."

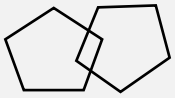
	Interviewee's Response	Correct	Wrong	Interpretation
LBAMSE7		1	0	

Three-Step Task:
[Give the respondent the following three instructions and observe what they do, then record it.]
a. Take this paper in your right hand.
b. Fold it in the middle.
c. Put the paper on the ground.

		Right	Wrong	Observation
LBAMSE8A	Step a	1	0	
LBAMSE8B	Step b	1	0	
LBAMSE8C	Step c	1	0	

Visual command:
Do what is written on this paper. (Show the written command "Close your eyes".)

Interviewee's Response	Correct	Wrong	Interpretation

LBAMSE9	1	0	
Sentence: **Please write any one complete sentence.**			
	Complete Sentence	Incomplete Sentence	Interviewee's Response
LBAMSE10	1	0	
Copying a Figure: **Please copy the picture shown here.** 			
LBAMSE11	Picture correctly made	1	
	Picture incorrectly made	0	

Psychological capacity *Finally, some questions about thinking and mood. Over the **last 2 weeks**, how often have you been bothered by any of the following problems?*		
Basic Assessment		
PHQ1	Little interest or pleasure in doing things	☐ 1. Yes ☐ 2. No
PHQ2	Feeling down, depressed, or hopeless	☐ 1. Yes ☐ 2. No
[if both PHQ1 =2 and PHQ=2] (no need if any of PHQ1 =1 or PHQ=1) **In-depth Assessment**		
PHQ1	Little interest or pleasure in doing things	☐ 1. Not at all ☐ 2. Several days ☐ 3. More than half the days ☐ 4. Nearly every day
PHQ2	Feeling down, depressed, or hopeless	☐ 1. Not at all ☐ 2. Several days ☐ 3. More than half the days ☐ 4. Nearly every day
PHQ3	Trouble falling or staying asleep, or sleeping too much	☐ 1. Not at all ☐ 2. Several days ☐ 3. More than half the days ☐ 4. Nearly every day
PHQ4	Feeling tired or having little energy	☐ 1. Not at all ☐ 2. Several days ☐ 3. More than half the days ☐ 4. Nearly every day

PHQ5	Poor appetite or overeating	☐ 1. Not at all ☐ 2. Several days ☐ 3. More than half the days ☐ 4. Nearly every day
PHQ6	Feeling bad about yourself – or that you are a failure or have let yourself or your family down	☐ 1. Not at all ☐ 2. Several days ☐ 3. More than half the days ☐ 4. Nearly every day
PHQ7	Trouble concentrating on things, such as reading the newspaper or watching television	☐ 1. Not at all ☐ 2. Several days ☐ 3. More than half the days ☐ 4. Nearly every day
PHQ8	Moving or speaking so slowly that other people could have noticed? Or the opposite – being so fidgety or restless that you have been moving around a lot more than usual	☐ 1. Not at all ☐ 2. Several days ☐ 3. More than half the days ☐ 4. Nearly every day
PHQ9	Thoughts that you would be better off dead or of hurting yourself in some way	☐ 1. Not at all ☐ 2. Several days ☐ 3. More than half the days ☐ 4. Nearly every day
Anxiety		
GAD1	Feeling nervous, anxious or on edge	☐ 1. Not at all ☐ 2. Several days ☐ 3. More than half the days ☐ 4. Nearly every day
GAD2	Not being able to stop or control worrying	☐ 1. Not at all ☐ 2. Several days ☐ 3. More than half the days ☐ 4. Nearly every day
GAD3	Worrying too much about different things	☐ 1. Not at all ☐ 2. Several days ☐ 3. More than half the days ☐ 4. Nearly every day
GAD4	Trouble relaxing	☐ 1. Not at all ☐ 2. Several days ☐ 3. More than half the days ☐ 4. Nearly every day
GAD5	Being so restless that it is hard to sit still	☐ 1. Not at all ☐ 2. Several days ☐ 3. More than half the days ☐ 4. Nearly every day

GAD6	Being so restless that it is hard to sit still	☐ 1. Not at all ☐ 2. Several days ☐ 3. More than half the days ☐ 4. Nearly every day
GAD7	Feeling afraid as if something awful might happen	☐ 1. Not at all ☐ 2. Several days ☐ 3. More than half the days ☐ 4. Nearly every day

Thank you for your time. The questionnaire is now complete, please proceed for physical examination.		
Exit1	Time completed	HH : MM
Exit2	Finalised by	

Section No: Measurment

Blood sugar Test					
	AGM_601	Interviewer ID	_____		
	AGM_602	Device ID	|____|____|.|____|		
	AGM_603	Date & Time	|____|____| : |____|____| Hour : Minute		
	AGM_604	How many hours has the participant been on an empty stomach?	|____|____| Hour		
Test Results					
	AGM_605	Glucose (ml/l)	_____		
Instruction: If the blood glucose level is 7 or above mmol/l then please refer					

Anthropometry (Height, weight and waist circumference measurment)					
No	**Variable**	**Question**	**Responses**	**Code**	**Instructions**
	WAMA_606	Start Time of anthropometry	|____|____| : |____|____| Hr: Min		Use 24 hr format
	WAMA_607	Weight Scale ID	|____|____|		
	WAMA_608	Height Scale ID	|____|____|		

Anthropometry (Height, weight and waist circumference measurment)						
No	**Variable**	**Question**		**Responses**	**Code**	**Instructions**
	WAMA_609	Clothing type during weight measurement		1 = Light clothing 2 = Slightly heavy clothing 3 = Heavy clothing		
	WAMA_610	Name of measurer				
	WAMA_611	Code of measurer		|____|____|		
No	**Variable**	**Measurement**	**Measurement 1**	**Measurement 2**	**Measurement 3**	
	WAMA_612 A/B/C	Height (Cm)	A.|____|____|____|.|____|	B.|____|____|____|.|____|	C.|____|____|____|.|____| If A and B differs more than 0.5 cm, take 3rd measurement	
	WAMA_613 A/B/C	Weight (Kg)	A.|___|____|____|.|____|	B.|____|____|____|.|____|	C.|____|____|____|.|____| If A and B differs more than 0.1kg, take 3rd measurement	
	WAMA_614 A/B/C	Mid upper arm circumference (MUAC) (Cm)	A.|____|____|.|____|	B.|____|____|.|____|	C.|____|____|____|.|____| If A and B differs more than 0.5 cm, take 3rd measurement	
	WAMB_614 A/B/C	Calf circumference (Cm)	A.|____|____|.|____|	B.|____|____|.|____|	C.|____|____|____|.|____| If A and B differs more than 0.5 cm, take 3rd measurement	

Blood Pressure (BP) measurement						
No	**Variable**	**Question**	**Responses**		**Code**	**Instructions**
	WMBP_615	Start Time of measuring blood pressure	|____|____| : |____|____| Hr : Min		Use 24 hr format	
Measurement -1 (Take the first measurement, considering at least 15 minutes rest)						
Number	**Variable**	**Name of the measurement**	**Systolic**	**Diastolic**	**Time of the measurement**	

Anthropometry (Height, weight and waist circumference measurment)						
No	**Variable**	**Question**	**Responses**		**Code**	**Instructions**
	WMBP_616 A/B/C	Blood Pressure (mm of Hg)	A.|___|___|___|	B.|___|___|___|	C.|____|____|:|____|____| Hr : Min	
Measurement - 2 (Allow 1 minute interval between two measurements)						
	WMBP_617 A/B/C	Blood Pressure (mm of Hg)	**Systolic**	**Diastolic**	**Time of Measurement**	
			A.|___|___|___|	B.|___|___|___|	C.|____|____|:|____|____| Hr : Min	
Measurement - 3 (If difference of between 1st and 2nd measurement is more than 10 mm of Hg, then take 3rd measurement for Blood Pressure)						
	WMBP_618 A/B/C	Blood Pressure (mm of Hg)	**Systolic**	**Diastolic**	**Time of Measurement**	
			A.|___|___|___|	B.|___|___|___|	C.|____|____|:|____|____| Hr : Min	
	WMBP_619	Blood pressure measuring machine ID	|____|____|			
	WMBP_620	Measurer's Name and Code	|____|____|			
	WMBP_621	End Time of measuring blood pressure	|____|____| : |____|____| Hr: Min			Use 24 hr format
[During any measurement, If Systolic BP ≥ 140 mm of Hg, Diastolic BP ≥ 90 mm of Hg - refer the respondent to appropriate health centre]						

Lung function Test						
Number	Variable	Name of the test	Responses			Instruction
	APFM_622	Interviewer ID	_____			
	APFM_623	Device ID	|____|____|.|____|			
	APFM_624	Date & Time	|____|____| : |____|____| Hr: Min			Use 24 hr format
Expected PFR for the interviewee: Formula*: Females: PEF = -1.454 (Age) + 2.368 (Height) Males: PEF = -1.807 (Age) + 3.206 (Height)						
			Measurment 1	Measurment 2	Measurment 3	Comments

	APFM_625 A/B/C	PFR before using sulbutamol				
		Average PFR____ _____L/min		If the measured PFR is less than the expected PFR than need to use inhaler		
		Expected PFR of the participant:____ _____L/min				
	APFM_626	Is salbutamol inhaler needed?	1 = Yes 2 = No			
			Measurment 1	Measurment 2	Measurment 3	Comments
	APFM_627 A/B/C	PFR after using the sulbutamol				
		Average PFR after using the sulbutamol____ _____L/min		If the new PFR is not at least 20% higher than the previous PFR, a spirometry test is needed.		
	APFM_628	Is spirometry test required?	1 = Yes 2 = No			

	APFM_629	ID of the spirometry device	|____|____|____|		
			FVC	FEV 1	FEV 1/FVC
	APFM_630A	Measurment 1			
	APFM_630B	Measurment 2			
	APFM_630C	Measurment 3			
	APFM_631	Average FEV1/FVC If the average is at or less than 0.7, then COPD	_____		
	If the measured PFR is less than the expected PFR than refer				

*Kodgule R R, Singh V, Dhar R, Saicharan B G, Madas S J, Gogtay J A, Salvi S S, Koul P A. Reference values for peak expiratory flow in Indian adult population using a European Union scale peak flow meter. J Postgrad Med [serial online] 2014 [cited 2023 Mar 23];60:123-9. Available from: https://www.jpgmonline.com/text.asp?2014/60/2/123/132311

Referral

No	Variable	Question	Responses	Code	Instructions
	WAGM_632	Has the participant been referred?	1 = Yes 2 = No		If the answer is 'No' then go to the next section

	WAGM_633	Where was the participant referred?	1 = Upazila Health Complex 2 = District Hospital 3 = Medical College Hospital 4 = Doctor's Chamber 99 = Other (specify)_____		
	WAGM_634	For which domain was the participant referred?	1. Cognition 2. Psychological capacity 3. Vitality 4. Locomotor 5. Hearing 6. Vision 99 = Other (specify)_____		

Name of data entry personnel (saved in data tab):_____

	Interview time: (ended)	HH : MM
Geo	Record geolocation	Latitude: Longitude:
Intvr_com	Interviewer's comments	_____

Thank you for your participation.

Appendix B: Informed Consent Form

Consent paper for study participants
Title: **Assessment of cognition and psychological capacity of older adults: A cross-sectional study**

Protocol No. TBD	**Version No. TBD**	**Date: TBD**

Principal Investigator Aysha Anan

Investigators' names: Malay K Mridha**,** Mahbub Latif, Sayeda Mahsina Akter, Md Mokbul Hossain, Ali Ahsan, Tanmoy Sarker, Sakib Rahman, Meghna Chakravarty, Saima Mehjabeen, Munia Afroz, Shahnaz Sharmin, Jakia Sultana.

Organization: BRAC James P Grant School of Public Health, BRAC University

Information Sheet

Introduction

Assalamu Walaikum/Nomoskar. I am (Name), and I have come from BRAC James P Grant School of Public Health, BRAC University. Thank you for showing an interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate, we welcome you. Please inform us if you wish to participate. Our contact details are given at the end of this information sheet. If you decide not to participate, there will be no disadvantage to you, and we thank you for considering our request.

The objective of this study:

The objective of this study is to assess the status of cognition and psychological capacity among older adults aged 60 years and above in rural Bangladesh and to identify the factors associated with decline in cognition and psychological capacity in this population.

What will participants be asked to do?

We are asking men and women aged 60 years and above, from wards 7,8 and 9 of Sujalpur union of Birganj upazila of Dinajpur district to participate in the study. No preference is shown to any ethnic or cultural group; we want everyone to get involved. We will collect data total number of participants will be 452. Data will be collected from selected participants. At this stage, we are asking participants for three things: i. to complete a questionnaire about their health, background, lifestyle, and diet; ii. to have some simple physical non-invasive measurements (e.g., Height, weight, blood pressure, MUAC, Lung function, retinal imaging). iii. To provide a small amount of blood sample from the finger (1–2 drops). These procedures, which include interview, household activity observation and physical measurement, will take approximately 1 hour and 30 minutes to 2 hours. We will inform you of the test results.

What are the potential risks and inconveniences?

All the measurements being carried out are well established. Providing a blood sample or participating in other examinations will not place you at any serious risk. However, some minor issues may occur on rare occasions. For example, you may feel slight discomfort during blood collection. These temporary side effects will resolve on their own without any medical treatment.

Can you change your mind and withdraw from the project?

You may withdraw from participation at any time, without giving an explanation and without any disadvantage to yourself of any kind. If you choose to withdraw after participation, your data will be excluded from the final analyses if you wish. Any unused material will be destroyed.

Anonymity and confidentiality of the research data

We need your name and address to record who has taken part. Thereafter, your research data will be held in an anonymized format using numeric identifiers. Only the senior members of the research team, or their approved representatives, will have access to code linking your identity to the research data and samples. The research data and samples collected will be stored securely in such a way that only approved researchers have access to them. De-identified data may be shared with investigators from other countries, the funding organization, and regulatory authorities. Results of this project will be published, including postings on the internet, but any data included will be fully anonymized and will not be individually identifiable. The raw data will be destroyed after the study has been completed according to research governance guidelines. The Institutional Review Board of BRAC James P Grant School of Public Health, BRAC University, has the authority to access all the research records.

Compensation

There will be no financial compensation for taking part in the study. But light snacks will be offered following the clinical measurements. Undergoing a comprehensive health assessment will raise awareness of your own health status or potentially identify unrecognized health issues. If any health issues are detected, you will be referred to the appropriate health care facility.

Who is organizing the research?

The work is organized and led by BRAC James P Grant School of Public health, BRAC University, and is funded by Masters of Public Health Program Thesis Fund and the Centre for Non-communicable Diseases and Nutrition project fund.

How does this affect my legal rights?

Taking part in the study does not impact your legal rights or release the investigator, the institution, the sponsor, or their representatives from legal responsibility of negligence. For more information about your rights and protection, you may contact the administrator of the Institutional Review Board:

IRB Administrator, Phone: 01993379512. Email: irb-jpgsph@bracu.ac.bd

BRAC James P. Grant School of Public Health, BRAC University;

What if I have any questions?

We appreciate that some of the language used in this consent form may appear technical. Please do ask us to explain anything that you do not understand, and we will do our best to answer your questions. In addition, if you have any questions about our project, please also feel free to contact the lead investigator:

Name: Aysha Anan Title: Master's of Public Health student, Institution: BRAC James P Grant School of Public Health, BRAC University; Address: Floor 10-13, BRAC Tower, 65 Mohakhali Commercial Area Bir Uttam A K Khandakar Road, Dhaka-1213, Bangladesh. Phone: 01717505989, Email: aysha.anan@g.bracu.ac.bd

Thank you for taking the time to read this information sheet. If you wish to participate in this project, please sign/put thumbprint and date the consent form given to you. You will be given a copy of the information sheet.

Do you give permission for the interview to be recorded?	Yes No
Do you give permission to share your findings?	Yes No
Do you have any questions? (State the question)	Yes No
If required, do you give permission for photographs or video recordings to be taken during the interview for documentation or research purposes?	Yes No

Name of the Participant: _____ Signature or fingerprint of left thumb: _____ Date: / / 202__	Interviewer Name: _____ Signature: _____ Date: / / 202__