



ASSESSMENT OF VISION AND HEARING CAPACITY OF OLDER ADULTS: A CROSS-SECTIONAL STUDY

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Declaration

I, Ashish Roy, hereby declare that this thesis entitled "Assessment of vision and hearing 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.



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Date: 02.06.2026

Approval

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

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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 JPGSPH), BRAC University, Dhaka, Bangladesh. Ethical approval was obtained before data collection (**IRB Reference No: MPH-2025-018**).

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

Confidentiality and anonymity of the 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 only to the senior research team.

Participants who screened positive for vision or hearing impairment during the study were informed of their results and referred to the appropriate health facilities. No financial incentives were provided.

Abstract

Background: Population ageing is associated with an increased burden of vision and hearing impairments, which significantly hampers the quality of life of older adults. Despite the substantial burden, no comprehensive assessment of vision and hearing has been conducted among older adults in Bangladesh. The Integrated Care for Older People (ICOPE) approach of the World Health Organisation was found to be effective and feasible for measuring the burden of vision and hearing with all other domains of intrinsic capacity.

Objectives: This study aimed to assess the status of vision and hearing capacity of older adults (aged ≥ 60 years) and identify the factors associated with their impairments.

Methods: This cross-sectional study was conducted in Sujalpur Union of Birganj, a sub-district of Dinajpur, Bangladesh. The total sample size was 402, and the sampling technique was simple random sampling. Data were collected through face-to-face interviews and anthropometric and other clinical measurements. Data analysis involved descriptive, bivariate, and regression analyses.

Results: The prevalence of vision impairment was 95.77% (n=385). And the prevalence of only distant vision impairment was 76.62% (n=308). Age (aOR:3.59, 95% CI: 1.89 - 6.8, $p < 0.001$), hypertension, and fruit and vegetable consumption (aOR: 2.24, 95% CI: 1.07 - 4.7, $p = 0.032$) were significantly associated with distant vision impairment. On the other hand, the prevalence of hearing impairment was 6.72% (n=27). And the prevalence of hearing impairment in at least one ear was 15.67% (n=63). Age (aOR: 4.73, 95% CI: 2.54 - 8.81, $p < 0.001$) and dietary diversity (aOR: 2.07, 95% CI: 1.05 - 4.08, $p = 0.035$) were significantly associated with hearing impairment in at least one ear.

Conclusions: A high prevalence of vision and hearing impairment was observed among older adults in rural Bangladesh. The findings of this study highlight the need to integrate vision- and hearing-related care services into existing primary healthcare facilities. The associated factors of vision and hearing impairment identified in this study should be considered while developing interventions for older adults.

Keywords: ICOPE, vision, hearing, intrinsic capacity, elderly, older adults, Bangladesh

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List of Acronyms

Acronyms	Full Form
ADL	Activities of Daily Living
BAMSE	Bangla Adaptation of the Mini-Mental State Examination
BMI	Body Mass Index
CI	Confidence Interval
CNCDN	Centre for Non-Communicable Diseases and Nutrition
COPD	Chronic Obstructive Pulmonary Disease
CRD	Chronic Respiratory Disease
DBP	Diastolic Blood Pressure
DDS	Dietary Diversity Score
DQQ	Diet Quality Questionnaire
FBG	Fasting Blood Glucose
FEV1	Forced Expiratory Volume in One Second
FVC	Forced Vital Capacity

Acronyms	Full Form
IC	Intrinsic Capacity
IADL	Instrumental Activities of Daily Living
ICOPE	Integrated Care for Older People
MET	Metabolic Equivalent of Task
MNA-SF	Mini Nutritional Assessment Short-Form
MUAC	Mid Upper Arm Circumference
NCD	Non-Communicable Disease
PHQ-9	Patient Health Questionnaire-9
PTA	Pure Tone Audiometry
SBP	Systolic Blood Pressure
SD	Standard Deviation
VA	Visual Acuity
WHO	World Health Organization

Chapter 1: Introduction

1.1 Background and Rationale

1.1.1 Background

Population ageing has emerged as an alarming public health concern due to the significant global demographic shift in the 21st century (Cristea et al., 2020). Due to increasing life expectancy and declining fertility rates, the proportion of older adults is increasing across the world (Rees, 2019). Although this demographic shift reflects one of the major public health achievements, it also raises questions about how societies can make this longer life healthier, more meaningful, and productive (Decade of Healthy Ageing: Plan of Action, n.d.). Alongside the demographic shift, the world is also experiencing an epidemiological transition towards non-communicable diseases, which has altered the patterns of morbidity (McKeown, 2009). In older adults, the non-communicable diseases often coexist and interact with each other, which gradually hampers both the physical and mental health of the individuals (Joy et al., 2024; Yadav et al., 2021). However, the presence of disease alone does not fully explain the functional ability of the older adults; that's why the public health and geriatric care frameworks mostly rely on intrinsic capacity, which is a more meaningful measure of the physical and mental capabilities of the older adults (Wang et al., 2025). A decline in intrinsic capacity is closely linked to frailty, which makes older adults more susceptible to disability, dependency, and reduced participation in daily life (Belloni & Cesari, 2019).

Intrinsic capacity comprises 6 key domains, including cognition, psychology, locomotor capacity, vitality, vision, and hearing (Integrated Care for Older People (ICOPE), n.d.). These domains are interconnected and interact dynamically, so a decline in one domain can affect multiple others (Exploring Intrinsic Capacity Chapter 1, 2024). Maintaining intrinsic capacity across domains is important for promoting functional ability and ensuring healthy ageing (Cesari et al., n.d.). Moreover, intrinsic capacity assesses and monitors individuals' health status, allowing identification of any functional decline and enabling targeted interventions before it becomes irreversible disability (Chhetri et al., 2022). Among the six domains, sensory capacity impairment, particularly vision and hearing, hampers functional independence and is one of the most common chronic conditions among older adults (Brennan et al., 2005). Vision, a core component of intrinsic capacity, enables people to

move freely and interact with others and the surrounding environment (Integrated Care for Older People (ICOPE), n.d.). However, vision impairment hampers quality of life and leads to conditions such as anxiety, depression, cognitive decline, social isolation, and frequent falls (Integrated Care for Older People (ICOPE), n.d.). On the other hand, untreated age-related hearing impairment impacts effective communication, leading to social isolation and health conditions like anxiety, depression, impaired cognition, dementia, poor balance, and falls (Integrated Care for Older People (ICOPE), n.d.).

The burden of intrinsic capacity decline is comparatively higher in developing countries due to the rapid expansion of older adults than in developed countries (Decade of Healthy Ageing: Plan of Action, n.d.; Tan, 2022). Moreover, the health system is not prepared enough to tackle the growing ageing population; at the same time, there is a lack of policies to address the needs of older adults in developing countries (Bhattacharyya et al., 2024). Bangladesh is one of the developing countries that is burdened with the ageing population, but the primary healthcare system lacks specialized geriatric care and sophisticated diagnostic tests, with all the services mainly concentrated in the tertiary care facilities (Abdullah et al., 2018; Rahman et al., 2024). As a result, conditions such as vision and hearing impairment are often ignored, remain undiagnosed and untreated, leading to irreversible loss of intrinsic capacity and functional ability.

Globally, initiatives like the United Nations Decade of Healthy Ageing (2021-2030) have underscored the importance of maintaining intrinsic capacity and functional ability, so that all people can live longer, healthier and meaningful lives (Decade of Healthy Ageing: Plan of Action, n.d.). Aligning with the global initiative, Bangladesh has also developed the National Healthy Ageing Strategy and Action Plan (2024-2030), which aims to promote healthy ageing and prevent intrinsic capacity decline by integrating age-friendly, function-centred care within the existing health system (Bangladesh National Healthy Ageing Strategy and Action Plan (2024-2030), n.d.). However, transforming this policy into effective actions requires reliable evidence. To support countries with low resource in operationalizing the healthy ageing within the primary care settings, the WHO has introduced the Integrated Care for Older People (ICOPE) guidelines, which provides a structured and framework for assessing and managing the intrinsic capacity decline (Integrated Care for Older People (ICOPE), n.d.). The ICOPE screening tool has been found to be effective and feasible for identifying status intrinsic capacity among community dwelling older adults, particularly in resource

constrained settings (Lu et al., 2023). Building on this framework, this study aimed to assess the status of vision and hearing capacity and identify the factors associated with the impairment of vision and hearing among older adults. By generating the context-specific evidence, the study wants to inform the adaptation and integration of ICOPE-based screening and management strategies within the primary healthcare system of Bangladesh.

1.1.2 Rationale

Although global and national initiatives emphasize intrinsic capacity, evidence regarding vision and hearing among older adults in rural Bangladesh remains scarce and outdated. Generating population-based data on vision and hearing decline among older adults is necessary to understand the extent of intrinsic capacity decline and identify the factors associated with the decline. Updated evidence will help quantify the burden and inform targeted interventions. Simultaneously, exploring the factors associated with vision and hearing impairment, including socioeconomic status, social and physical environments, diseases, and other risk factors, will provide insights for designing age-friendly, function-oriented health services that integrate comprehensive care for older adults within the primary healthcare system.

1.2 Problem Statement

ICOPE screening tool, developed by the WHO, for identifying decline in vision and hearing capacity as well as other domains of intrinsic capacity, is an effective and feasible tool for measuring visual and hearing impairment in resource-constrained settings. However, no comprehensive assessment of vision and hearing has been conducted in Bangladesh using the ICOPE framework. This study aims to generate context-specific evidence to adapt and integrate the ICOPE-based screening and care pathway within primary healthcare settings in Bangladesh.

1.3 Research Questions

- i. What is the status of vision and hearing capacity in older adults (aged ≥ 60 years), living in rural areas of Bangladesh?
- ii. What are the factors associated with the decline in vision and hearing capacities in older adults?

1.4 Study Objectives

1.4.1 Overall Objective

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

1.4.2 Specific Objectives

The specific objectives of this study were as follows:

- i. To assess the status of vision and hearing capacity among older adults (aged ≥ 60 years) in rural Bangladesh.
- ii. To identify the associated factors of vision and hearing impairment among older adults (aged ≥ 60 years) in rural Bangladesh.

1.5 Structure of the Thesis

This thesis is organized into six chapters. Chapter 1 provides the introduction, background, and study objectives. Chapter 2 presents a comprehensive review of the existing literature. Chapter 3 outlines the methodology used in this study. Chapter 4 presents the study findings. Chapter 5 provides a discussion and interpretation of the results in light of the existing evidence. Chapter 6 concludes the thesis with key conclusions and recommendations.

Chapter 2: Literature Review

2.1 Global Evidence

Population ageing has become an emerging global concern owing to rapid demographic shifts (Cristea et al., 2020). In Bangladesh, 9.29% of the population is aged ≥ 60 years, which is projected to be 21.9% by 2050 (UN, 2024). However, rapid ageing is associated with an increased burden of vision and hearing impairments, which significantly hampers the quality of life of older adults (Fischer et al., 2009; World Health Organisation, 2017). A substantial number of vision and hearing impairments are preventable, treatable, or correctable (Getachew et al., 2024). WHO addresses the importance of preventing and managing vision and hearing impairment for healthy ageing. They introduced the ICOPE guidelines to assess and manage vision and hearing impairments in resource-constrained settings.

2.2 Conceptual Framework

This study was supported by the WHO ICOPE framework. Among the six domains of intrinsic capacity, the focus areas of this study are vision and hearing capacity. According to the ICOPE framework, the vision and hearing capacity of older adults is affected by a variety of factors, including demographic factors (age, sex, occupation, income, education, religion, marital status, etc.), behavioural risk factors (tobacco consumption, alcohol consumption, diet, physical activity, air pollution, sleep, etc.), physical environment (housing condition, sanitation, living arrangement, risk of fall), social care and support home environment, financial situation, social isolation and loneliness, risk of abuse, etc.), clinical factors (hypertension, diabetes, cardiovascular diseases, nutritional status, etc.), medication use (drug adherence, polypharmacy, toxic medication use, immunization, etc.), and health-seeking behaviour.

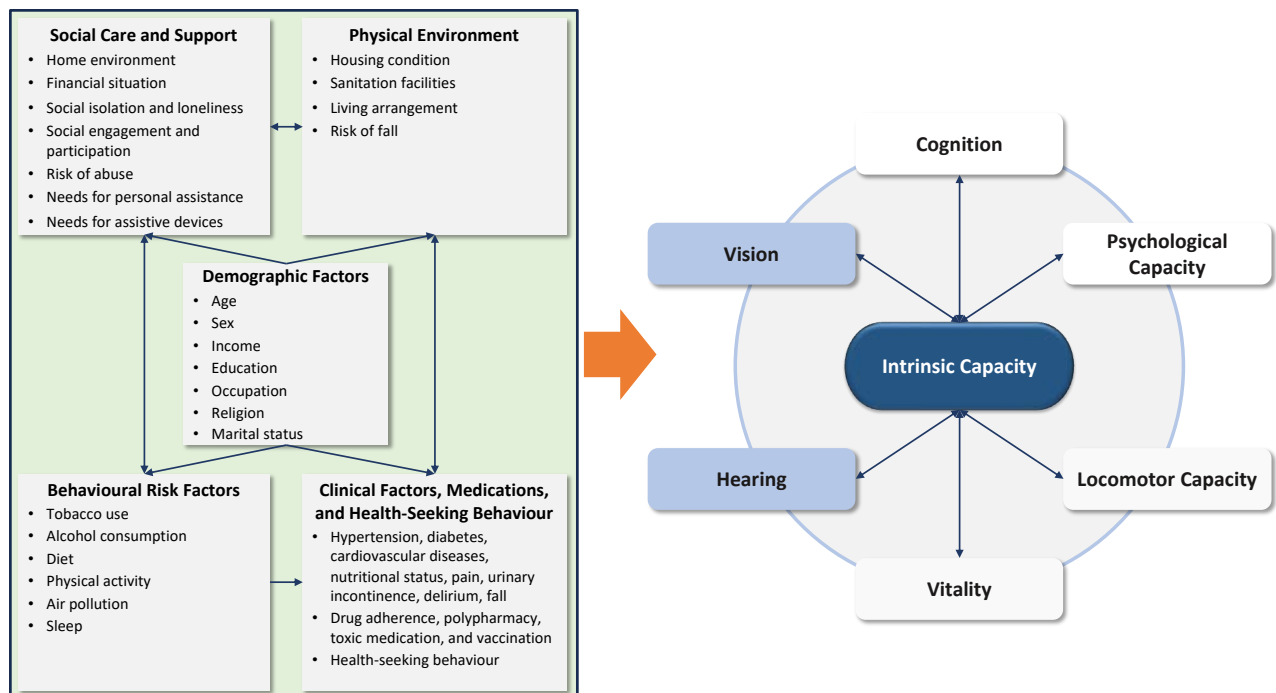


Figure 1. Conceptual framework based on ICOPE

Chapter 3: Methods

3.1 Study Design

This was a cross-sectional study. The justification for choosing this design was to conduct the study cost-effectively within a short period of time.

3.2 Study Area and Setting

The study was conducted in a rural setting. The study area was Ward 7, Ward 8, and Ward 9 of Sujalpur Union of Birganj sub-district of Dinajpur district.

3.3 Study Period

The study duration was approximately 5 months, starting on January 5, 2026, until June 2, 2026, including a 2-month data collection period.

3.4 Study Population and eligibility

3.4.1 Study Population

We recruited community-dwelling older adults (≥ 60 years of age) from three Wards (7, 8 and 9) of Sujalpur Union of Birganj sub-district as our study population.

3.4.2 Inclusion and Exclusion Criteria

Inclusion criteria:

- Adults aged ≥ 60 years.
- Permanent resident of the selected area (residing in the study area for at least 12 months or above).

- Capable of providing informed written consent.

Exclusion criteria:

- Individuals with severe disabilities (unable to speak, blind or deaf, or having a terminal illness) that prevent effective participation.
- Acute illness that requires immediate hospitalization.
- Who showed an unwillingness to participate in the study.

3.5 Sample Size Calculation

Using Cochran's formula, the required sample size was calculated separately for the prevalences, 0.50 (Vision) and 0.363 (Hearing) using the value of $z = 1.96$ (at 95% of confidence level) and margin of error, $d = 5\%$ (Lwanga & Lemeshow, 1991). The largest sample size, $n = 452$ (considering a 15% non-response rate), 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)
Vision*	0.50*	452
Hearing (Tarafder et al., 2015)	0.363	418

* Due to a lack of recent specific prevalence data for impaired vision in older adults in Bangladesh, a prevalence of 50% ($p=0.50$) was used to generate the largest sample size.

3.6 Sampling Technique

Participants were selected using a simple random sampling method. To create a sampling frame, we first conducted a household listing in three Wards (7, 8, and 9) of the Sujalpur Union of the Birganj sub-district of Dinajpur. We found a total of 791 eligible participants from 1724 households. We then made a list of 500 participants through randomization, ensuring a maximum of one participant from a selected household. We then approached our participants to participate in the study.

3.7 Variables

3.7.1 Dependent Variables

This study evaluated the outcomes of only two domains of intrinsic capacity (vision and hearing) as defined by the WHO ICOPE framework.

Vision impairment: We assessed visual acuity using the WHO standard visual acuity chart (Both distant and near vision; distant VA first, then near VA) (Chhetri et al., 2022). Distance vision $<6/12$ (either eye) or unable to see N6 with reading spectacles was considered as vision impairment (*Integrated Care for Older People (ICOPE)*, n.d.). These parameters align with the WHO ICOPE guidelines.

Hearing impairment: We conducted Pure Tone Audiometry test using a smartphone-based application (Hearing Test Pro) (Aremu, 2018). The test was conducted in a quiet audiometry booth using ‘Soundcore Q11i’ overhead headphones. A person was considered to have hearing impairment if his/her hearing threshold in the better ear is 35 dBHL or more (*Integrated Care for Older People (ICOPE)*, n.d.). The app was proven cost-effective, and an accurate alternative to traditional audiometry for screening programs (Aremu, 2018).

Table 2. Dependent variables with details

Dependent variables	Details
Vision	Distance VA <6/12 (either eye) or inability to read N6 with correction was defined as vision impairment, and vice versa.
Hearing	A hearing threshold ≥ 35 dBHL in the better ear was considered to indicate hearing impairment and vice versa.

3.7.2 Independent Variables

Data were collected on sociodemographic, socioeconomic, nutritional, behavioral, lifestyle, clinical, and functional factors.

- **Socio-demographic factors:** Age, sex, education level, marital status, religion, occupation and meal companionship.
- **Socio-economic factors:** Household monthly income, wealth index and Household food security status.
- **Nutritional factors:** Nutritional status, dietary diversity, and Body Mass Index (Kaiser et al., 2009; Herforth et al., 2024).
- **Behavioural and lifestyle factors:** Tobacco and alcohol consumption, physical activity, fruit and vegetable consumption, sleep duration, and cooking fuel use. Information regarding these factors were collected using the WHO STEP tool (Riley et al., 2016).
- **Clinical and functional factors** included hypertension, diabetes, chronic respiratory disease, external ear abnormality, levels of depression severity, cognitive impairment levels, Activities of Daily Living and Instrumental Activities of Daily Living (M. & M., 1999; Graf, 2008).

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

Table 3. Independent variables with details

Groups	Variables	Types	Details
Socio-demographic	Age	Continuous and categorical	Age of participants in completed years, Categories: <70 years, ≥70 years).
	Sex	Categorical	Male, Female.
	Education level	Categorical	No formal schooling and formal schooling.
	Marital status	Categorical	Currently married, Other than currently married (Divorced, widowed, separated, cohabiting, never married)
	Religion	Categorical	Islam, Other than Islam (Hinduism and Christianity)
	Occupation	Categorical	Employed (Government employee, non-government employee, self-employed, retirees), Homemaker or unemployed (Homemaker, unemployed- able to work and unemployed -unable to work)

Groups	Variables	Types	Details
	Meal companionship	Categorical	Alone, with others, with spouse.
Socio-economic	Wealth index	Categorical	Categorized into tertiles (Low, Middle, High).
	Household monthly income	Continuous	Household monthly income in Taka (mean $\pm$ SD).
	Household food security status	Categorical	Secure, Insecure. (using a validated household food security scale).
Nutritional	Nutritional status	Categorical	Normal (Score 12-14), at risk of malnutrition (Score 8-11) and malnourished (Score 0-7).
	Dietary diversity	Continuous and categorical	Dietary diversity was assessed using the Diet Quality Questionnaire (DQQ). Adequate (≥ 5 food groups/day) and inadequate (< 5 food groups/day).
	Body Mass Index (BMI)	Categorical	Underweight (BMI < 18.5 kg/m ²), normal (BMI $18.5 - 24.9$ kg/m ²), and overweight/obese (BMI ≥ 25).

Groups	Variables	Types	Details
			kg/m ²).
Behavioural and lifestyle	Tobacco use (Smoking, smokeless, any form)	Categorical	Yes, No.
	Alcohol consumption	Categorical	Yes, No.
	Physical activity	Categorical	Adequate (≥ 600 MET minutes/week) and inadequate (< 600 MET minutes/week).
	Fruit and vegetable intake	Categorical	Adequate (≥ 5 servings/day) and inadequate (< 5 servings/day).
	Salt intake	Categorical	Adequate (< 5 g), high (5–10 g), and very high (> 10 g).
	Sleep duration	Categorical	Adequate (≥ 7 hours/night) and inadequate (< 7 hours/night).
	Cooking fuel use	Categorical	Clean, Unclean.
	Hypertension	Categorical	Yes (SBP ≥ 140 mmHg or DBP ≥ 90 mmHg or any

Groups	Variables	Types	Details
Clinical and functional			antihypertensive medication use) or No.
	Diabetes	Categorical	Yes (FBG ≥ 7.0 mmol/L or on any diabetic medication) or No.
	Chronic respiratory disease	Categorical	Yes (Bronchial asthma or COPD positive on measurement) or No.
	External ear abnormality	Categorical	Yes, No.
	Level of depression severity	Categorical	No to minimal, mild and moderate to severe.
	Cognitive impairment levels	Categorical	No, mild and moderate to severe.
	Activities of Daily Living (ADL)	Categorical	Dependence (dependence in ≥ 1 ADL item) or independence was measured using the Katz index.
	Instrumental Activities of Daily Living (IADL)	Categorical	Dependence (dependence in ≥ 1 IADL item) or independence was measured using the Lawton index.

3.7.3 Anthropometric and Clinical Measurements

In addition to the assessment of vision and hearing, we have conducted different anthropometric and clinical measurements following standardized operating procedures. The anthropometric measurements included height, weight, arm span, MUAC and calf-circumference. On the other hand, clinical measurements included blood pressure, random blood glucose, peak flowmetry and spirometry. All the measurements were obtained by trained data collectors using calibrated instruments and devices. The details operating procedures of the measurements are given below:

Blood pressure: We have used ‘Omron HEM-7120’ digital machines to measure the blood pressure of the study participants. Measurements were obtained on the participants’ right arm, with palms facing upward after around 30 minutes of rest. The participants’ clothes over the arm were handled in a manner that did not exert pressure on the localized vessels of the arm. A cuff of appropriate size was placed approximately 2.5 cm above the elbow joint, gently wrapped onto the arm, and maintained 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 taken. The final blood pressure values were calculated as the average of two closest readings.

Fasting Blood Glucose: In this study, we used the ‘ACCU-CHECK Instant’ glucometer with compatible test strips and a sterile lancing device to measure fasting blood sugar. We only measured the blood glucose of the participants, who were fasting overnight for at least 8 hours. 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 an 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. Drop of blood 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 following standard biosafety measures.

Weight: We have used ‘Omron BF511’ devices to measure participants’ body weight. Participants were instructed to remove their mobile phones, keys, money bags, shoes, socks, and belts, to avoid

false measurements. The measurer ensured that the device was placed on a firm and 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. We used the average of the two closest recorded values to determine the final weights.

Height: We used portable height measuring boards to measure the stature of the participants. Before taking the readings, participants were instructed to remove their headgear and footgear to avoid incorrect readings. We measured the height of each participant twice and if the discrepancy between two measurements was more than 50 mm, we took third measurement. Then we used the arithmetic mean of the two closest measurements to calculate height.

Arm span: We took arm span with measuring tape when the accurate height of the participants was impossible to measure. The participants were told to stand with their backs and heels flat against a plain wall, extending the arms laterally and keeping fully straight, and parallel to the floor. Then the maximum linear distance between the tips of their middle fingers was recorded. Usually two measurements were taken, a third measurement was taken only if the difference between first two readings was more than 50 mm. The average between two arm span was used to estimate the height of the participants (Aggarwal et al., 2000).

Mid-upper arm circumference (MUAC): We used Anthro Flex tape to measure the MUAC of the participants. Measurements were taken in the non-dominant or least affected arm (in case of previous history of stroke or disability) in a relaxed sitting or standing position. To identify the midpoint of the upper arm, first the location of the acromion and olecranon processes were identified flexing the elbow at 90°. Then the distance between the acromion and olecranon processes was measured and divided by two. The midpoint was marked with 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 soft tissue. The reading was taken to the nearest 0.1 cm. The average of the two readings was used for analysis.

Calf Circumference: We used a measuring tape for the measurement of calf circumference. The widest point of the left calf was measured according to the standard WHO protocol. The participants were instructed to sit in a flat surface bending their knees at 90 degree and feet flat on the floor. Measurement was recorded wrapping the soft tissues of the calf without compressing.

Peak flowmetry: A ‘Mini-Wright peak flow meter’ was used to record the Peak Expiratory Flow Rate (PEFR). Before the measurement, the indicator was set to zero, and the device was held horizontally ensuring no obstruction of the scale and air vent. The participants were assessed in a standing or sitting upright position to allow optimal lung expansion. The participants were instructed to take a maximum deep breath and place the mouthpiece firmly in their mouths, sealing it tightly with their lips. Then, exhale as hard and fast as possible in a single forceful blow. The experiment was repeated three times, 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: Spirometry was performed only in participants with a negative reversibility test, using ‘NuvoAir’ spirometer. Before using the spirometer, a new calibrated turbine was inserted each time. Then we instructed the participants to breathe normally for a few cycles, followed by a maximum inhalation. Sealing the mouthpiece tightly with their lips, the participants were told to exhale forcefully and rapidly for at least 6 seconds. The procedure was repeated thrice. The application recorded the best FEV1 and FVC values. Grade F of the spirometry results were dropped from the analysis.

3.7.4 Operational Definitions

Vision impairment: Distant vision <6/12 (either eye) or inability to see N6 with reading spectacles was considered as vision impairment.

Distant vision impairment: Distant visual acuity <6/12 (either eye) was considered as distant vision impairment.

Near vision impairment: Near visual acuity worse than N6 even with reading spectacles was considered as near vision impairment.

Hearing impairment: A person was considered to have hearing impairment if their hearing threshold in the better ear was ≥ 35 dBHL.

Hearing impairment (At least one ear): If the hearing threshold in either ear or both ears was ≥ 35 dBHL.

3.8 Data Collection

3.8.1 Data Collection Tools

We used a structured, pretested Bangla questionnaire for data collection using the KoBoToolbox application on tablets. The questionnaire was made by incorporating some validated and established tools, such as the WHO STEPS questionnaire for behavioural risk factors, Diet Quality Questionnaire (DQQ) for assessing dietary diversity, Mini Nutritional Assessment Short-Form (MNA-SF) for nutritional assessment, the Katz index and Lawton index for functional ability, PHQ-9 for depressive symptoms, and BAMSE for cognitive assessment. We used separate forms for anthropometric and clinical measurements.

3.8.2 Pretesting

The pretesting of the data collection tools was conducted in the same Union but in a separate Ward outside the study area among ten older adults. The pretesting was conducted to assess the appropriateness of the questionnaire for our target population and context. Revisions and minor refinements were made based on the feedback from pretesting.

3.8.3 Data Collection Procedure

A data collection team of six data collectors, consisting of three MPH student researchers, three research assistants, and one field supervisor, was deployed for the study. All team members received a 10-day training, including two days of field testing to standardize the interview techniques and measurement procedures. Before commencing the fieldwork, the local government, Civil Surgeon, Dinajpur, and UH&FPO, Birganj were formally notified of the study.

Data were collected in two stages. First, trained data collectors visited selected households from the randomization list, verified participants via national ID or other ID cards, obtained written informed consent, and conducted face-to-face interviews alongside an observational checklist for the physical environment and risk of abuse using the Kobo Toolbox application on their tablets.

Participants were then invited to attend a makeshift clinic the following morning, that was set up in a centrally located school within the study area and was equipped with all the necessary instruments for anthropometric and clinical measurements. At the clinic, the ICOPE basic assessment was conducted first, and participants who did not pass the basic assessment underwent an in-depth assessment. Other clinical measurements were obtained from all participants. The measurement data were initially recorded on structured paper forms and later entered into the Kobo Toolbox. Participants with clinical abnormalities were referred to the nearest appropriate health facility.

3.9 Data Management and Quality Assurance

All study data were anonymized using unique identifiers on physical questionnaires and electronic files and stored in a password-protected server accessible only to authorized investigators. Built-in skip and range checks minimized data entry errors. We also performed regular data cleaning to ensure the integrity and logical consistency of the data. In addition, range and logic checks were conducted to identify outliers and data entry errors. Queries were generated to address this issue, including missing values. Occasionally, participants were re-contacted to address queries.

3.10 Data Analysis

Descriptive analysis: We used descriptive statistics to summarize the sociodemographic characteristics of our study population. We reported the mean and standard deviation (SD) for continuous variables. Frequencies and percentages for categorical variables were reported from the univariate analysis.

Bivariate analysis: For categorical variables, we performed the Pearson Chi-square test to compare the characteristics of those with and without vision or hearing impairments.

Regression analysis: Logistic regression models were used to evaluate the outcomes and explanatory variables. As there was insufficient variability in the two outcome variables, we used distance vision and hearing impairment (at least in one ear) as the outcome variables for the regression model. The factors associated with the two outcome variables were analysed separately. The predictors of the multivariable analysis were selected based on the conceptual framework and biological plausibility. We measured the adjusted Odds Ratio (aOR) with the corresponding 95% Confidence Interval (CI). A p-value ≤ 0.05 was considered statistically significant in the final model. The association among the predictors in the final model was assessed using VIF > 10 , indicating potential collinearity.

Data analysis was conducted using StataNow/BE 18.5 (StataCorp, TX, 77845, USA).

3.11 Ethical Considerations

Ethical approval for this study was obtained from the Institutional Review Board of BRAC James P Grant School of Public Health. The approval number is MPH-2025-018, and the approval date is February 26, 2026. Written informed consent was obtained from each participant before enrolment. An information sheet and explanation of the consent were provided in Bangla. All participants were informed of the objectives, risks, benefits, and voluntary participation. Participants have the full right to withdraw at any time up to the report submission without any consequences. Consent was documented with a signature or thumb impression. Regarding the risks to the participants, the study

only involved established procedures that did not cause serious harm. To mitigate participants' privacy risks, all data were anonymized using a unique numeric value.

Chapter 4: Results

Table 4 presents the background characteristics of the study participants. From the randomization list of 500 eligible participants, we reached a total of 457. We could not reach the rest of them because some were outside the study area at that time, some were unavailable due to agricultural work, some were sick, some refused to participate in the study, and one of the participants died after the household listing. Of the 457 participants we reached, 402 completed both the household interview and the anthropometric and clinical assessment. Therefore, the response rate was approximately 88%.

The mean age of the study participants was 68.29 (± 5.96) years, among them 64% were below 70 years age-group and other were 70 years and above. Of the participants, 53.98% were male and 60.2 % participants were currently married. Only 32.59% of the participants had formal schooling, with the majority having no formal schooling. More than half (52.99%) of the study participants were employed; the others were homemakers or unemployed. Mean monthly income was 19073.26 (± 17189.12) taka. The majority of the households use unclean cooking fuel.

Regarding lifestyle and behavioural factors, 64.68% of the participants reported tobacco consumption in any form, either smoking or smokeless. More than half (58.71%) of the participants performed an adequate level of physical activity. Mean sedentary time spent per day was 7.4 (± 2.76) hours. 68.66% of the respondents reported inadequate sleep with mean sleep hours being 5.89 (± 1.33) hours.

Table 4. Background characteristics of the study participants

Characteristics	Mean $\pm$ SD	Frequency (n)	Percentage (%)
Age	68.29 $\pm$ 5.96		
Age in years			
<70 years		258	64.18
≥ 70 years		144	35.82
Sex			
Male		217	53.98

Characteristics	Mean $\pm$ SD	Frequency (n)	Percentage (%)
Female		185	46.02
Marital status			
Currently married		242	60.2
Other than currently married		160	39.8
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
Homemaker/unemployed		189	47.01
Monthly household income in taka	19073.26 $\pm$ 17189.12		
Household wealth tertile			
Low		166	41.29
Middle		106	26.37
High		130	32.34
Involvement with income generating activity			
No		164	40.8
Yes		238	59.2
Smoking			
Yes		112	27.86
No		290	72.14
Smokeless tobacco consumption			
Yes		192	47.76
No		210	52.24

Characteristics	Mean $\pm$ SD	Frequency (n)	Percentage (%)
Tobacco consumption in any form			
Yes		260	64.68
No		142	35.32
Physical activity			
Inadequate (<600 MET min/week)		166	41.29
Adequate ($\geq$ 600 MET min/week)		236	58.71
Sedentary time spent (hours/day)	7.4 $\pm$ 2.76		
Sedentary time category			
$\leq$ 7 hours/day		192	47.76
>7 hours/day		210	52.24
Sleeping duration (hours/night)	5.89 $\pm$ 1.33		
Sleep status			
Not adequate sleep		276	68.66
Adequate sleep		126	31.34
Alcohol consumption			
No		385	95.77
Yes		17	4.23
Cooking fuel			
Unclean		384	95.52
Clean		18	4.48
Fruit and vegetable consumption			
Adequate ($\geq$ 5 servings/day)		42	10.45
Inadequate (<5 servings/day)		360	89.55
Composite salt behavior score	7.02 $\pm$ 2.01		
Dietary diversity score	3.93 $\pm$ 1.65		
Dietary diversity			
Adequate ($\geq$ 5 food-groups/day)		137	34.08
Inadequate (<5 food-groups/day)		265	65.92

Characteristics	Mean $\pm$ SD	Frequency (n)	Percentage (%)
NCD protect score	2.06 $\pm$ 1.33		
NCD risk score	0.57 $\pm$ 0.82		
GDR score	10.49 $\pm$ 1.38		
Nutritional status			
Normal		100	24.88
At risk of malnutrition		216	53.73
Malnourished		86	21.39
Food security status			
Secure		247	61.44
Insecure		155	38.56
BMI	20.79 $\pm$ 3.55		
BMI category			
Underweight		112	27.86
Normal		187	46.52
Overweight/obese		103	25.62
Hypertension			
No		242	60.2
Yes		160	39.8
Diabetes			
No		368	91.54
Yes		34	8.46
Chronic respiratory disease*			
No		313	78.45
Yes		86	21.55
External ear abnormality			
No		372	92.54
Yes		30	7.46
Level of depression severity			

Characteristics	Mean $\pm$ SD	Frequency (n)	Percentage (%)
No to minimal		214	53.23
Mild		105	26.12
Moderate to severe		83	20.65
Cognitive impairment levels			
No		182	45.27
Mild		136	33.83
Moderate to severe		84	20.9
Activities of daily living			
Dependent		99	24.63
Independent		303	75.37
Instrumental activities of daily living			
Dependent		339	84.33
Independent		63	15.67
Meal companionship			
Alone		158	39.3
With others		102	25.37
With spouse		142	35.32

*Grade F of the spirometry test results were dropped from analysis, which made the sample size 399 for Chronic respiratory diseases.

Approximately 75% of the participants were at risk of malnutrition or were malnourished. 38.56% of the respondents mentioned household food insecurity. Mean BMI was found to be 20.79 (± 3.55).

Hypertension was observed in 39.80% of the participants. In contrast, 21.55% and 8.46% of participants had chronic respiratory diseases (CRD) and diabetes mellitus (DM), respectively. 7.46% of the study participants had external ear abnormalities, including ruptured tympanic membranes, impacted ear wax, and pus/discharge from the ear. Of the participants, 26.12% had mild depression and 20.65% had moderate to severe depression. A total of 20.9% of the participants had severe

cognitive impairment. Approximately 84.33% of the participants were dependent on others for their instrumental activities of daily living (IADL).

Table 5. Prevalence of vision impairment by key different characteristics

Characteristics	Total n	Both distant and near vision n (%)	Distant vision only n (%)	Near vision only n (%)
Age in years				
<70 years	258	244 (94.57)	179 (69.38)	241 (93.41)
≥70 years	144	141 (97.92)	129 (89.58)	139 (96.53)
Sex				
Male	217	204 (94.01)	152 (70.05)	201 (92.63)
Female	185	181 (97.84)	156 (84.32)	179 (96.76)
Marital status				
Currently married	242	227 (93.80)	169 (69.83)	222 (91.74)
Other than currently married	160	158 (98.75)	139 (86.88)	158 (98.75)
Religion				
Islam	193	183 (94.82)	143 (74.09)	181 (93.78)
Other than Islam	209	202 (96.65)	165 (78.95)	199 (95.22)
Education				
No formal schooling	271	261 (96.31)	220 (81.18)	258 (95.20)
Formal schooling	131	124 (94.66)	88 (67.18)	122 (93.13)
Occupation				
Employed	213	200 (93.90)	145 (68.08)	198 (92.96)
Homemaker/unemployed	189	185 (97.88)	163 (86.24)	182 (96.30)
Household wealth tertile				
Low	166	160 (96.39)	131 (78.92)	158 (95.18)
Middle	106	103 (97.17)	88 (83.02)	101 (95.28)
High	130	122 (93.85)	89 (68.46)	121 (93.08)

Characteristics	Total n	Both distant and near vision n (%)	Distant vision only n (%)	Near vision only n (%)
Involvement with income generating activity				
No	164	160 (97.56)	141 (85.98)	157 (95.73)
Yes	238	225 (94.54)	167 (70.17)	223 (93.70)
Smoking				
Yes	112	105 (93.75)	83 (74.11)	103 (91.96)
No	290	280 (96.55)	225 (77.59)	277 (95.52)
Smokeless tobacco consumption				
Yes	192	183 (95.31)	140 (72.92)	182 (94.79)
No	210	202 (96.19)	168 (80.00)	198 (94.29)
Tobacco consumption in any form				
Yes	260	246 (94.62)	191 (73.46)	243 (93.46)
No	142	139 (97.89)	117 (82.39)	137 (96.48)
Physical activity				
Inadequate (<600 MET min/week)	166	161 (96.99)	142 (85.54)	160 (96.39)
Adequate ($\geq$ 600 MET min/week)	236	224 (94.92)	166 (70.34)	220 (93.22)
Sedentary time category				
$\leq$ 7 hours/day	192	184 (95.83)	138 (71.88)	183 (95.31)
>7 hours/day	210	201 (95.71)	170 (80.95)	197 (93.81)
Sleep status				
Not adequate sleep	276	262 (94.93)	207 (75.00)	259 (93.84)
Adequate sleep	126	123 (97.62)	101 (80.16)	121 (96.03)
Alcohol consumption				
No	385	369 (95.84)	295 (76.62)	365 (94.81)

Characteristics	Total n	Both distant and near vision n (%)	Distant vision only n (%)	Near vision only n (%)
Yes	17	16 (94.12)	13 (76.47)	15 (88.24)
Cooking fuel				
Unclean	384	369 (96.09)	297 (77.34)	365 (95.05)
Clean	18	16 (88.89)	11 (61.11)	15 (83.33)
Fruit and vegetable consumption				
Adequate (≥ 5 servings/day)	42	37 (88.10)	25 (59.52)	37 (88.10)
Inadequate (< 5 servings/day)	360	348 (96.67)	283 (78.61)	343 (95.28)
Dietary diversity				
Adequate (≥ 5 food-groups/day)	137	131 (95.62)	104 (75.91)	129 (94.16)
Inadequate (< 5 food-groups/day)	265	254 (95.85)	204 (76.98)	251 (94.72)
Nutritional status				
Normal	100	97 (97.00)	65 (65.00)	96 (96.00)
At risk of malnutrition	216	206 (95.37)	171 (79.17)	204 (94.44)
Malnourished	86	82 (95.35)	72 (83.72)	80 (93.02)
Food security status				
Secure	247	235 (95.14)	181 (73.28)	231 (93.52)
Insecure	155	150 (96.77)	127 (81.94)	149 (96.13)
BMI category				
Underweight	112	108 (96.43)	89 (79.46)	104 (92.86)
Normal	187	176 (94.12)	143 (76.47)	175 (93.58)
Overweight/obese	103	101 (98.06)	76 (73.79)	101 (98.06)
Hypertension				
No	242	234 (96.69)	193 (79.75)	231 (95.45)
Yes	160	151 (94.38)	115 (71.88)	149 (93.13)
Diabetes				
No	368	355 (96.47)	284 (77.17)	350 (95.11)

Characteristics	Total n	Both distant and near vision n (%)	Distant vision only n (%)	Near vision only n (%)
Yes	34	30 (88.24)	24 (70.59)	30 (88.24)
Chronic respiratory disease				
No	313	298 (95.21)	236 (75.40)	295 (94.25)
Yes	86	84 (97.67)	69 (80.23)	83 (96.51)
Level of depression severity				
No to minimal	214	205 (95.79)	153 (71.50)	201 (93.93)
Mild	105	100 (95.24)	83 (79.05)	100 (95.24)
Moderate to severe	83	80 (96.39)	72 (86.75)	79 (95.18)
Cognitive impairment levels				
No	182	175 (96.15)	130 (71.43)	172 (94.51)
Mild	136	127 (93.38)	106 (77.94)	125 (91.91)
Moderate to severe	84	83 (98.81)	72 (85.71)	83 (98.81)
Activities of daily living				
Dependent	99	98 (98.99)	79 (79.80)	96 (96.97)
Independent	303	287 (94.72)	229 (75.58)	284 (93.73)
Instrumental activities of daily living				
Dependent	339	328 (96.76)	272 (80.24)	323 (95.28)
Independent	63	57 (90.48)	36 (57.14)	57 (90.48)
Meal companionship				
Alone	158	153 (96.84)	129 (81.65)	152 (96.20)
With others	102	101 (99.02)	83 (81.37)	100 (98.04)
With spouse	142	131 (92.25)	96 (67.61)	128 (90.14)

ICOPE Vision assessment pathway:

Figure 2 shows the vision assessment pathway. Of the 402 participants enrolled in the basic assessment of vision, 16 passed the assessment and were considered to have no visual impairment. The remaining 386 participants underwent an in-depth assessment using WHO visual acuity charts. Of the 386 participants, 1 passed the in-depth assessment and was classified as having no visual impairment. Combining the basic and in-depth assessments, 17 (4.33%) participants were found to have no visual impairment, while 385 (95.77%) were identified as having visual impairment.

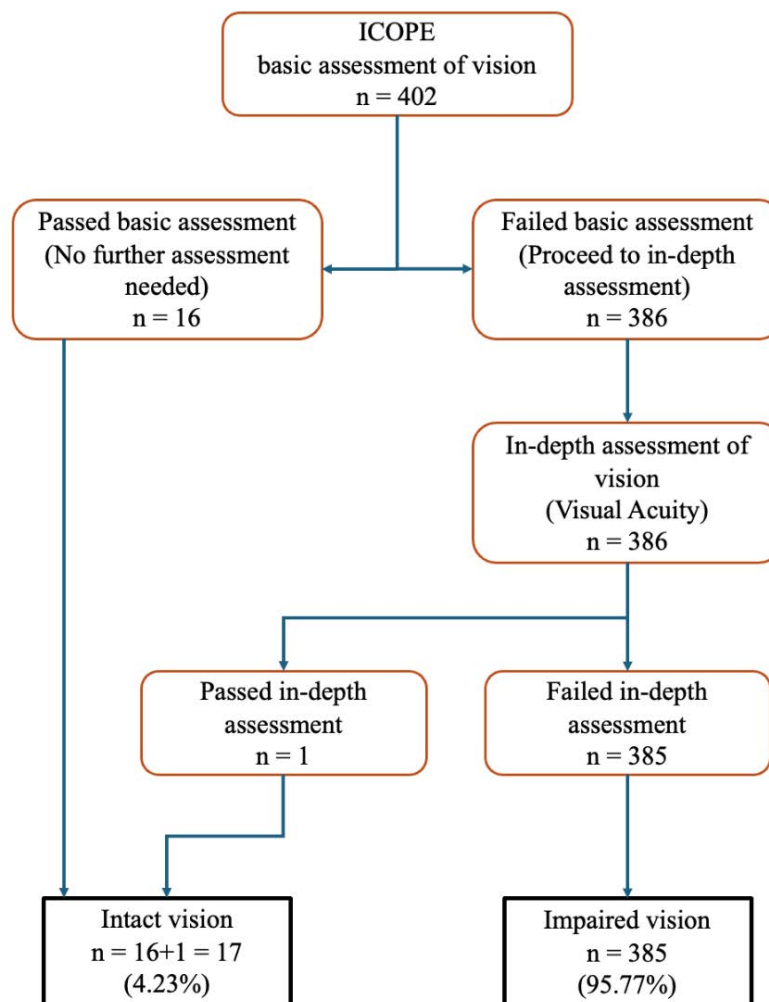


Figure 2. ICOPE Vision assessment pathway

ICOPE Hearing capacity assessment pathway:

Figure 3 illustrates the pathway for hearing capacity assessment. Of the 402 participants enrolled in the basic assessment of hearing capacity, 313 passed the basic assessment and were considered to have no hearing impairment. The remaining 89 participants underwent an in-depth assessment using Pure Tone Audiometry with the ‘Hearing Test Pro’ application. Of the 89 participants, 62 passed the in-depth assessment and were classified as having no hearing impairment. Combining the basic and in-depth assessments, 375 (93.28%) participants were found to have no hearing impairment, while 27 (6.72%) were identified as having hearing impairment.

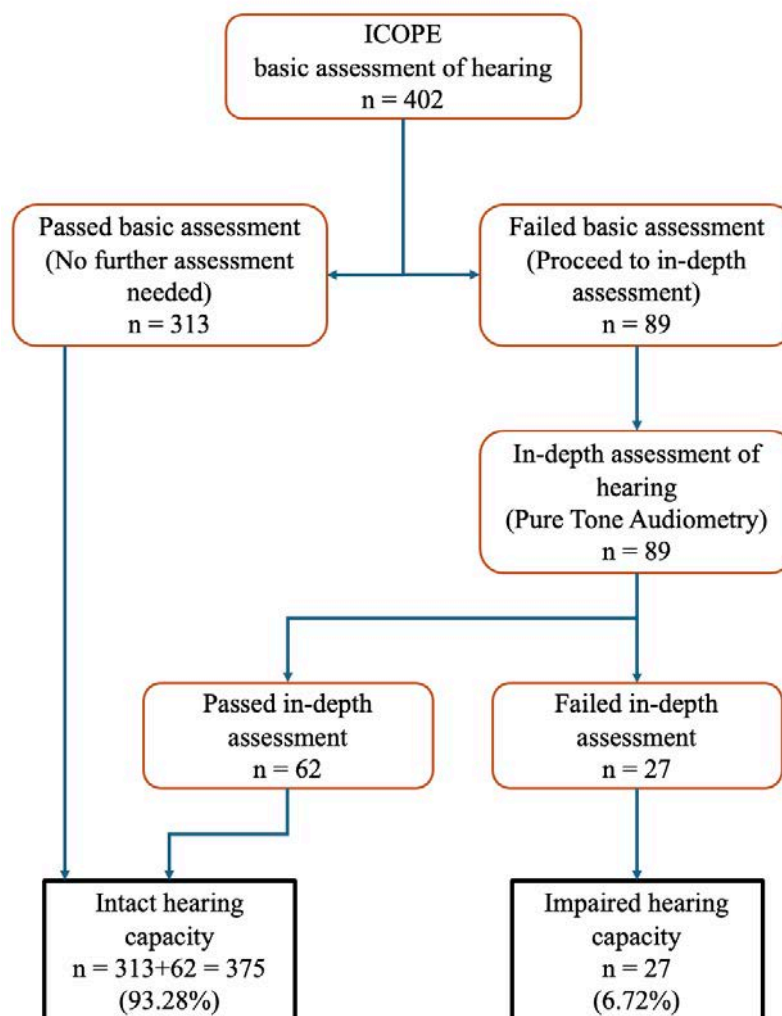


Figure 3. ICOPE Hearing capacity assessment pathway

Prevalence of vision and hearing impairment:

Among the 402 participants, 95.77% had vision impairment, and 6.72% had hearing impairment in both ears ([Figure 4](#)). Females had a higher proportion of vision (male: 94.01%; female: 97.84%) and hearing impairments (male: 4.61%; female 9.19%) than their male counterparts.

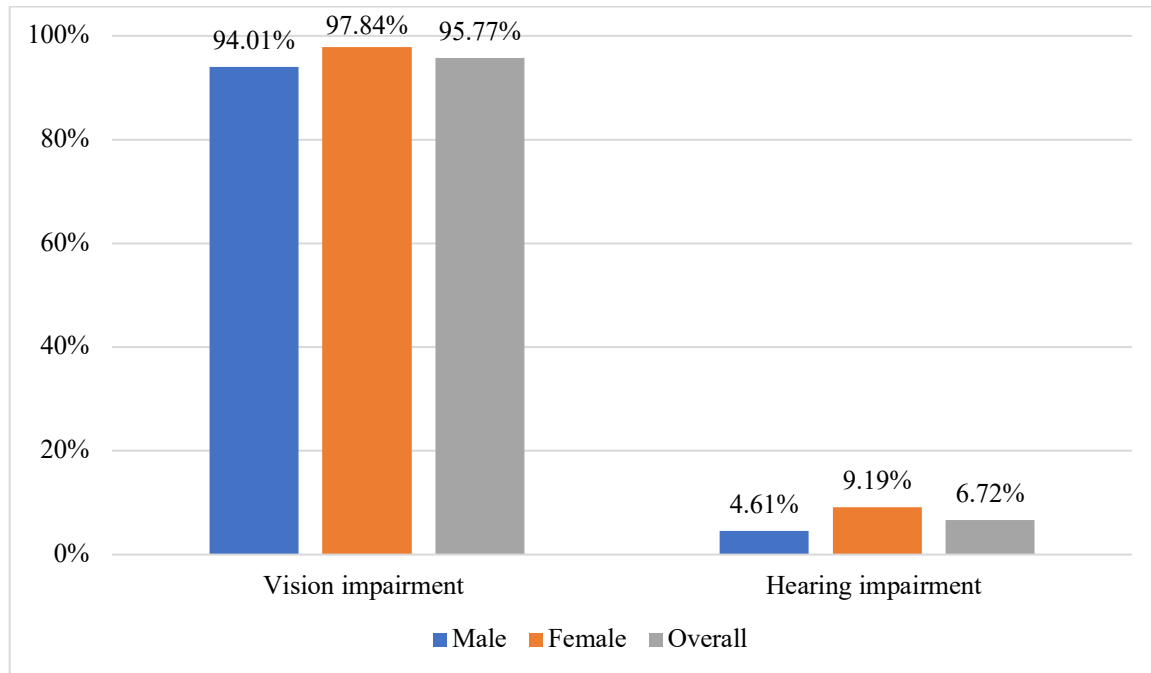


Figure 4. Prevalence of vision and hearing impairment among older adults

Table 6. Prevalence of hearing impairment by different key characteristics

Characteristics	Total n	Both ears n (%)	At least one ear n (%)
Age in years			
<70 years	258	7 (2.71)	20 (7.75)
≥70 years	144	20 (13.89)	43 (29.86)
Sex			
Male	217	10 (4.61)	27 (12.44)
Female	185	17 (9.19)	36 (19.46)
Marital status			
Currently married	242	11 (4.55)	27 (11.16)
Other than currently married	160	16 (10.00)	36 (22.50)
Religion			
Islam	193	11 (5.70)	28 (14.51)
Other than Islam	209	16 (7.66)	35 (16.75)
Education			
No formal schooling	271	23 (8.49)	45 (16.61)
Formal schooling	131	4 (3.05)	18 (13.74)
Occupation			
Employed	213	4 (1.88)	20 (9.39)
Homemaker/unemployed	189	23 (12.17)	43 (22.75)
Household wealth tertile			
Low	166	12 (7.23)	29 (17.47)
Middle	106	6 (5.66)	17 (16.04)
High	130	9 (6.92)	17 (13.08)
Involvement with income generating activity			
No	164	22 (13.41)	39 (23.78)
Yes	238	5 (2.10)	24 (10.08)
Smoking			
Yes	112	6 (5.36)	17 (15.18)
No	290	21 (7.24)	46 (15.86)

Characteristics	Total n	Both ears n (%)	At least one ear n (%)
Smokeless tobacco consumption			
Yes	192	9 (4.69)	27 (14.06)
No	210	18 (8.57)	36 (17.14)
Tobacco consumption in any form			
Yes	260	13 (5.00)	37 (14.23)
No	142	14 (9.86)	26 (18.31)
Physical activity			
Inadequate (<600 MET min/week)	166	15 (9.04)	35 (21.08)
Adequate ($\geq$ 600 MET min/week)	236	12 (5.08)	28 (11.86)
Sedentary time category			
$\leq$ 7 hours/day	192	10 (5.21)	20 (10.42)
>7 hours/day	210	17 (8.10)	43 (20.48)
Sleep status			
Not adequate sleep	276	21 (7.61)	44 (15.94)
Adequate sleep	126	6 (4.76)	19 (15.08)
Alcohol consumption			
No	385	26 (6.75)	61 (15.84)
Yes	17	1 (5.88)	2 (11.76)
Cooking fuel			
Unclean	384	26 (6.77)	61 (15.89)
Clean	18	1 (5.56)	2 (11.11)
Fruit and vegetable consumption			
Adequate ($\geq$ 5 servings/day)	42	3 (7.14)	4 (9.52)
Inadequate (<5 servings/day)	360	24 (6.67)	59 (16.39)
Dietary diversity			
Adequate ($\geq$ 5 food-groups/day)	137	6 (4.38)	16 (11.68)
Inadequate (<5 food-groups/day)	265	21 (7.92)	47 (17.74)
Nutritional status			
Normal	100	5 (5.00)	12 (12.00)
At risk of malnutrition	216	12 (5.56)	35 (16.20)

Characteristics	Total n	Both ears n (%)	At least one ear n (%)
Malnourished	86	10 (11.63)	16 (18.6)
Food security status			
Secure	247	19 (7.69)	43 (17.41)
Insecure	155	8 (5.16)	20 (12.90)
BMI category			
Underweight	112	11 (9.82)	25 (22.32)
Normal	187	11 (5.88)	26 (13.90)
Overweight/obese	103	5 (4.85)	12 (11.65)
Hypertension			
No	242	16 (6.61)	36 (14.88)
Yes	160	11 (6.88)	27 (16.88)
Diabetes			
No	368	24 (6.52)	58 (15.76)
Yes	34	3 (8.82)	5 (14.71)
Chronic respiratory disease			
No	313	21 (6.71)	49 (15.65)
Yes	86	5 (5.81)	13 (15.12)
External ear abnormality			
No	372	17 (4.57)	37 (9.95)
Yes	30	10 (33.33)	26 (86.67)
Level of depression severity			
No to minimal	214	10 (4.67)	25 (11.68)
Mild	105	10 (9.52)	22 (20.95)
Moderate to severe	83	7 (8.43)	16 (19.28)
Cognitive impairment levels			
No	182	6 (3.30)	17 (9.34)
Mild	136	9 (6.62)	24 (17.65)
Moderate to severe	84	12 (14.29)	22 (26.19)
Activities of daily living			
Dependent	99	8 (8.08)	15 (15.15)

Characteristics	Total n	Both ears n (%)	At least one ear n (%)
Independent	303	19 (6.27)	48 (15.84)
Instrumental activities of daily living			
Dependent	339	27 (7.96)	58 (17.11)
Independent	63	0 (0.00)	5 (7.94)
Meal companionship			
Alone	158	10 (6.33)	24 (15.19)
With others	102	11 (10.78)	22 (21.57)
With spouse	142	6 (4.23)	17 (11.97)

Factors associated with distance vision:

Table 7 is the adjusted logistic regression model, showing factors that were associated with impairment of distant vision. In the model, we found that age was associated with distance vision (aOR:3.59, 95% CI: 1.89-6.8, $p < 0.001$). Hypertension was also associated with distant vision (aOR: 0.55, 95% CI: 0.33 - 0.91, $p = 0.022$). Participants with hypertension had lower odds of having impaired distance vision. Fruit and vegetable consumption was found to be statistically significant with distance vision (aOR: 2.24, 95% CI: 1.07 - 4.7, $p = 0.032$). Sex, occupation, DM, CRD, cognition, and dietary diversity were not significantly associated with distance vision.

Factors associated with hearing (At least one ear):

Table 7 is the adjusted logistic regression model, showing factors that were associated with impairment of hearing in at least one ear. The table showed that age was associated with hearing impairment (aOR: 4.73, 95% CI: 2.54 – 8.81, $p < 0.001$). Sex, occupation, diabetes, hypertension, chronic respiratory disease, cognition, and household food security were not significantly associated with hearing. However, dietary diversity was significantly associated with hearing impairment in at least one ear (aOR: 2.07, 95% CI: 1.05 - 4.08, $p = 0.035$).

Table 7. Adjusted logistic regression models to find the associated factors of impairment of distant vision and hearing impairment (At least one ear)

*Multivariable logistic regression models were fitted for Distant vision and Hearing (At least one ear) separately. The adjusted Odds Ratio (aOR) presented under each of the outcomes in the following table correspond to respective models

Characteristics	Distant vision		Hearing (At least one ear)	
	aOR (95% CI)	p-value	aOR (95% CI)	p-value
Age in years				
<70 years	Ref		Ref	
≥70 years	3.59 (1.89, 6.8)	<0.001	4.73 (2.54, 8.81)	<0.001
Sex				
Male	Ref		Ref	
Female	1.66 (0.83, 3.31)	0.148	1.89 (0.83, 4.34)	0.132
Occupation				
Employed	Ref		Ref	
Homemaker/unemployed	1.64 (0.82, 3.28)	0.164	1.19 (0.51, 2.79)	0.681
Diabetes				
No	Ref		Ref	
Yes	0.83 (0.35, 1.96)	0.668	1 (0.33, 3)	0.996
Hypertension				
No	Ref		Ref	
Yes	0.55 (0.33, 0.91)	0.022	1.04 (0.56, 1.95)	0.893
Chronic respiratory disease				
No	NA	NA	Ref	
Yes	NA	NA	0.68 (0.31, 1.47)	0.325
Cognitive impairment levels				
No	Ref		NA	NA

Characteristics	Distant vision		Hearing (At least one ear)	
	aOR (95% CI)	p-value	aOR (95% CI)	p-value
Mild	1.15 (0.66, 2.02)	0.623	NA	NA
Moderate to severe	1.55 (0.71, 3.4)	0.275	NA	NA
Food security status				
Secure	NA	NA	Ref	
Insecure	NA	NA	0.59 (0.3, 1.14)	0.117
Fruit and vegetable consumption				
Adequate (≥ 5 servings/day)	Ref		NA	NA
Inadequate (< 5 servings/day)	2.24 (1.07, 4.7)	0.032	NA	NA
Dietary diversity				
Adequate (≥ 5 food-groups/day)	Ref		Ref	
Inadequate (< 5 food-groups/day)	0.81 (0.47, 1.4)	0.455	2.07 (1.05, 4.08)	0.035

Chapter 5: Discussion

Summary of Key Findings

The primary aim of this study was to assess the vision and hearing status of older adults (aged ≥ 60 years). Our study revealed that 95.77% of the older adults had vision impairment, either distance vision, near vision, or both. The study also found that the prevalence of hearing impairment was 6.72% which is lower than the national prevalence. When it comes to sex, females were more likely to have both vision and hearing impairment than males. We found that 97.84% of the females had vision impairment and their males had 94.01%. On the other hand, 9.19% of the females had hearing impairment, but the prevalence among males was 4.61%. Those with a history of formal schooling had a comparatively lower proportion of vision and hearing impairments. The participants mentioning inadequate fruit and vegetable consumption had higher odds (aOR: 2.24, 95% CI: 1.07 – 4.7, $p = 0.032$) of distant vision impairment than the others. The participants with inadequate dietary diversity had higher odds (aOR: 2.07, 95% CI: 1.05 - 4.08, $p = 0.035$) of hearing impairment.

Discussion of Findings

A higher prevalence of vision impairment was found with increasing age, which is consistent with other studies (Shakoor et al., 2022). Many clinical studies have found that hypertension is associated with visual impairment, as it increases the risk of retinopathy and other vascular diseases (Baye Ashenef et al., 2023). However, this study found that hypertensive participants had a relatively lower odds of visual impairment, which requires further exploration. The adjusted regression model showed that adequate fruit and vegetable consumption was significantly associated with vision. Participants who reported inadequate fruit and vegetable consumption had 2.24 times the odds of developing visual impairment. This finding reflects the importance of micronutrients and antioxidants for maintaining ocular function in the study area aligning with the past studies (Boeing et al., 2012; Fan et al., 2023). Many studies have shown an association between diabetes mellitus and vision, but this study did not find any significant association with diabetes.

The other primary outcome of this study was hearing impairment. Studies have shown that ageing is associated with increased hearing impairment (Liu & Yan, 2007). This study also found that increasing age is an important associated factor of hearing loss. Multiple studies have found that

diverse dietary patterns and healthy nutritional practices are effective in preventing age-related hearing impairment (Du et al., 2025; Shen et al., 2024). Similarly, the present study found a significant positive association between dietary diversity and hearing impairment.

Strengths of the Study

The main strength of this study is that it is the first comprehensive study to assess vision and hearing capacity using the ICOPE guidelines. The study design is very suitable for the research objectives in a short period of time. In addition, the quality of the data was very strong, as the data collectors were very experienced. They also received extensive training and real field exposure to familiarize themselves with the study and avoid mistakes in the final data collection. The quality was also frequently checked.

Limitations of the Study

However, our study had some limitations. First, as the study design was cross-sectional, we could not establish any causal relationship or temporality with the associated factors. Second, we conducted the study in only three Wards of a single Union of the Birganj sub-district of Dinajpur; therefore, the study findings may not be generalizable to other parts of the country. It would have been more accurate if we had included other areas in the study. Third, we assessed visual status through visual acuity tests only but could not check for refractive errors. For hearing assessment, we conducted pure-tone audiometry using a smartphone-based application. Although it was found to be effective for community-level hearing assessment, a conventional audiometer may provide more accurate results (Aremu, 2018). Fourth, for social care, support, and risk of abuse assessment, we maintained an observation checklist. However, a qualitative approach would have been more insightful. Therefore, a mixed-method study could be a better study design.

Implications for Public Health Policy and Practice

One of the most important public health implications is that it provides evidence for potential feasibility of the ICOPE-based care pathway in community settings of Bangladesh. Bangladesh has a National Healthy Aging Strategy and Action Plan; however, geriatric care services are not available at the primary healthcare level. The extremely high prevalence of vision impairment among older adults indicates the urgent need of vision screening and management at the primary care settings

through ICOPE-based geriatric care pathway. Although the hearing impairment was comparatively lower than the national prevalence among, it remains significant for maintaining healthy ageing and functional ability of the older adults. Integrating vision and hearing assessments following ICOPE-based care pathways could help early identification and management of vision and hearing capacity decline. Future interventions should be designed based on these findings to prevent vision and hearing capacity decline and ensure healthy ageing.

Chapter 6: Conclusion and Recommendations

6.1 Conclusion

We conclude that the prevalence of vision impairment was 95.77% among older adults (aged ≥ 60 years). The prevalence of hearing impairment was 6.72%, which is lower than the national prevalence. Age, hypertension, and fruit and vegetable consumption were significantly associated with visual impairment, whereas age, and dietary diversity were significant factors for hearing impairment. The higher odds of vision impairment among non-hypertensive participants and the lower odds of vision impairment among diabetic individuals require further research. Bangladesh already has its National Healthy Ageing Strategy and Action Plan, however, the findings from this study will help design targeted services for older adults.

6.2 Recommendations

Policymakers should integrate vision and hearing screening into primary care settings in rural areas. Additionally, corrective devices such as glasses and hearing aids should be available at no cost or minimal cost. They should also arrange capacity-building sessions for providers on vision and hearing screening, management, and geriatric care.

Program implementers should focus on establishing permanent corners for vision and hearing screening and referral in primary care settings. Also strengthen the linkage between primary care settings and specialized centres for timely diagnosis and treatment of critical cases.

Future research should explore the barriers to accessing existing services in government health facilities. Further research is needed to establish the causal association with the factors associated with vision and hearing impairment and to evaluate the effectiveness of the ICOPE-based care pathway in primary care settings in Bangladesh.

Declaration of GenAI Use

I, Ashish Roy, declare that in preparing this assignment, I used ChatGPT (OpenAI, version GPT 5.5) as a support tool to assist with brainstorming ideas, organising the structure of my writing, 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 results, or produce final academic content. I have also used Grammarly to avoid grammatical errors. 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

Section A: Household Interview Questionnaire

Questionnaire administration		
Be completed by the Researcher administering the questionnaire after participant consented		
Admin 0	Questionnaire version	1.0
Admin 1	Interviewer name	
Admin 2	Interviewer ID	
Admin 3	Date	DD / MM / YYYY
Admin 4	Time interview started	HH : MM
Admin 15	Household number	
Admin 14	Do you agree to participate in this study?	1. Yes 2. No
STUD YID	Participant ID <i>Instructions: 10 digits</i>	_____

Admin 5	Participant name	
Admin 6	Participant NID	
Admin 7	Participant's father's name	
Admin 8	Participant's spouse's name	
Address and contact of the participant		
Admin 9	Ward	
Admin 10	Village	
Admin 10	Contact number	
Sociodemographic characteristics <i>Hello, my name is X. I have some questions to go through with you. This questionnaire will take about 1 hour to complete. First, I would like to ask you about your background and personal circumstances</i>		
Demo1	What is your date of birth? <i>[Check participant ID if available. If the participants cannot recall</i>	DD / MM / YYYY

	<i>their birthday, probe, and try to make a best guess using anchoring historical events, or other approaches as appropriate]</i>	
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 <u>hard check</u> 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 <u>soft check</u> 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? <i>[Choose one that applies]</i>	☐ 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. Post graduate degree
Demo8	What is your current marital status? <i>[Choose one that applies]</i>	☐ 1. Never married ☐ 2. Currently married ☐ 3. Divorced ☐ 4. Widowed ☐ 5. Separated (without getting divorced) ☐ 6. Cohabiting
Demo9	What is your religion? <i>[Choose one that applies]</i>	☐ 1. Muslim ☐ 2. Hindu ☐ 3. Buddhist

		☐ 4. Christian ☐ 5. Other → specify _____
Demo1 0	Which of the following best describes your main work status over the past 12 months? <i>[Choose one that applies]</i>	☐ 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
Demo1 1	Where do people cook in your living space? <i>[Choose one that applies]</i>	☐ 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

Demo1 2	What ventilation is there in the area where the cooking is done? <i>[Choose one that applies]</i>	☐ 1. Stove has chimney or exhaust fan ☐ 2. Window used for ventilation ☐ 3. No ventilation ☐ 4. Not known ☐ 5. Other → Specify _____	
Demo1 3	What is the primary fuel used for cooking in your household? <i>[Choose one that applies, use showcard]</i>	☐ 1. Electricity ☐ 2. Natural gas ☐ 3. Liquefied 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 _____	
Demo1 4	Does your household have the following items?	Demo14a. Electricity Demo14b. Television Demo14c. Electric fan	☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No

		Demo14d. Wardrobe/Amirah Demo14e. Refrigerator	☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No
Demo1 5	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
Demo1 6	With whom do you live?	☐ 1. Living alone ☐ 2. Living with spouse/family	
Demo1 7	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 _____	
Demo1 8	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 <i>Now I am going to ask you some questions about tobacco use.</i>			
Tob1	Do you currently smoke any tobacco products, such as cigarettes, cigars,	☐ 1. Yes ☐ 2. No <i>[go to Tob6]</i>	

	or pipes? <i>[use showcard]</i>		
Tob2	How old were you when you first started smoking?	_____ Years ☐ 99. Don't know [PROGRAM: Trigger <u>hard check</u> 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 <u>daily</u> ?	☐ 1. Yes ☐ 2. No	
On average, how many of the following products do you smoke each day? <i>[If products are smoked less than daily by daily smokers, enter weekly consumption.]</i>			
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 <i>[go to Tob9 – regardless of the answer to this question]</i>	
Tob6	In the past, did you ever smoke any tobacco products?	☐ 1. Yes ☐ 2. No <i>[go to Tob9]</i>	
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”]
<i>Smokeless tobacco use</i>		
Tob9	Do you currently use any smokeless tobacco products, such as snuff, chewing tobacco, or betel with tobacco? <i>[use showcard]</i>	☐ 1. Yes ☐ 2. No <i>[go to Tob13]</i>

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 <i>Zorda</i> or other forms of tobacco	_____ per day	_____ per week
Tob12e	Other	_____ per day	_____ per week
Tob12f	Other, specify	_____ <i>[Specify smokeless tobacco not listed above]</i>	
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 <i>[go to Tob15b – regardless of the answer to this question]</i>	
Tob13	In the past, did you ever use smokeless tobacco products?	☐ 1. Yes ☐ 2. No <i>[go to Tob16, regardless of the answer to this question]</i>	
Tob13a	In the past, did you ever use smokeless tobacco products <u>daily</u> ?	☐ 1. Yes ☐ 2. No <i>[go to Tob15b]</i>	
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	☐ 1. Yes ☐ 2. No

	<u>closed area</u> of your home?	
Tob17	During the last 30 days, did someone smoke near you, in a <u>closed area</u> of your workplace (e.g., in the office)?	☐ 1. Yes ☐ 2. No
Alcohol consumption <i>The next questions ask about consumption of alcohol</i>		
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 <i>[go to Diet1]</i> ☐ 3. Never <i>[go to Diet1]</i>
Alc2	How frequently have you had at least one standard drink? <i>[use showcard]</i>	☐ 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 <u>within the past 30 days?</u>	☐ 1. Yes ☐ 2. No <i>[go to Diet1]</i>

Alc4	During past 30 days, when you drink alcohol, on average, how many standard drinks do you have during one occasion?	_____ Drinks
Dietary intake <i>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.</i>		
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, sweetened milk, sweetened tea or coffee) on most days.	☐ 1. Yes ☐ 2. No
Diet6	How often do you eat <u>foods high in sugar (e.g., sweets, desserts)</u> ?	☐ 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 <i>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.</i> <i>[Read this opening statement out loud. Don't forget to use the showcard which will help the respondent when answering to the questions.]</i>		
Salt1	How often do you <u>add salt or a salty sauce such as soy sauce</u> to your food right before you eat it or as you are eating it? <i>[select only one, use showcard]</i>	☐ 1. Always ☐ 2. Often ☐ 3. Sometimes ☐ 4. Rarely ☐ 5. Never ☐ 99. Don't know
Salt2	How often is <u>salt, salty seasoning or a salty sauce added</u> 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 <u>processed food high in salt</u>? 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	<u>How much salt or salty sauce</u> do you think you consume?	☐ 1. Always ☐ 2. Often ☐ 3. Sometimes ☐ 4. Rarely ☐ 5. Never ☐ 99. Don't know

Salt5	<u>How much salt you need</u> <u>in your household</u> for food or food preparation in one week?	_____ spoon Or _____ gram
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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 <i>[carrying or lifting heavy loads, digging or construction work]</i>? <i>[INSERT EXAMPLES]</i> <i>(USE SHOWCARD)</i> <i>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.</i>	☐ 1. Yes ☐ 2. No <i>[go to PA4]</i>
PA2	In a typical week, on how many days do you do vigorous-intensity activities as part of your work? <i>“Typical week” means a week when the participant is engaged in his/her usual activities. Valid responses range from 1-7.</i>	_____ Days [PROGRAM: Range 0 - 7]

PA3	How much time do you spend doing vigorous-intensity activities at work on a typical day? <i>Ask the participant to think of a typical day he/she can recall easily in which he/she engaged in vigorous-intensity activities at work. The participant should only consider those activities undertaken continuously. Probe very high responses (over 4 hrs) to verify.</i>	_____ Minutes [PROGRAM: Range 0 - 1440]
PA4	Does your work involve moderate-intensity activity, that causes small increases in breathing or heart rate such as brisk walking <i>[or carrying light loads]</i>? <i>[INSERT EXAMPLES] (USE SHOWCARD)</i> <i>Ask the participant to think about moderate-intensity activities at work</i>	☐ 1. Yes ☐ 2. No <i>[go to PA4]</i>

	<i>only. Activities are regarded as moderate intensity if they cause small increases in breathing and/or heart rate.</i>	
PA5	In a typical week, on how many days do you do moderate-intensity activities as part of your work? <i>“Typical week” means a week when the participant is engaged in his/her usual activities. Valid responses range from 1-7.</i>	_____ Days [PROGRAM: Range 0 - 7]
PA6	How much time do you spend doing moderate-intensity activities at work on a typical day? <i>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</i>	_____ Minutes [PROGRAM: Range 0 - 1440]

	<i>undertaken continuously.</i> <i>Probe very high responses (over 4 hrs) to verify.</i>	
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. <i>[Insert other examples if needed]</i> <i>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.</i>		
PA7	Do you walk or use a bicycle (<i>pedal cycle</i>) to get to and from places? <i>Select the appropriate response.</i>	☐ 1. Yes ☐ 2. No <i>[go to PA10]</i>
PA8	In a typical week, on how many days do you walk or bicycle to get to and from places? <i>“Typical week” means a week when the participant is engaged in his/her usual activities. Valid responses range from 1-7.</i>	_____ Days [PROGRAM: Range 0 - 7]
PA9	How much time do you spend walking or	_____ Minutes [PROGRAM: Range 0 - 1440]

	bicycling for travel on a typical day? <i>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.</i>	
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) <i>[Insert relevant terms]</i>. <i>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.</i>		
PA10	Do you do any vigorous-intensity sports, fitness or recreational (leisure) activities that cause large increases in breathing or	☐ 1. Yes ☐ 2. No <i>[go to PA13]</i>

	heart rate like <i>[running or football]</i>? <i>[INSERT EXAMPLES]</i> <i>(USE SHOWCARD)</i> <i>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.</i>	
PA11	In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational (<i>leisure</i>) activities? <i>“Typical week” means a week when the participant is engaged in his/her usual activities. Valid responses range from 1-7.</i>	_____ Days [PROGRAM: Range 0 - 7]
PA12	How much time do you spend doing vigorous-intensity sports, fitness or	_____ Minutes [PROGRAM: Range 0 - 1440]

	recreational activities on a typical day? <i>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.</i>	
PA13	Do you do any moderate-intensity sports, fitness or recreational (<i>leisure</i>) activities that cause a small increase in breathing or heart rate such as brisk walking, [cycling, swimming, volleyball]? <i>[INSERT EXAMPLES] (USE SHOWCARD)</i> <i>Ask the participant to think about recreational moderate-intensity</i>	☐ 1. Yes ☐ 2. No <i>[go to PA16]</i>

	<i>activities only. Activities are regarded as moderate intensity if they cause small increases in breathing and/or heart rate.</i>	
PA14	In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational (<i>leisure</i>) activities? <i>“Typical week” means a week when the participant is engaged in his/her usual activities. Valid responses range from 1-7.</i>	_____ Days [PROGRAM: Range 0 - 7]
PA15	How much time do you spend doing moderate-intensity sports, fitness or recreational (<i>leisure</i>) activities on a typical day? <i>Ask the participant to think of a typical day he/she can recall easily in which he/she engaged in recreational moderate-intensity activities. The</i>	_____ Minutes [PROGRAM: Range 0 - 1440]

	<i>participant should only consider those activities undertaken continuously.</i> <i>Probe very high responses (over 4 hrs) to verify.</i>	
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, piau, 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	COM 1 Hypertension COM 2 Diabetes COM 3 asthma COM 4 Chronic obstructive lung disease (COPD) COM 5 Cancer	☐ 1. Yes ☐ 2. No

	any of the following conditions?	COM 6 Stroke/ mini-stroke (TIA) COM7 Heart disease COM8 Depression/mental health condition COM9 Anxiety/mental health condition COM10 Dementia/significant memory problems COM11 Delirium/being unable to think or speak clearly COM12 Arthritis or chronic joint disease COM13 Osteoporosis or fragile bones COM14 Anaemia COM15 Eye condition affecting vision (e.g., cataract, glaucoma)? COM16 Hearing loss COM17 Urinary incontinence COM18 Sarcopenia COM19 Hypothyroidism COM20 Parkinson disease COM21 Inflammatory bowel diseases COM22 Peptic ulcers		
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 centre 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	1 =Yes	[If ‘2’ or ‘3’ please

		prescription of doctor or other health care provider to control hypertension/ raised blood pressure? <i>Instruction: Record correct answer</i>	2= Stopped medication as per doctor's advice 3= No	go to next section]
	HTN7	In the last 30 days, have you missed taking your prescribed medicine? <i>Instruction: Medicine should be taken according to doctor's prescription or advice of registered health care provider only.</i>	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? <i>Instruction: Multiple responses possible.</i>	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 centre	

			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? <i>Instruction: Record correct answer</i>	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? <i>Instruction: Medicine should be taken according to doctor’s prescription or advice of registered health care provider only.</i>	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?	1 = Don't think taking drug is necessary	

		Instruction: Multiple responses possible.	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 centre 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? <i>Instruction: Record correct answer</i>	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? <i>Instruction: Medicine should be taken according to doctor’s</i>	1 = Yes, frequently 2 = Yes, occasionally 3= I was able to take regularly	[If ‘1’ or ‘2’ please go to ‘Asthm8’]

		<i>prescription or advice of registered health care provider only.</i>		
	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 centre 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? <i>Instruction: Record correct answer</i>	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? <i>Instruction: Medicine should be taken according to doctor's prescription or advice of registered health care provider only.</i>	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? <i>Instruction: Multiple responses possible.</i>	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 = Oesophagus 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 centre 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	1 =Yes 2= Stopped medication as per doctor's advice	[If '2' or '3' please go to

		health care provider to control cancer? <i>Instruction: Record correct answer</i>	3= No	next section]
	Cancer8	In the last 30 days, have you missed taking your prescribed medicine? <i>Instruction: Medicine should be taken according to doctor's prescription or advice of registered health care provider only.</i>	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? <i>Instruction: Multiple responses possible.</i>	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 centre 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? <i>Instruction: Record correct answer</i>	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? <i>Instruction: Medicine should be taken according to doctor's prescription or advice of registered health care provider only.</i>	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? <i>Instruction: Multiple responses possible.</i>	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 centre 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	

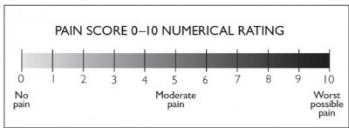
			99 = Others (Specify)	
	GRI4	How soon do you usually seek care after noticing a health problem?	1= Immediately (within 24–48 hours) 2= Within 1 week 3= After symptoms worsen 4= Do not seek care	
	GRI5	Have you ever received any of the following services? <i>Instruction: Multiple responses possible.</i>	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? <i>Instruction: Record correct answer</i>	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? <i>Instruction: Medicine should be taken according to doctor's prescription or advice of registered health care provider only.</i>	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? <i>Instruction: Multiple responses possible.</i>	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)	
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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 <i>[please remind participant to bring the regularly used medication and/or prescription to examination. Please record the information carefully – an example was given]</i>	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]

MMAS 1	Do you ever forget to take your medication?	☐ 1. Yes ☐ 2. No
MMAS 2	Do you ever have problems remembering to take your medication?	☐ 1. Yes ☐ 2. No
MMAS 3	When you feel better, do you sometimes stop taking your medicine?	☐ 1. Yes ☐ 2. No
MMAS 4	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 you have fallen will 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		
Vision		
APS1	Do you use spectacles for reading or distance vision?	☐ Yes ☐ No
APS2	Do you use magnifiers or other low-vision aids?	☐ Yes ☐ No
APS3	Do you use audio books?	☐ Yes ☐ No
APS4	Do you use talking watches?	☐ Yes ☐ No
APS5	Do you use text-to-speech features?	☐ Yes ☐ No
APS6	Do you use a white cane for vision impairment?	☐ Yes ☐ No

APS7	Do you use large digit clocks/large-print labels?	☐ Yes ☐ No
Hearing		
APS8	Do you use hearing aids?	☐ Yes ☐ No
APS9	Have you been advised for cochlear implants due to severe hearing loss?	☐ 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 correct time. 2. Takes responsibility if medication is prepared in advance in separate dosages. 3. Is not capable of dispensing 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?]		
EQ5D5L1	Problems with your mobility (ability to walk about)	☐ 1. None ☐ 2. Slight ☐ 3. Moderate ☐ 4. Severe ☐ 5. Unable

EQ5D5L2	Problems with your ability to self-care (wash and dress)	☐ 1. None ☐ 2. Slight ☐ 3. Moderate ☐ 4. Severe ☐ 5. Unable
EQ5D5L3	Problems with your ability to do usual activities (work, study, family or leisure activities)	☐ 1. None ☐ 2. Slight ☐ 3. Moderate ☐ 4. Severe ☐ 5. Unable
EQ5D5L4	Feelings of pain or discomfort	☐ 1. None ☐ 2. Slight ☐ 3. Moderate ☐ 4. Severe ☐ 5. Unable
EQ5D5L5	Feelings of anxiety or depression	☐ 1. None ☐ 2. Slight ☐ 3. Moderate ☐ 4. Severe ☐ 5. Unable
EQ5D5L6	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.]

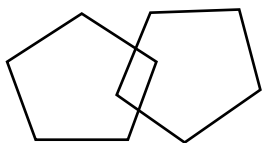
		Interviewee's Response	Correct	Wrong	Interpretation
IBAMSE4A	Friday		1	0	
IBAMSE4B	Thursday		1	0	
IBAMSE4C	Wednesday		1	0	
IBAMSE4D	Tuesday		1	0	
IBAMSE4E	Monday		1	0	

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:

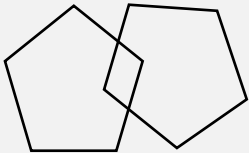
(Showing a pencil) What is this?

	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 <i>Finally, some questions about thinking and mood. Over the last 2 weeks, how often have you been bothered by any of the following problems?</i>		
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

Basic Assessment of Vision		
Filter question		
FV1	Do you have any problems with your eyes: difficulties in seeing far or near (with spectacles if normally worn), eye pain or discomfort?	☐ 1. Yes ☐ 2. No
FV2	Are currently using steroids or eye medications?	☐ 1. Yes ☐ 2. No
[If answer is 'Yes' (FV1= 1 or FV2 =1), proceed for in-depth assessment]		
Screening test		

BAV1	Is there any external eye abnormality found during the external eye check? (If yes, go to BAV2 and BAV3)	☐ 1. Yes ☐ 2. No
BAV2	Which eye? (Select multiple)	☐ Right ☐ Left ☐ Both
BAV3	Which of the following abnormalities found?	☐ Pus/discharge ☐ Redness/abnormalities of the conjunctiva ☐ Abnormal haziness or red on the coloured part (iris/cornea/pupil) of the eye ☐ Others
BAV4	Is distance vision less than 6/12 in either eye (with spectacles if normally worn) in distance vision test? Or Is the person unable to see N6 (with spectacles if normally worn) in near vision test?	☐ 1. Yes ☐ 2. No
[If answer is 'Yes' (BAV1= 1 or BAV4=1), proceed for in-depth assessment]		
In-Depth Assessment of Vision (Visual Acuity)		
IDAV1	Distance vision (Using WHO distance vision chart)	Right eye (OD): ____ / ____

		Left eye (OS): ____ / ____
IDAV2	Near vision (Using WHO near vision card)	Right eye (OD): N ____ Left eye (OS): N ____

Basic Assessment of Hearing		
Filter question		
FH1	Do you have a hearing problem? For those using a hearing aid(s) add, “even when using your hearing aid(s)”.	☐ 1. Yes ☐ 2. No
[If answer is ‘Yes’ (FH1= 1), proceed for in-depth assessment]		
Screening test		
BAH1	Does the person fail to respond at 35 dBHL at one or more frequencies in either ear during the ‘Screening audiometry’ test?	☐ 1. Yes ☐ 2. No
[If answer is ‘Yes’ (BAH1= 1), proceed for in-depth assessment]		
In-Depth Assessment of Hearing		
IDAH1	If there any abnormalities found during the otoscopic examination?	☐ 1. Yes ☐ 2. No

	(If yes, go to IDAH2 and IDAH3)	
IDAH2	Which ear? (Select multiple)	☐ Right ☐ Left ☐ Both
IDAH3	Which of the following abnormalities found? (Select multiple)	☐ Ear wax ☐ Pus/discharge ☐ Swelling and redness ☐ Foreign body ☐ Perforated ear drum ☐ Others
IDAH4	Is there any hearing impairment found in pure tone audiometry? (If yes, go to IDAH5)	☐ 1. Yes ☐ 2. No
IDAH5	What is the hearing threshold in pure tone audiometry?	☐ < 35 dB (Normal or mild hearing loss) ☐ 35 - < 80 dB (Moderate to severe hearing loss) ☐ ≥ 80 dB (Deafness)

Section B: Measurement

Blood sugar Test					
601	AGM_601	Interviewer ID			
602	AGM_602	Device ID			
603	AGM_603	Date & Time	 Hour : Minute		
604	AGM_604	How many hours has the participant been on an empty stomach?	 Hour		
Test Results					
605	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 measurement)					
No	Variable	Question	Responses	Code	Instructions
606	WAMA_606	Start Time of anthropometry	 Hr: Min		Use 24 hr format
607	WAMA_607	Weight Scale ID			
608	WAMA_608	Height Scale ID			

Anthropometry (Height, weight and waist circumference measurement)						
No	Variable	Question		Responses	Code	Instructions
609	WAMA_609	Clothing type during weight measurement		1 = Light clothing 2 = Slightly heavy clothing 3 = Heavy clothing		
610	WAMA_610	Name of measurer				
611	WAMA_611	Code of measurer				
No	Variable	Measurement	Measurement 1	Measurement 2	Measurement 3	
612	WAMA_612 A/B/C	Height (Cm)	A.	B.	C. . If A and B differs more than 0.5 cm, take 3rd measurement	
613	WAMA_613 A/B/C	Weight (Kg)	A.	B.	C. . If A and B differs more than 0.1kg, take 3rd measurement	

Anthropometry (Height, weight and waist circumference measurement)						
No	Variable	Question		Responses	Code	Instructions
614	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
615	WAMA_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
616	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	
617	WMBP_616	Blood Pressure (mm of Hg)	A. 	B. 	C. : 	

Anthropometry (Height, weight and waist circumference measurement)					
No	Variable	Question	Responses		Code Instructions
	A/B/C				Hr : Min
Measurement - 2 (Allow 1 minute interval between two measurements)					
618	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)					
619	WMBP_618 A/B/C	Blood Pressure (mm of Hg)	Systolic	Diastolic	Time of Measurement
			A. 	B. 	C. : Hr : Min
620	WMBP_619	Blood pressure measuring machine ID			
621	WMBP_620	Measurer's Name and Code			
622	WMBP_621	End Time of measuring blood pressure	: Hr: Min		Use 24 hr format

Anthropometry (Height, weight and waist circumference measurement)					
No	Variable	Question	Responses	Code	Instructions
[During any measurement, If Systolic BP $\geq$ 140 mm of Hg, Diastolic BP $\geq$ 90 mm of Hg - refer the respondent to appropriate health centre]					

Lung function Test						
Number	Variable	Name of the test	Responses			Instruction
623	APFM_62 2	Interviewer ID				
624	APFM_62	Device ID	_ _ _ _ . _ _ _ _			
625	APFM_62 4	Date & Time	_ _ _ _ : _ _ _ _ _ Hr: Min			Use 24 hr format
Expected PFR for the interviewee:						
Formula*:						
Females: $\text{PEF} = -1.454 (\text{Age}) + 2.368 (\text{Height})$						
Males: $\text{PEF} = -1.807 (\text{Age}) + 3.206 (\text{Height})$						
			Measurement 1	Measurement 2	Measurement 3	Comments
626	APFM_62 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				
627	APFM_626	Is salbutamol inhaler needed?	1 = Yes 2 = No			
			Measurment 1	Measurment 2	Measurment 3	Comments
628	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.			
629	APFM_628	Is spirometry test required?	1 = Yes 2 = No			
630	APFM_629	ID of the spirometry device		_ _ _ _		
			FVC	FEV 1	FEV 1/FVC	
631	APFM_630A	Measurment 1				
	APFM_630B	Measurment 2				
	APFM_630C	Measurment 3				

631	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			

Section C: Referral

No	Variable	Question	Responses	Code	Instructions
632	WAGM_632	Has the participant been referred?	1 = Yes 2 = No		If the answer is 'No' then go to the next section
633	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)_____		
634	WAGM_634	For which domain was the participant	1. Vision 2. Hearing		

		referred?			
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Appendix B: Informed Consent Form

Consent paper for study participants

Title: “Assessment of vision and hearing capacity of older adults: A cross-sectional study”

Protocol No. TBD	Version No. TBD	Date: TBD
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Principal Investigator: Ashish Roy

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 Ashish Roy, and I have come from BRAC James P Grant School of Public Health, BRAC University. Thank you for your interest in this project. Please read this information sheet carefully before deciding whether to participate. If you decide to participate, we will welcome you. Please inform us if you wish to participate in this study. Our contact details are provided 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:

To assess the status of vision and hearing capacity and identify the associated factors of their impairments among older adults aged ≥ 60 years in rural Bangladesh.

What will the participants be asked to do?

We are asking men and women aged ≥ 60 years from the Sujalpur Union of Birganj upazila of the Dinajpur district to participate in the study. No preference is shown to any ethnic or cultural group; we want everyone to be involved. We will collect data from a total of 452 participants. Data will be collected from the 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, vision, hearing, retinal imaging); iii. To provide a small amount of blood sample from the finger (1–2 drops). These procedures, which include interviews, household observations, and physical measurements, will take approximately 1 h 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 experience 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 materials will be destroyed.

Anonymity and confidentiality of the research data

We need your name and address to record your participation. Thereafter, your research data will be held in an anonymized format using numerical identifiers. Only senior members of the research team or their approved representatives will have access to the code linking your identity to the research data and samples. The research data and samples collected will be stored securely so 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. The 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 is completed,

according to the research governance guidelines. The Institutional Review Board of BRAC James P Grant School of Public Health, BRAC University, has the authority to access all research records.

Compensation

There will be no financial compensation for participating in the study. However, light snacks will be provided following the clinical measurements. In addition, undergoing a comprehensive health assessment will raise awareness of your health status and potentially identify unrecognized health issues. If any health issues are detected, you will be referred to the appropriate healthcare 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 Master of Public Health Program Thesis Fund and the Centre for Non-communicable Diseases and Nutrition project fund.

How does this affect my legal rights?

Participation in the study will not impact your legal rights or release the investigator, institution, sponsor, or their representatives from legal responsibility for negligence. For more information about your rights and protections, 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 to be technical. Please 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 feel free to contact the lead investigator:

Name: Ashish Roy, Title: Master 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: 01640153118;
Email: ashish.roy@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 your thumbprint and date the consent form given to you. You will receive a copy of this information sheet.

Do you give permission for the interview to be recorded?	Yes	No
Do you grant 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 the left thumb: _____ Date: / / 202__	Interviewer Name: _____ Signature: _____ Date: / / 202__
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