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## DEFINING THE HIDDEN BURDEN OF DISEASE IN RURAL COMMUNITIES IN BANGLADESH, CAMBODIA AND THAILAND: A CROSS-SECTIONAL HOUSEHOLD HEALTH SURVEY PROTOCOL

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## DEFINING THE HIDDEN BURDEN OF DISEASE IN RURAL COMMUNITIES IN BANGLADESH, CAMBODIA AND THAILAND: A CROSS-SECTIONAL HOUSEHOLD HEALTH SURVEY PROTOCOL

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### Abstract

#### Introduction

In low- and middle-income countries in Southeast Asia, the majority of the population resides in rural areas where the burden of diseases remains poorly understood, posing a challenge for effective healthcare prioritization and resource allocation. Addressing this knowledge gap, the South and Southeast Asia Community-based Trials Network (SEACTN) will undertake a prevalence survey, as one of the key initiatives of its first project- the Rural Febrile Illness project (RFI). This survey, alongside other RFI studies that explore fever etiology, leading causes of mortality, and establishing village and health facility maps and profiles, aims to provide an updated epidemiological background of the rural areas where the network is operational.

#### Methods and analysis

During 2022-2023, a cross-sectional household survey will be conducted across three SEACTN sites in Bangladesh, Cambodia, and Thailand. Using a two-stage cluster-sampling approach, we will employ a probability-proportional-to-size sample method for village, and a simple random sample for household, selection, enrolling all members from the selected households. Approximately 1500 participants will be enrolled per country. Participants will undergo questionnaire interview, physical examination and hemoglobin point-of-care testing. Blood samples will be collected and sent to central laboratories for

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3 analysis, to test for chronic and acute infectious diseases, and biomarkers associated with cardiovascular  
4 disease and diabetes. Prevalences will be presented as an overall estimate by country, and stratified and  
5 compared across sites and participants' sociodemographic characteristics. Associations between disease  
6 status, risk factors, and other characteristics will be explored.  
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## 8 Ethics and dissemination 9

10 This study protocol has been approved by the Oxford Tropical Research Ethics Committee, National  
11 Research Ethics Committee of Bangladesh Medical Research Council, the Cambodian National Ethics  
12 Committee for Health Research, the Chiang Rai Provincial Public Health Research Ethical Committee. The  
13 results will be disseminated via the local health authorities and partners, peer-reviewed journals, and  
14 conference presentations.  
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16 297/300  
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## 18 **Trial registration** 19

20 Clinicaltrials.gov, NCT05389540.  
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## 23 **Strengths and limitations** 24

- 25 • The study will utilize diverse methods (interviews, physical examinations, and laboratory tests)  
26 to gather extensive data on the prevalence, risk factors, healthcare utilization patterns of both  
27 communicable and non-communicable diseases
- 28 • The use of two-stage cluster sampling enables the sample to be representative of each study  
29 area.
- 30 • As an integrated component of the Rural Febrile Illness project, the findings will be synergized  
31 with outcomes of concurrent studies in these specified regions, offering a multidimensional  
32 overview of health and healthcare provision.
- 33 • The findings are specific to the selected rural areas, and should be interpreted with caution  
34 when considering broader implications for rural populations in the study countries.  
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## 40 **Introduction** 41

42 Life expectancy in Southeast Asia increased from 63 to 71 years between 2000 and 2019 (1). These positive  
43 changes can be attributed, in part, to advancements in the region's health systems, which have addressed  
44 traditional high-burden diseases, such as infectious diseases, maternal and neonatal health, and under 5  
45 mortality (2). Despite these improvements, the burden of traditionally significant diseases persists,  
46 particularly in rural areas. Furthermore, there is a transition in disease epidemiology due to rapidly  
47 changing environments, growing economies, and ageing populations (3). The shift is marked by a rising  
48 burden of non-communicable diseases and injuries, along with emerging infectious diseases (e.g. COVID-  
49 19 and chikungunya) (4,5).  
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51 The knowledge of current disease epidemiology in the region, however, is limited, constraining health  
52 systems' ability to identify healthcare priorities and direct future resource allocation (6). While the Global  
53 Burden of Disease study provides insights into disease burdens across countries and diseases, the accuracy  
54 of its results is impeded by the scarcity of recent epidemiological data (6). For instance, less than 10% of  
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3 data sources from Cambodia, Myanmar and Laos were collected since 2010, from a pool of about four to  
4 five hundred publications and datasets from each of these countries(7). Given the limited coverage of  
5 disease reporting and surveillance systems in the region, research data is pivotal in bridging this  
6 information gap. Such data not only offers up-to-date information for modeling studies, but is also critical  
7 for optimizing resource allocation by including factors such as disease severity, the magnitude of the  
8 population affected, and equity (8).  
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11 Moreover, the marked systemic disparities in healthcare between rural and urban areas in the region  
12 highlight the need for rural-specific epidemiological data(3). Despite 50%- 85% of the region's population  
13 residing in rural areas, this large population group remains relatively understudied compared to  
14 countrywide estimates (7,9–13). In this context, cross-sectional surveys are an effective research method  
15 to provide timely estimates of disease prevalence in rural communities, through cost-effective approaches  
16 combining questionnaire interviews, clinical examinations, and laboratory tests.  
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19 The newly-formed South and Southeast Asia Community-based Trials Network (SEACTN) aims to establish  
20 a network of community-based healthcare providers and facilities capable of implementing interventions  
21 designed to triage, diagnose, and treat patients within rural communities across five South and Southeast  
22 Asian countries (Bangladesh, Cambodia, Laos, Myanmar, and Thailand) (14). The first project is the Rural  
23 Febrile Illness Project (RFI), dedicated to delineating the epidemiological baseline of febrile illness in  
24 remote and underserved regions, where febrile illness and access to healthcare pose significant health  
25 challenges (14). RFI encompasses diverse initiatives designed to gain a multifaceted understanding of the  
26 health dynamics within these communities to effectively facilitate the identification of interventions for  
27 future studies across SEACTN. Recognizing the gaps in understanding of disease prevalence, a cross-  
28 sectional household health survey has been planned as one of the key initiatives of the RFI.  
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31 This survey aims to define the prevalence of a broad spectrum of communicable and non-communicable  
32 causes of health conditions in areas where the network operates. Alongside the survey, other key  
33 initiatives of RFI include a fever etiology study to determine the incidence, causes, and outcomes of febrile  
34 illness; a verbal autopsy study to identify common causes of mortality and the circumstances surrounding  
35 death; and a village and health facility mapping study creating a detailed profile of the study villages,  
36 estimating travel time to health facilities, and identifying health service provision gaps. Each initiative  
37 holds significant value as an independent study, and their results will be complementary providing a  
38 thorough comprehension of healthcare needs and enabling more equitable resource allocation.  
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## 45 Methods and analysis

46 The SEACTN household health survey is a community-based cross-sectional survey aiming to provide an  
47 overview of the burden of disease in selected rural areas where the network is operational. The first  
48 participant was enrolled on October 3, 2022, and data collection is expected to continue until December,  
49 2023.  
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### 52 Primary objectives and outcomes

- 53 1. To determine the prevalences of selected diseases and exposure to locally prevalent or important  
54 pathogens, including, but not limited to:  
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- 3 a. Immunoglobulin G (IgG) against selected common pathogens causing fever.
- 4 b. Hepatitis B and C
- 5 i. Hepatitis B virus (HBV) surface antigen
- 6 ii. IgG against Hepatitis C virus (HCV) and presence of HCV
- 7 c. Selected common non-communicable diseases (e.g. diabetes, hypertension, stroke)
- 8 according to self-reported disease history and laboratory tests.
- 9 d. Self-reported illness or injury in the past 30 days.
- 10 i. Any acute conditions (e.g. fever, persistent cough, watery diarrhea)
- 11 ii. Injury or death caused by an accident
- 12
- 13 2. To determine the point prevalence of different self-perceived health statuses.
- 14 3. To determine the prevalences of major risk factors for common non-communicable diseases (e.g.
- 15 smoking, alcohol consumption, overweight).
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## 19 Study population and setting

20 All SEACTN operational areas were selected by partner organizations as they represent poor, remote, and  
21 rural communities with limited access to formal healthcare (14). This study will be conducted in three  
22 areas, consisting of 391 villages in Bangladesh, Cambodia and Thailand (Figure 1). The other sites will not  
23 take part of the study due to operational constraints.

24 Two-stage cluster sampling will be used to obtain a representative sample from each study site. In the  
25 first stage, 75 villages will be selected using the probability-proportional-to-size sample method (15–17).  
26 For the second stage, within each village, a simple random sample of five to seven households (adjusted  
27 to the average household size) will be selected using computer-generated random sampling from the  
28 village household list.

### 29 *Inclusion and exclusion criteria*

30 For each selected household, all usual household members or visitors who stayed overnight in the  
31 households before the survey are eligible to be enrolled (18).

## 32 Sample size

33 This study is adequately powered to determine the prevalences of all key indicators within each age group,  
34 with a design effect of 1.5 and a range of 5-10% degrees of precision, while considering a maximum of  
35 1500 participants per study country (Table 1). To account for a 10% non-response rate, assuming an  
36 average household size of 4.5 persons, and enrolling all household members, the final sample size was  
37 adjusted to 1667 participants per country (19–21).

38 The minimal sample size required was calculated based on the estimated prevalences of key indicators  
39 overall and within each population age group (Table 1). Prevalence estimates, population proportions  
40 within each age group, and average household size, were derived from previously conducted national  
41 health surveys and published studies, preferably from the study country, or from countries with a similar  
42 epidemiological context (19–29).

## Study procedures

Standard operating procedures (SOPs) were developed for field procedures, sample collection and transportation. Training materials were developed and training sessions were delivered to all the study staff directly, or using a train-the-trainer model where field supervisors and managers will be trained first and then subsequently train other field staff. All research staff are experienced in community-based research or interventions. Experienced phlebotomists were recruited and trained in specimen collection and processing in the field. A monitoring and evaluation plan was devised to maximize the research quality.

### *Patient and Public Involvement Statement*

The potential challenges for the study include comprehensibility of the questionnaires, and willingness of selected households to participate. We have proactively addressed these concerns by involving the target population in the questionnaire validation process (section: Questionnaire interviews), and planning community mobilization events before the survey, tailored to the local context.

Collaborators will identify contact points from local stakeholders and communities, such as village leaders, local health center staff, or community health workers, and determine the most suitable methods for establishing contact. Main events may involve community engagement meetings to explain the study purpose, organization and procedures, and the plan for dissemination of study results. Prior to the survey day for each village, the study team will meet, or call if physical meetings are not feasible, the household head or members of the selected households. With the support of the key contact persons, this interaction will create an opportunity to address questions or concerns, enabling the survey teams to work with each community and selected household to plan an effective data collection schedule.

### *Survey schedule*

On the scheduled survey day for each village, stations will be set up at a convenient location within or near the village. Household members will arrive at the survey location following their appointment to complete the procedures (Figure 2).

### *Informed Consent*

Participants must sign the informed consent form before any study-specific procedures are performed. The informed consent will be available in the official local language. It will be presented to prospective participants by trained study staff detailing the study procedures and implications of study participation. It will be made explicit that participation is voluntary and participants are free to withdraw from the study at any time. If necessary, the informed consent process will be interpreted to dialect when participants do not speak the official local language.

Adequate time will be given to study participants to consider the information and ask questions. Written consent will then be obtained from the participants, or the caretakers of participants, in compliance with local legal age requirements, using the participant's dated signature or thumbprint (if unable to write) and dated signature of a person who presented and obtained the informed consent. A copy of the signed Informed Consent document will be given to the participant. Children aged as dictated by local legislation and regulations will be required to sign the written informed assent form in addition to their parent or guardian signing a consent form.



### *Questionnaire interviews*

The questionnaire consists mostly of questions adapted from well-validated and widely implemented tools (Appendix A). This approach enables direct comparison of results with previously conducted surveys by incorporating questions from the Demographic and Health Surveys (DHS), World Health Organization (WHO) STEPwise surveys for Non-communicable Disease Risk Factors (STEP), and the World Health Survey (30–32).

The questionnaire underwent adjustments and validation through pretests using behavior coding and participant debriefing (33,34). During mock interviews, the observer of each interview pair recorded the interaction problems for each question, such as “major change in wording”, “question reading interrupted by the respondent”, or “additional prompt is provided”. All interviewers, interviewees, and the observers participated in the debriefing. The pretest was conducted initially among peer researchers in English. Subsequently, the adjusted version was translated into Thai and tested among the target population in Thailand. This ensured the questionnaire’s suitability, comprehensibility, and appropriate length for administration. The final questionnaire was then translated into the official languages of each study country (Bangla, Khmer, and Thai) by professional translators or dedicated staff from partner organizations, and validated by the local research teams. When necessary, during face-to-face interviews, questions will be interpreted to dialect for participants who do not speak the official local language.

The questionnaire consists of four sections answered by household members based on their sex and age (Figure 2, top).

- The household section is completed by the household head, providing information on household characteristics, and a list of all household members along with any illnesses in the past 4 weeks and health seeking behavior.
- The adult section is for household members aged 15 years or older and includes questions on socio-demographic characteristics (e.g., age, sex, education, marital status, and occupation), disease history (e.g. tuberculosis, diabetes, cardiovascular disease), self-perceived health status, health concerns, substance use (e.g., tobacco and alcohol), and other disease risk factors.
- The women’s health section is for female household members aged 15 years or older, and includes questions on contraception use, utilization of antenatal care and delivery services.
- The children’s health section is answered by caretakers of children under 5 years, providing information on each child’s vaccination and breastfeeding history.

### *Physical examination*

All household members will undergo weight, height, and tympanic temperature measurements. Children under 5 years will also have their mid-upper arm circumference (MUAC) measured, and adult household members ( $\geq 15$  years) will undergo blood pressure measurement (Figure 2, middle). Weight will be measured with a digital scale, preferably with a taring function allowing a child's weight to be measured while being held by an adult. Height measurements will be carried out with measuring scales/boards. Children younger than 24 months will be measured lying down on the board, while standing height will be measured for older children. Tympanic temperature will be measured with infrared thermometers.

All measures will be taken by experienced and trained staff. Consistency and comparability will be ensured by using the same validated devices previously used in studies in similar settings, whenever possible, across study sites.

### *Blood sample collection and point-of-care hemoglobin test*

Blood samples will be collected from participants aged six months or older (Figure 2, bottom). For participants aged 6 months to under five years, four dried blood spots (DBS) will be collected via finger or heel prick. Participants aged five years or older will provide venous blood samples, with four milliliters collected from those aged five to under 15 years, and six milliliters from participants aged 15 years or older (Figure 2, bottom). After blood sample collection, appropriate samples will be tested for hemoglobin using HemoCue® Hb 301 system (HemoCue®AB, Ängelholm, Sweden) to detect anemia.

The venous blood samples will be temporarily stored in cool boxes between 4°C and 8°C, for a maximum of 24 hours before centrifugation in the field laboratories. Aliquots of whole blood, serum, plasma, and packed red blood cells of these samples will be stored at a minimum of -20°C or below without freeze-thaw until analysis. DBS will be air-dried in the laboratory for at least six hours, after which they will be placed in a plastic zip-lock bag and stored at room temperature or at 4°C or below.

### *Information, consultation and referral*

Upon completion of the field procedures, individual participants will receive the results of their hemoglobin test and physical examinations. Participants with abnormal results will be referred to a study nurse who will provide recommendations and, if the participant wishes, further referrals in accordance with local guidelines.

## **Analysis of blood samples**

Sample aliquots and DBS will be shipped to the central laboratories in Bangkok, Thailand where they will be analyzed. All laboratory activities will be performed by experienced and trained staff. All laboratory procedures will be performed using validated SOPs. Multiplex serology tests will be developed and validated for measures of IgG and immunoglobulin M (IgM) of common pathogens causing fever; all other methods have already been published in peer-reviewed journals.

Malaria polymerase chain reaction (PCR) will be performed for all participants to identify individuals with malaria parasites. The PCR methods typically have a detection level in the range of 100-1000 parasites per milliliter(35). Plasmodium species will also be identified.

Serology tests for selected common pathogens causing fever including IgG and IgM for Dengue, Chikungunya, Japanese encephalitis, Zika, SARS-CoV-2, *Plasmodium vivax*, *Plasmodium falciparum*, *Orientia tsutsugamushi*, *Rickettsia spp.*, and *Leptospira spp.* will be performed for all participants.

Tests for hepatitis B and C: all participants will be tested for HBV surface antigen; participants 15 years or older will also be tested for IgG for HCV, and the positive samples will undergo HCV PCR.

Non-communicable disease-related markers: participants 15 years or older will be tested for Hemoglobin A1c, total cholesterol and high-density lipoprotein cholesterol.

Additionally, the remaining samples will be tested for exposure to, or presence of, pathogens associated with selected diseases that are regionally or locally prevalent or important. The final list of diseases, pathogens, and sample selection will be adjusted based on findings from other SEACTN studies exploring diagnostics and prognostics in febrile patients, and other available evidence.

## Results feedback

Individual-level data collected from physical examinations and hemoglobin tests will be provided on the same day once all field procedures are concluded for an individual participant (Section: Study procedure-Information, consultation and referral). Additionally, participants will be thoroughly informed about the implications of the laboratory tests to be performed during the consent process. They will be presented with the option to receive the results of hepatitis B and C tests. If they wish to receive them, the results, once available, will be placed in a sealed envelope and will then be delivered by the local health providers or village leaders to the participants. The decision on which results to provide to individual participants is made in consultation with the site research teams and local clinicians, considering factors such as their clinical relevance, the potential harm that could result from a lack of consultation upon results distribution, and the accessibility of treatment.

## Planned analysis

All data obtained through questionnaire interviews, physical examinations, and hemoglobin point-of-care tests will be collected on tablets using an electronic data collection platform - Open Data Kit (36). The electronic case report form has built-in validation rules to identify missing or potentially incorrect data. Stringent checks are applied to variables used to estimate the study outcomes, such as recent fever history, diabetes history, and weight. Survey interviewers cannot progress to the next question if these data are missing or outside the defined ranges. Throughout the survey, data will be continuously updated and monitored for quality. Data queries and quality reports will be generated every two to four weeks for data verification and correction, and to identify areas needing additional training and support, ensuring data integrity.

For descriptive summaries, means and standard deviations (SD) or medians with interquartile range (IQR) for continuous variables, and proportions for categorical variables will be calculated. Outcomes will be presented as an overall estimate by country, and with 95% confidence intervals, stratified and compared across sites and participants' sociodemographic characteristics using appropriate tests, such as the Student's t-test, Mann-Whitney U tests or chi-squared tests. Associations between disease status, risk factors, self-perceived health status, and other characteristics will be explored through univariate and multivariate analyses, and measures of effect will be reported with 95% confidence intervals. Sampling weights will be accounted for, as needed, in the analysis.

## Discussion

This prevalence survey conducted across three rural SEACTN study sites in Bangladesh, Cambodia, and Thailand aims to provide a comprehensive epidemiological description of the study areas. Employing a multi-faceted approach, including questionnaire interviews, laboratory tests, and physical examinations, the study will yield extensive data on the prevalence, risk factors, healthcare utilization patterns of both communicable and non-communicable diseases. The findings will contribute to improved estimates of the burden of disease, and deepen the comprehension of findings from other RFI initiatives, offering a thorough overview of health and healthcare provision in these areas. The survey will be invaluable for setting healthcare priorities and directing resource allocation for health system development.

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3 As a core component of RFI, this survey, alongside other initiatives, adopts an integrated approach to  
4 address health challenges more effectively, particularly in the context of the “double burden of disease”,  
5 characterized by the rising burden of non-communicable diseases, alongside ongoing challenges posed by  
6 infectious diseases and sub-optimal maternal and child health (2). This survey will encompass various  
7 dimensions of health, allowing for further exploration of associations among disease occurrence, risk  
8 factors, and self-perceived health. Key data from the survey, such as household wealth status, and  
9 community members’ perception of their health and health concerns, will contextualize the findings from  
10 the other three RFI studies, and provide insights into potential health disparities and inequalities. By  
11 integrating disease prevalence with fever etiology and causes of death, a multi-layered understanding of  
12 health dynamics in the study area could be attained. Additionally, knowledge from the survey will play a  
13 vital role for estimating incidence. This involves assimilating data on proportion of the population with  
14 fever who visited various healthcare providers from the survey, with the number of fever patients  
15 recruited from the village health workers or health facilities, captured from the fever etiology studies.  
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19 The study will also bridge the gap in community-based seroprevalence estimates for common pathogens  
20 causing fever, minimizing biases related to health-seeking behavior in facility-based studies. The data can  
21 also to be used for population-based incidence estimates (37,38). Furthermore, the updated prevalences  
22 of hepatitis B and C can be instrumental in evaluating the coverage and effectiveness of HBV vaccination  
23 programs, and inform HCV screening and treatment strategies in the region in the era of direct-acting  
24 antiviral agents (39,40). This study also extends its scope to gather insights into the health perspectives  
25 and concerns of community members, facilitating the alignment of future interventions with the needs  
26 and expectations of the population. Specifically, for self-perceived status, while existing studies primarily  
27 focus on the elderly population, this study encompasses a broader age range(41–44). This can inform  
28 tailored interventions to improve the quality of life for a more extensive population (45–47).  
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32 This study encourages regional collaboration by applying consistent research methods and seeking  
33 representative samples across study sites, allowing effective cross-country comparisons and fostering  
34 collaborative approaches to address shared health challenges (3).  
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36 The findings of this study are limited in their generalizability and should be interpreted with caution when  
37 considering broader implications for rural populations in the study countries. However, the study was  
38 specifically designed for and conducted within the selected rural areas of Bangladesh, Cambodia, and  
39 Thailand, where SEACTN is operational. This focused approach allows for insights into health challenges  
40 and opportunities within these areas.  
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43 In conclusion, this planned household prevalence survey will significantly contribute to disease prevention  
44 and control in the region by offering a comprehensive understanding of health conditions of the rural  
45 populations. Complementing the results from other RFI initiatives, it will serve as a foundation for  
46 evidence-based interventions, shaping future research and disease control priorities. The study findings  
47 will not only serve the next phase of SEACTN but also extend to the broader context, ultimately leading  
48 to improved health outcomes in rural communities.  
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## Ethics and dissemination

This study protocol was approved by the Oxford Tropical Research Ethics Committee (OxTREC Ref: 6-22), National Research Ethics Committee of Bangladesh Medical Research Council (BMRC/NREC/2022-2025/69), the Cambodian National Ethics Committee for Health Research (23rd December 2022 NECHR), the Chiang Rai Provincial Public Health Research Ethical Committee (CRPPHO 75/2565).

## Safety considerations

Participants may experience slight discomfort during the blood draw, however, our experienced clinical staff performing the phlebotomy will take special attention to minimize this discomfort. While some interview questions may be personal, all data will be handled confidentially, and linked only to study IDs. Participants will also be informed of their right to skip questions or end the interview if they feel uncomfortable.

## Data deposition and curation

The database and all electronic data will be stored on secure servers that are backed up daily, with weekly off-site storage. Paper records, if they exist, will be kept in secure storage such as locked cabinets; if necessary, the record will be scanned and stored electronically. Study data will be archived in accordance with Mahidol Oxford Tropical Medicine Research Unit (MORU) SOPs. Electronic data will be de-identified and preserved indefinitely. Paper records will be preserved for five years after study completion. With participant's consent, electronic data can be shared according to the terms defined in the MORU data sharing policy with other researchers for future use (48).

## Dissemination

The results of the study will be summarized in plain language in both English and the official local language. These summaries will be disseminated via the local health authorities and partners. The findings will also be disseminated internationally through conference presentations and peer-reviewed academic journal publications, aligning with Wellcome Trust policy and guidelines.

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## Declarations

### Authors' contribution

MZ, NSNH, TJP contributed to conception and design of the study, and drafted the manuscript.

SI, AS, MAI, AKN, RT, LD, CP, RC, EMB, WT, JW, SDB, SJL contributed to the design of the study, and provided critical review of the manuscript.

NW, CM contributed to the design of the study, data collection platform development, and provided critical review of the manuscript.

SIZ contributed to the design of the study, provided the study sites' map and critical review of the manuscript.

ML, RJM, NPJD, YL contributed to the conception of the study, and provided critical review of the manuscript.

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### Competing interests

Nothing to declare

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## Tables and figures

Table 1. Required sample size tested against the estimated prevalence of key indicators of the highest prevalence, overall and by age groups of interests.

	Expected number of participants	Indicator (estimated prevalence)	Required sample size *
<b>Overall</b>	1500	Overweight (20%)	369
<b>Age groups (years)</b>			
≥15	1050	Current drinker (55%)	570
<5	150	Anemia (30%)	122
15-49	750	Injury or death caused by recent accident (20%)	414

≥50	300	Hypertension (20%)	257
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\*The formula used for calculating sample size is shown below. Assessing the sufficiency of the sample size for the key indicators of the highest prevalences ensures sufficient statistical power for indicators with lower prevalence. A degree of precision of 5% is applied for the sample size calculation overall and across age groups, except for the under 5 years and the 50 years or older groups, for which degrees of precision of 10% and 6% are applied, respectively.

$$n = DEFF \times \frac{Np(1-p)}{\frac{d^2}{1.96^2}(N-1) + p(1-p)}$$

n: Sample size.

DEFF: Design effect. Design effect of 1.5 is used to account for a slightly expected increase in variance due to clustering.

N: population size

p: expected prevalence of key indicators.

d: degree of precision.

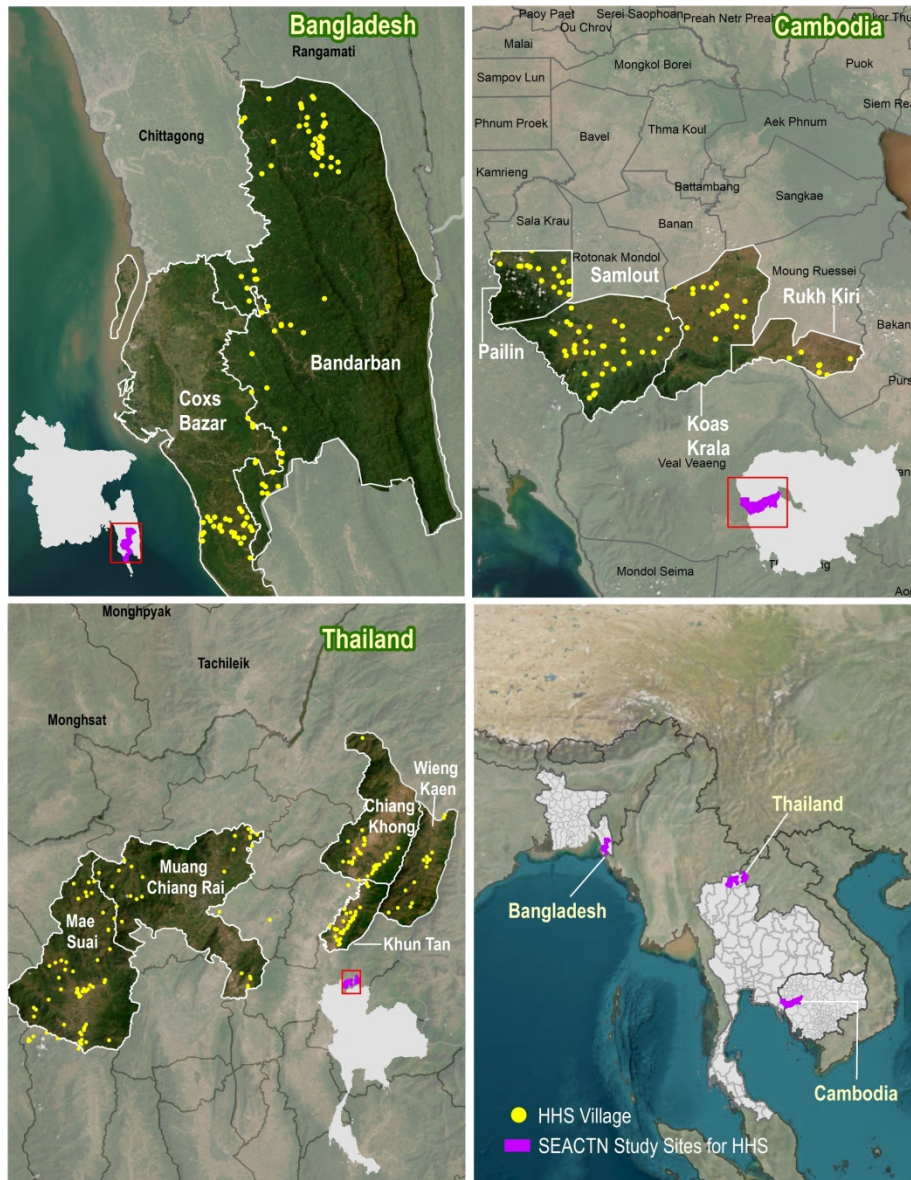
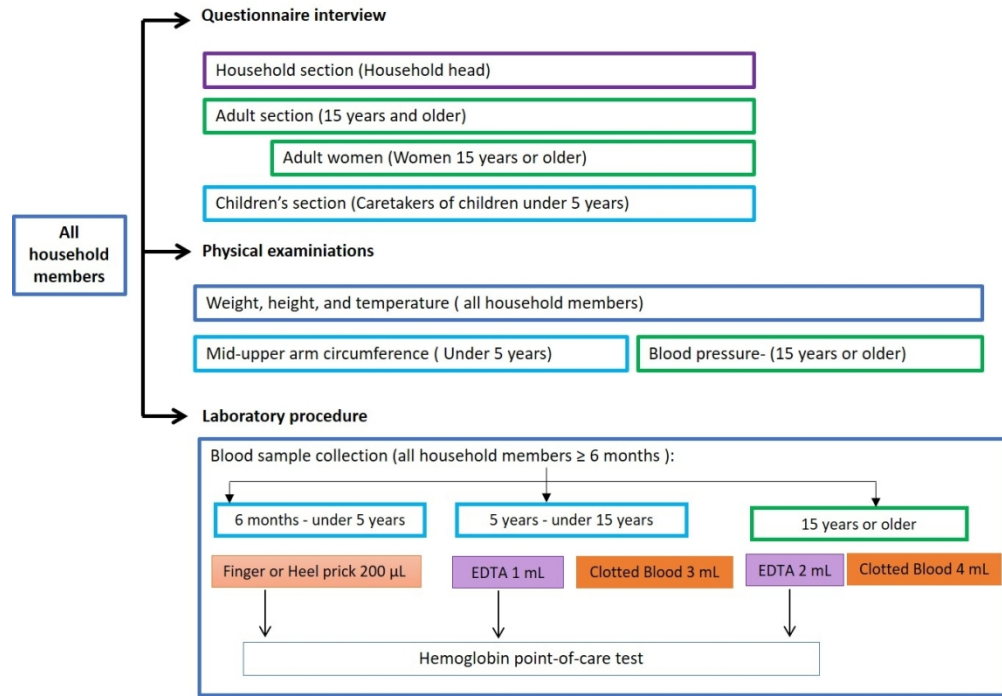


Figure 1. The study sites and population of the Cross-sectional Household Health Survey conducted by the South and Southeast Asia Community-based Trials Network (SEACTN). The Bangladesh site includes 130 villages from Cox's Bazar and Bandarban districts; the Cambodia site includes 82 villages from Battambang and Pailin provinces; and the Thailand site includes 179 villages located in Chiang Rai province. HHS: The Household Health Survey; SEACTN: the South and Southeast Asia Community-based Trials Network

218x279mm (300 x 300 DPI)



29 Figure 2. Questionnaire interviews, physical examinations, and laboratory procedures administrated to study  
30 participants according to age and sex.

31 EDTA: Blood sample collection tubes containing ethylenediaminetetracetic acid.

32 230x161mm (150 x 150 DPI)

## Appendix A. Questionnaire

### DEFINING THE HIDDEN BURDEN OF DISEASE IN RURAL COMMUNITIES IN BANGLADESH, CAMBODIA AND THAILAND: A CROSS-SECTIONAL HOUSEHOLD HEALTH SURVEY PROTOCOL

Study site:

Village:

Household ID:

Household head section			
Code	Question	Answer	Skip logic
S1a	<p>(Household head or adult member of the household) Please give me the names of the persons who usually live in your household starting from the household head.</p> <p><i>Prompt: Have you told me the names of all the household members, even the ones are not here now?</i></p> <p><i>Record the full name with the study ID in the paper-based household checklist</i></p>	Initials, and assign study ID automatically	



S1b	Could you now give me the names of the guests of the household who stayed here last night?		
S2	What is the relationship of [NAME] to the head of the household?	Head→S3 Wife or husband→S4 Son or daughter→S4 Son-in-law or daughter-in-law→S4 Grandchild→S4 Parent→S4 Parent-in-law→S4 Brother or sister→S4 Other relative→S4 Adopted/ Foster/ Stepchild →S4 Not related→S4 Don't know→S4	If S2=Head then S3, else skip to S4
S3	What is your ethnic group?	Ethnic group1 Ethnic group 2 [insert names of locally relevant ethnic groups]	
S4	Is [NAME] male or female?	Male Female	
S5	Does [NAME] usually live here in the past month?	Yes No	
S6	Did [NAME] stay here last night?	Yes No	
S7	How old is [NAME]?	_____ in year  If age 5-14 years→S8-S10  Else→S1, until completing the information of all the mentioned household members→ S11	Go back to S1 until completing the information of household members.

S8	Did [NAME] attend school or any early childhood education program at any time during the [2021-2022] school year?	Yes No→S10	If S8=No, then S10
S9	During [this/that] school year, what level [is/was] (NAME) attending?	Early childhood Primary Secondary Higher Don't know  → S1, until the information of all household members is taken →S11	
S10	What is the highest level of school [NAME] has attended?	Early childhood Primary Secondary Higher Don't know  → S1, until the information of all household members is taken→ S11	Go back to S1 until completing the list

<b>Household Schedule summary</b>			
Code	Question	Answers	Skip logic
S11	Total persons in household	Auto calculation	
S12	Number of household member >=18 years	Auto calculation	
S13	Number of household member 15-17 years	Auto calculation	
S14	Number of women household member>=15 years	Auto calculation	



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S15	Number of school age children 5-14 years old	Auto calculation	
S16	Number of children under 5 years old	Auto calculation	
S17	Just to make sure that I have a complete listing: are there any other people such as small children or infants that we have not listed?	Yes →S1 No	If yes, go to S1
S18	Are there any other people who may not be members of your family, such as domestic servants, lodgers, or friends who usually live here?	Yes→S1 No	If yes, go to S1
S19	Are there any guests or temporary visitors staying here, or anyone else who stayed here last night, who have not been listed?	Yes→S1 No	If yes, go to S1
S20	Is there anybody, who is a household member or a guest who stayed in your household last night, is not here for the survey now?	Yes →S1 No →EQ1	
S21	Can you tell me the names of the people who are not here?	Choose from the Initials and study IDs	
S22	What are the reasons [name] is not here now?	Not available at the time (work or school) Physical illness or disability Mental illness or disability Other reason, specify: _____ Don't know	

<b>Household section</b>			
Code	Question	Answers	Skip logic
	Now I'm going to ask you some questions about your household amenities and possessions. [use Equity Tool of the country. Example Cambodia]		
	Does your household have		
EQ1	... Electricity	Yes No	
EQ2	... a television?	Yes No	
EQ3	... refrigerator?	Yes	

		No	
EQ4	.... CD or DVD player	Yes No	
EQ5	... wardrobe?	Yes No	
EQ6	...Generator or Battery or Solar panel	Yes No	
EQ7	Does any member of your household own a motorcycle or scooter?	Yes No	
EQ8	... A watch?	Yes No	
EQ9	Does any member of this household have a bank account?	Yes No	
EQ10	What is the main material of the floor?	Ceramic tiles Wood planks Other material	
EQ11	What is the main material of the exterior walls?	Cement blocks Palm / bamboo / thatch Other material	
	<b>Housing</b>		
HH1	<p>What is the main source of drinking water for members of your household?</p> <p><i>(show card)</i> <i>The showcard provided the definitions of the water source categories. Based on the description of the respondent, choose from the categories.</i></p>	<p><u>Piped water</u> Piped into dwelling Piped to yard/plot Piped to neighbour Public tap/standpipe Tube well or borehole</p> <p><u>Dug well</u> Protected well Unprotected well</p> <p><u>Water from spring</u> Protected spring Unprotected spring</p>	If “bottled water”, then HH4

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		Rainwater Tanker truck Cart with small tank Surface water (river/dam/Lake/pond/stream/canal/Irrigation channel) Bottled water→HH4  Other, specify:____	
HH2	Do you do anything to the water to make it safer to drink?  <i>Prompt: Participants might not know it's for making the water safer to drink. The interviewer can prompt if they do anything to the water before drinking.</i>	Yes No → HH4 Don't know	
HH3	What do you usually do to make the water safer to drink? Anything else? (check all that apply)	Boil Add bleach/chlorine Strain through a cloth Use water filter (ceramic/sand/composite/etc) Solar disinfection Let it stand and settle Other, specify_____ Don't know	
HH4	What kind of toilet facility do members of your household usually use?  <i>If the respondent answers in general terms such as "flush toilet," probe to determine where the toilet flushes to; likewise, if the respondent answers "latrine," probe to determine the type of latrine.</i>	<u>Flush or pour flush toilet</u> Flush to piped sewer system Flush to septic tank Flush to pit latrine Flush to somewhere else Flush, don't know where  <u>Pit latrine</u> Ventilated improved pit latrine	

	<p><i>(show card)</i>  <i>The show card provides you definitions of types of toilet, according to the description from the respondent choose the appropriate option.</i>  <i>If you cannot choose according to the participants description, show them the pictures on the showcard.</i></p>	<p>Pit latrine with slab  Pit latrine without slab/open pit</p> <p>Composting toilet  Bucket toilet  Hanging toilet/hanging latrine  No facility/bush/field</p> <p>Other, specify _____</p>	
HH5	What type of fuel does your household mainly use for cooking?	<p>Electricity  Liquefied Petroleum Gas (LPG)  Charcoal  Wood  No food cooked in household  Other (specify) _____</p>	
HH6	Does the stove have a chimney or fan?	<p>Yes  No  Don't know</p>	
HH7	Is the cooking usually done in the house, in a separate building, or outdoors?	<p>In the house  In a separate building  Outdoors  Other, specify: _____</p>	
HH8	Does your household have any mosquito nets?	<p>Yes  No → HH10</p>	If HH8=No, then HH10
HH9	How many mosquito nets does your household have?	Number of net _____	
HH10	Do <u>all</u> of your household windows have mosquito/fly screens?	<p>Yes  No</p>	

1 2 3 4 5 6 7 8 9 10 11	ST1	How often is your house floor being cleaned (e.g. swept)?	Everyday (7 days/week) Almost everyday (5-6 days/week) Every other day (3-4 days/week) Weekly (1-2 days/week) Monthly (1-3 days/month) Scarcely (a few times/ year) Never	
12 13 14 15 16 17 18 19 20	ST2	How often do you or other members of your household perform activities to maintain grass or weed in or around your household, or work on a vegetable garden?  Prompt: For example, cut or trim weeds, plant or pick vegetables in the yard, garden, by the walls or fences of your household?	Everyday (7 days/week) Almost everyday (5-6 days/week) Every other day (3-4 days/week) Weekly (1-2 days/week) Monthly (1-3 days/month) Scarcely (a few times/ year) Never	
21		<b>Household member check</b>		
22		Now I'm going to asking you some questions about the members of your household including you, if anyone have had an accident, or had illness in the <u>past 30 days</u> .		
23 24 25 26		<b>Accident and illness in the past 30 days</b>		
27 28 29 30 31	HM1	Was any person of your household injured or killed in an accident? Prompt: anyone injured or killed in an accident <u>any time</u> before the interview.	Yes, how many? ____ No→HM14	If HM1=No, then HM14
32 33	HM2	What the name of the person got injured or killed in an accident?	Identify the ID code and show initial Not in the list, initial: ____	
34 35 36 37 38 39 40 41 42 43 44 45 46 47	HM3	Could you tell me in what type of accident (NAME) was injured or killed?	Landmine/unexploded bomb (UXO) Gunshot/weapon Road accident Fire/burning Snake/animal bite Fall from tree/building Drowning	

		Poisoning (chemical) Violence/assault Other, specify _____ Don't know	
HM4	Is (NAME) still alive?	Yes No → HM6	If HM4 =No, then HM6
HM5	In your opinion, was (NAME'S) injury serious, moderate, or slight?	Serious Moderate Slight DON'T KNOW	
HM6	Was (NAME's) death due to accident?	Yes ] → HM7 No ]	→ HM7
HM7	Did the accident happen in the <u>past 30 days</u> ?	Yes No → HM14	If No then HM 14
HM8	Was advice or treatment sought for [Name] after the accident?	Yes No → HM14	If No then HM14
HM9	Where was advice or treatment first sought for [NAME] after the accident?	<u>Public sector</u> Primary care unit/Primary care centers/Community Health centers Community hospital General hospital/Central hospital University hospital Government hospital <u>Private medical sector</u> Poly private clinic/private clinic Private hospital Others <u>source</u> Traditional/herbal medicine Traditional healer Self-bought medicine Relatives/ Friends , specify: _____	

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4	HM10	Where did the money come from to pay for transportation and treatment for the members of your household who had an injury over the <u>past 30 days</u> ?	
5		Record all that mentioned	
6		<i>The payment method for transportation and medical care can be different. If the respond provided one method, the interviewer should probe and confirm if both payment for transportation and treatment are from the same method.</i>	
7		<i>If any out-of-pocket payment method is selected, then proceed to HM11.</i>	
8			Subsidy or exemption → HM14
9			Insurance scheme → HM14
10			Universal coverage card (UC)
11			Social Security/ worker compensated fund (SSSS)
12			civil servant medical benefit scheme (CSMBS)
13			State enterprise
14			Independent agency of the state
15			Local government
16			Private health insurance
17			Health insurance covered by employer
18			Other health insurance, specify _____
19			Out of pocket → HM11
20			Wage/income
21			Loan/borrowed money
22			Sale of assets
23			Gift from relatives/neighbours/friends
24			Saving/ family funds
25			Other, specify _____ → HM14
26			Don't know → HM14
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28	HM11	How much in total was spent on [NAME]'s treatment at (name of the place)?	_____ amount of money
29			Don't know
30	HM12	How much in total was spent on transport to go to and return from (name of the place)?	_____ amount of money
31			Don't know
32	HM13	Has the debt been repaid? (If HM10= Loan/borrowed money)	Yes
33			No
34			Don't know
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36	HM14	Please tell me if any member of your household (including you) is sick, has an illness now or at any time in the <u>last 30 days</u> ?	Yes, how many? _____
37			No → End of the household head section
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	<p>It can be <b>acute</b> disease or previous diagnosed <b>chronic</b> disease.</p> <p>An acute illness is a condition that appears suddenly: the person did not have it immediately before becoming ill.</p> <p>A chronic disease is an illness that will not go away or takes a long time to go away, even when treated.</p> <p>Prompt if nobody: Is there anyone had fever? Any infant or child in your family was ill?</p>		
HM15	<p>Now I would like to ask you some questions about each person who is sick now or at any time in the <u>last 30 days</u>.</p> <p>Could you tell me his/her/their name(s)? Then we will talk about one person at a time.</p>	<p>Identify all that from the list of the family member (ID number)</p> <p>No body → end of the household head section</p>	
HM16	<p>What type of health problems or symptoms did [name] have or is having during this illness?</p> <p>DO NOT READ. TICK ONE BOX FOR EACH GROUP OF SYMPTOMS MENTIONED.</p> <p><i>If the respondent provide a diagnosis directly, especially for an acute condition, please still probe for the symptoms. Check all the symptoms that apply, and check "other acute condition, specify: ____ and write down the diagnosis.</i></p> <p><i>For example: if the respondent answer "Covid", check "other acute condition, specify: COVID". Then continue probe what did the symptoms the person have, and check all the symptoms that are described.</i></p>	<p><u>Acute conditions</u></p> <p>Fever</p> <p>Persistent headaches</p> <p>Persistent cough</p> <p>Running nose</p> <p>Difficulty breathing, fast breathing</p> <p>Difficulty swallowing/ throat pain</p> <p>Difficulty seeing or other eye complaint</p> <p>Stomach pain, nausea, vomiting, could not eat</p> <p>Thirst/ sweating</p> <p>Watery diarrhoea</p> <p>Bloody stools</p> <p>Skin disease, such as rash, irritation, open sores</p> <p>gyn-obstetrics</p> <p>Could not sleep</p> <p>Feeling tired</p> <p>Constipation</p> <p>Convulsion/ seizure</p>	



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		<p>Musculoskeletal pain (general body pain, back and joint pain)</p> <p><u>Chronic disease</u>  Hypertension, high blood pressure  Heart disease, heart attack consequence  Diabetes, high blood sugar  Asthma, wheezing, chronic difficulty breathing  HIV infection, AIDS  Arthritis, chronic body pain  High cholesterol  Ulcer, chronic stomach pain  Stroke consequence  Epilepsy, seizures, fits  Cancer  Tuberculosis  Liver disease  Depression</p> <p>Other acute illness, specify: _____  Other chronic illness, specify: _____  Don't know</p>	
HM17	In your opinion, was [NAME]'s illness serious, moderate, or slight?	<p>Serious  Moderate  Slight  Don't know</p>	
HM18	Was advice or treatment sought for [Name]'s illness?	<p>Yes  No → End of the household head section</p>	If HM18=No, then end of the section
HM19	Where was advice or treatment first sought for [NAME]'s illness?	<p><u>Public sector</u>  Government hospital  Government health centre  Government health post</p>	

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	<p>[insert Country specific list]</p>	<p>Mobile clinic Community health worker/field worker <u>Other public sector</u> <u>Private medical sector</u> Private hospital Private clinic Pharmacy Private doctor Mobile clinic Community health worker/field worker Other private medical sector <u>NGO medical sector</u> NGO hospital NGO clinic Other NGO medical</p> <p><u>Other source</u> Shop Traditional practitioner Market Itinerant drug seller</p> <p>Other, specify: _____</p>	
<p>HM20</p>	<p>Where did the money come from to pay for transportation and medical care for the members of your household who had an illness over the <u>past 30 days</u>? (record all that mentioned)</p> <p><i>The payment for transportation and medical care can be different. If the respond provided one method, the interviewer should probe and confirm if both payment for transportation and treatment are from the same method.</i></p>	<p>Subsidy or exemption → end of the section</p> <p><u>Insurance scheme</u> → end of the section</p> <p>Mutual Health Organization/Community-Based Health Insurance Health Insurance through Employer Social Security</p> <p><u>Out of pocket</u> → HM21 Wage/income</p>	

	<p><i>If any out-of-pocket method is recorded, proceed to HM21.</i></p> <p>[Insert locally relevant insurance schemes]</p>	<p>Loan/borrowed money  Sale of assets  Gift from relatives/neighbours/friends  Saving/ family funds  specify _____ --&gt; End of the household head section  Don't know → End of the household head section</p>	
HM21	How much in total was spent on [NAME]'s treatment at (name of the place)?	<p>_____ amount of money  Don't know</p>	If HM20 checked any out of pocket payment.
HM22	How much in total was spent on transport to go to and return from (name of the place)?	<p>_____ amount of money  Don't know  → HM23, if HM20=loan/borrowed money.  → Else, end of the household head section</p>	<p>HM23, if HM20=loan/borrowed money.  Else, end of the household head section</p>
HM23	Have this debt been repaid?	<p>Yes  No  Don't know</p>	If HM20=Loan/borrowed money

Adult section			
Code	Question	Answers	Skip logic
<b>Respondent background</b>			
A1	How old were you at your last birthday?	Age in complete years __	
A2	Have you ever attended school?	Yes No → A4	If no, then A4
A3	What is the highest level of school you completed?	No formal schooling Less than primary school Primary school uncompleted Primary school completed Secondary school completed High school/ vocational school completed College/university completed Postgraduate degree	
A4	What is your marital status?	Never married Currently married Separated Divorced Widowed Cohabiting Refuse to answer	

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A5	Which of the following best describes your main work status over the <u>past 12 months</u> ?	<u>Government employee</u> <u>Non-government employee</u> State enterprise officer Private company employee  <u>Business</u> Business owner Household business assistance <u>Agriculture</u> Agriculture (landowner and farmer) Agriculture labourer (other's land) <u>Labourer</u> Industrial labourer Day labourer Transport labourer Paid domestic worker Blacksmith/ Goldsmith/other skilled labour <u>Other self-employed</u> <u>Student</u> <u>Home maker/household work</u> <u>Retired</u> <u>Unemployed</u> Unemployed (able to work, e.g. unwilling to work) Unemployed (unable to work, e.g. too sick, disabled)  <u>Other, specify: _____</u> <u>Refuse to answer</u>	
	Now, I'm going to ask you some questions about your behaviour when you are in or around your household, and when you are working, in the <u>past 12 months</u> .		
ST3	In the <u>past 12 months</u> , how often do you sit or lying directly on the floor in your house or lawn?	Everyday (7 days/week) Almost everyday (5-6 days/week)	

		Every other day (3-4 days/week) Weekly (1-2 days/week) Monthly (1-3 days/month) Scarcely (a few times/ year) Never	
ST4	<p>In the <u>past 12 months</u>, have you worked in forest or high hill (for collecting wood/ bamboo/ mushroom), or rice field, fruit/tea/coffee plantation, or dry farm field for other agriculture products (e.g. vegetable, corn, pineapple)?</p> <p><i>Prompt: the participant might have worked in different areas throughout the year, and worked different length in different area, prompt to record all areas that the participant have worked in the past 12 months.</i></p>	Yes No → WHS1	If no, then WHS1
ST5	<p>Which one of them have you worked in?  <i>Check all that apply</i></p>	Forest or high hill Rice field Fruit/Coffee/tea plantation Dry field	Completing ST6-ST8 for each area checked
ST6	<p>Do you work in the [areas checked above] all year or only when in some seasons?</p> <p><i>Check "all year" if worked every month in the <u>past 12 months</u>. The respondent might work with different frequency in different month, but if he/she has worked in the area in each month in the past 12 month, this option should be checked.</i></p> <p><i>Check "in season" if not every month in the past 12 month.</i></p>	All year → ST8 In season → ST7	

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ST7	<p>How many months have you worked in [area] in the <u>past 12 months</u>?</p> <p><i>The number of months should be cumulative including all the months in the past 12 months the respondent has worked in the area. E.g. if the participants worked in March-June, and November, the total months he/she worked in the area is 4 months, "3-5 months" should be checked.</i></p>	<p>9-11 months 6-8 months/year 3-5 months/year 1-2 months/year or less</p>	IfST6= In season
ST8	<p>How often do you work in [area] (when it was the months you worked there)?</p> <p><i>Ask the question accordingly: if the respondent answered only work in the area in some seasons, then read the words in "(when it was the months you worked there)". If different frequency in different month, please use an average.</i></p>	<p>Everyday (7 days/week) Almost everyday (5-6 days/week) Every other day (3-4 days/week) Weekly (1-2 days/week) Monthly (1-3 days/month) Scarcely (a few times/ year)</p> <p>→ ST6, until completed all the areas the participants have listed</p>	ST6 until completed the frequency for all the fields the respondent has worked in the past 12 months.
ST9a	<p>The following questions we will ask you some things you do when you were at work in the area(s) you mentioned before. When you answer them, you need to consider: (all)the area(s) you have mentioned, and the total time you have worked in those area(s) in the <u>past 12 months</u>.</p> <p><i>Repeat the area(s) and the frequencies of working in the area from ST5-ST8</i></p>	Show the area(s) and frequency from ST5-ST8	
ST9	<p>At the time when you work in the area(s), how often do you sit or lay directly on the ground, haystacks, grass or other places in the forest or high hill, or farm field without a mat?</p>	<p>Every time Most times Sometimes Rarely Never</p>	

ST10	How often do you wear long sleeves?	Every time Most times Sometimes Rarely Never	
ST11	How often do you wear gloves?	Every time Most of times Sometimes Rarely Never	
ST12	How often do you wear shoes with socks or boots without or without socks?	Every time Most of times Sometimes Rarely Never	
ST13	How often do you wash your body after work?	Every time Most of times Sometimes Rarely Never	
ST14	How often do you change your clothes wore at work to clean clothes <u>immediately (i.e., within 30 minutes)</u> when you arrive home?	Every time Most of times Sometimes Rarely Never	
WHS1	I'm going to ask you now your overall health, including both your physical and your mental health.  In general, how would you rate your health <u>today</u> ? Would you say it's very good, good, moderate, bad, or very bad?	Very good Good Moderate Bad Very Bad	



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WHS2	<p>The following questions, I'm going to ask you how much difficulty you have when doing some activities. You can give me answers, such as you have no difficulty, mild difficulty, moderate difficulty, or extreme difficulty, or cannot do it at all.</p> <p>Overall in the <u>last 30 days</u>, how much difficulty did you have with work or household activities?</p>	<p>None Mild Moderate Severe Extreme/ Cannot do</p>	
WHS3	<p>Overall in the <u>last 30 days</u>, how much difficulty did you have with moving around, such as walking or climbing steps</p>	<p>None Mild Moderate Severe Extreme/ Cannot do</p>	
WHS4	<p>Overall in the <u>last 30 days</u>, how much difficulty did you have with selfcare, such as washing or dressing yourself?</p>	<p>None Mild Moderate Severe Extreme/ Cannot do</p>	
WHS5	<p>Overall in the <u>last 30 days</u>, how much of bodily aches or pains did you have?</p>	<p>None Mild Moderate Severe Extreme</p>	
WHS6	<p>Overall in the <u>last 30 days</u>, how much difficulty did you have with concentrating or remembering things?</p>	<p>None Mild Moderate Severe Extreme</p>	
WHS7	<p>Do you wear glasses or contact lenses?</p>	<p>Yes No</p>	

1 2 3 4 5 6 7 8	WHS8	In the <u>last 30 days</u> , how much difficulty did you have in seeing (IF WHS7=Yes, even when you wear glasses or contact lenses)?	None Mild Moderate Severe Extreme	
9 10 11 12 13	WHS9	Overall in the <u>last 30 days</u> , how much of a problem did you have with sleeping, such as falling asleep, waking up frequently during the night or waking up too early in the morning?	None Mild Moderate Severe Extreme	
14 15 16 17 18 19	WHS10	Overall in the <u>last 30 days</u> , how much of a problem did you have with feeling sad, low, or depressed?	None Mild Moderate Severe Extreme	
20		<b>Substance use</b>		
21 22 23 24 25 26	SU1	Now I would like to ask you some questions on smoking and tobacco use. Do you currently smoke any tobacco products, such as cigarettes, cigar, or pipes?	Yes No→S6	If No, then S6
27 28	SU2	Do you currently smoke tobacco product <u>daily</u> ?	Yes No	
29 30 31	SU3	How old were you when you first started smoking?	Age _____ years→ S5 Don't know→ S4	If S3=Don't know, then S4, else S5
32 33	SU4	Do you remember how long ago it was?	_____ in year/month/week Don't know	
34 35 36 37 38 39 40 41 42 43 44 45 46 47	SU5	What type of tobacco do you currently smoke? (Check all that apply)	Manufactured cigarettes Hand-rolled cigarettes Kreteks Pipes full of tobacco Cigars, cheroots, or cigarillos Water pipe (e.g. Baraku/ Hookah/ Shisha) Other, specify: _____	Jump to S10

		→ Select any option, move to S10	
SU6	In the past, did you ever smoke any tobacco products?	Yes No→ S10	If S6=No, then S10
SU7	In the past, did you ever smoke tobacco product daily?	Yes No	
SU8	How old were you when you first stopped smoking	Age _____ years→S10 Don't know→S9	If S8=Don't know, then S9, else S10
SU9	Do you remember how long ago it was?	_____ in year/month/week Don't know	
SU10	Now I would like to ask you some questions about drinking alcohol. Have you ever consumed any alcohol, such as beer, wine, spirits, or [ADD OTHER LOCAL EXAMPLES]?	Yes No→S18	If No, then S18
SU11	We count one drink of alcohol as one can or small bottle of beer, one glass of wine, one shot of spirits, or [insert local example].  (Show card)  During the past <u>12 months</u> , how frequently have you had at <u>least one</u> standard alcoholic drink?  <i>Refer to locally relevant examples of one standard drink.</i>	Daily 5-6 days per week 3-4 days per week 1-2 days per week 1-3 days per month Less than once a month Never	If S11=Never, then AS18
SU12	Have you consumed any alcohol in the <u>past 30 days</u> ?	Yes No→S18	If S12=No then S18
SU13	During the <u>past 30 days</u> , on how many <u>occasions</u> did you have at least <u>one standard</u> alcoholic drink?	Number _____ Don't know	

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4	SU14	In the <u>past 30 days</u> , <u>how many standard drinks</u> on average did you have during one drinking occasion?	Number of drinks ____ Don't know
5		(Showcard)	
6		<i>If the respondent is not able to reply by standard drink, ask on average the amount and type of alcohol he/she consume, and convert by yourself to number of standard drinks.</i>	
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13	SU15	In the <u>past 30 days</u> , how many occasions did you have <u>six or more standard alcoholic drinks</u> in a single drinking occasion?	Number of occasions ____ Don't know
14		(Showcard)	
15		<i>Prompt: Six standard drinks is roughly about: 6 cans of beer/3 big bottles of beer/ 6 shots of spirit/ a bottle of spirit shared among 3-4 people [insert local examples].</i>	
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23	SU16	In the <u>past 30 days</u> , did you consume any home brewed alcohol, any alcohol brought over the border/from another country, any alcohol not intended for drinking or other untaxed alcohol?	Yes No→S18
24			If S16=No then S18
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29	SU17	How many occasions did you consume any home brewed alcohol, any alcohol brought over the border/from another country, any alcohol not intended for drinking or other untaxed alcohol?	Number of occasions ____ Don't know
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33	SU18	Do you currently chew betel nuts?	Yes No
34			If S18=No then S20
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36	SU19	In the last 24 hours, many pieces did you chew?	____pieces
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38	SU20	Have your ever used heroin, Yama/ice, Ecstasy, Glue, Marijuana, Cocaine, Histamine, Pantazogon, Valium/diazepam, [locally popular drug]?	Yes No Refuse to answer
39			If No or refuse to answer then D1
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SU21	In the past 12 months have you used any of the drugs?	Yes No Refuse to answer	
S22	Have you ever injected drugs?	No Yes, in past 12 months Yes, before past 12 months Refuse to answer	
	<b>Disease and symptom</b>		
D1	Have you ever been diagnosed with chronic lung disease (emphysema, bronchitis, COPD) by a doctor or other health worker?	Yes No→D3	If No, then D3
D2	In the <u>last 30 days</u> , have you been taking any medication or other treatment (like oxygen) for it prescribed by a doctor or other health worker?	Yes No	
D3	In the <u>last 12 months</u> , have you had a tuberculosis (TB) test? I mean, has a doctor examined your sputum (taken a sample of the substance spit out from a deep cough and sent it to a laboratory for analysis) or made an x-ray of your chest?	Yes No→D5	If no, then D5
D4	Have you been taking any medication or treatment during the <u>last 30 days</u> prescribed by a doctor or other health worker?	Yes No	
D5	Have you had fever in the <u>past 30 days</u> ?	Yes No→D7	If No, then D7
D6	How long have you had fever?	One week or more No or less than one week	
D7	Are you currently coughing?  Prompt: If participants answer induced coughing due to environmental factor or substance use, prompt: I mean	Yes No→10	If No, then D10

	coughing throughout the day, even if you are not smoking or in the environment.		
D8	What is the duration of coughing continuously?	Two weeks or more Less than two weeks	
D9	Are you coughing up blood?	Yes No	
D10	Have you lost body weight unintentional/ suddenly?	Yes No	
D11	In the <u>past 30 days</u> , have you experienced drenching night sweats?	Yes No	If D5-D11 checked 2 or more symptoms, or coughing up blood, then refer to TB care
D12	Have you been diagnosed with Asthma (an allergy respiratory disease) by a doctor or other health worker?	Yes No→D14	If No, then D14
D13	In the <u>last 30 days</u> , have you been taking any medication or treatment prescribed by a doctor or other health worker?	Yes No	
D14	Have you ever had your blood pressure measured by a doctor or other health worker?	Yes No→D17	If No, then D17
D15	Have you ever been told by a doctor or other health worker that you have raised blood pressure or hypertension?	Yes No→D17	If No, then D17
D16	In the <u>past 30 days</u> , have you taken any drugs (medication) for raised blood pressure prescribed by a doctor or other health worker?	Yes No	

D17	Have you ever had your blood sugar measured by a doctor or other health worker?	Yes No→D20	If No, then D20
D18	Have you ever been told by a doctor or other health worker that you have raised blood sugar or diabetes?	Yes No→D20	If No, then D20
D19	In the <u>past 30 days</u> , have you taken any drugs (medication) or insulin injection for diabetes prescribed by a doctor or other health workers?	Yes No	
D20	Have you ever had your cholesterol (fat levels in your blood) measured by a doctor or other health worker?	Yes No→D23	If No, then D23
D21	Have you ever been told by a doctor or other health worker that you have raised cholesterol?	Yes No→D23	If No, then D23
D22	In the <u>past 30 days</u> , have you taken any oral treatment (medication) for raised total cholesterol prescribed by a doctor or other health worker?	Yes No	
D23	Have you ever had a heart attack or chest pain from heart disease (angina) or a stroke (cerebrovascular accident or incident)?	Yes No	
D24	Are you currently taking medications regularly to prevent or treat heart disease? (for example: aspirin, statins- Lovastatin/ Simvastatin/ Atorvastatin/ any other statin)	Yes No	
D25	Besides the health conditions we have just spoken about, do you currently have other chronic diseases that have been diagnosed by a doctor or health care provider?  (check all that apply)	<u>No other disease</u> <u>Cancer</u> Liver cancer bronchial and lung cancer Colon and rectal cancer	If mention the disease or symptoms above, go back to the relevant question

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<p><i>If diseases that are mentioned are not in the list, but you know in which system it belongs, check "other, specify" in that system and fill the name of the disease.</i></p> <p><i>If you do not know which system the disease should be categorized, then check "Other unknow system disease, specify: _____" on the bottom of the list, and fill in the name of the disease.</i></p>	<p>Breast cancer Cervical cancer Leukaemia/lymphoma Other, specify: <u>Endocrine system and metabolic disorder</u> thyroid/goitre Other, specify: _____ <u>Sensor disorders</u> Glaucoma Cataract Hearing loss Other, specify</p> <p><u>Cardiovascular / circulatory disease</u> Enlarged heart congestive heart heart fluttering Cardiac arteriosclerosis Severe cerebrovascular disease Other, specify: _____</p> <p><u>Haematological disease</u> Thalassemia <u>Chronic respiratory disease</u> Chronic emphysema Other, specify: _____</p> <p><u>Digestive disorders</u> Gastritis Acid reflux Liver cirrhosis Other, specify: _____</p> <p><u>Genito-urinary disease</u></p>	
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		<p>Kidney failure/kidney disabilities enlarged prostate/inflammation kidney stone/ bladder stone Other, specify:_____</p> <p><u>Muscular-skeleton disease</u> Gout rheumatoid/ rheumatoid arthritis Chronic knee pain / chronic back pain/ chronic neck pain Paralysis Other, specify:_____</p> <p><u>Chronic infection or defective by infection disease</u> HIV Polio Leprosy Chronic HBV infection Chronic HCV infection Other, specify:_____</p> <p><u>Congenital anomalies</u> abnormal intelligence (Down syndrome) Other, specify:_____</p> <p><u>Oral disorders</u> Periodontitis (gingivitis) Other, specify:_____</p> <p><u>Immune system disorder</u> Allergy Other, specify:_____</p>	
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For peer review only

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		<p><u>Neurological disorder</u>                  Parkinson's disease                  Epilepsy/epilepsy                  Dementia                  Other, specify: _____</p> <p><u>Mental health disorder</u>                  Alcoholism                  Depression                  Other, specify: _____</p> <p><u>Other unknow system disease, specify: _____</u></p> <p><u>Unknown</u> _____</p>	
CC0	<p>You have told us the symptoms and diseases affect your health currently.                  Now I'd like to ask you about the concerns you have related with health. It can be from the experience of yourself, your family, or your community.                  I'm going to ask your concerns from different perspective of health, and in the end, I will ask you to rank the ones that concern you the most.</p>		
CC1	<p>The first 3 questions about different dimensions of health services.</p> <p>I'm going to ask first if you have concerns about accessing health services, which means the service is provided somewhere, but you cannot receive it                  Do you have any concerns about health service accessibility?</p>	<ul style="list-style-type: none"> <li>- Affordability- Cost of care</li> <li>- Geographic accessibility- Travel to service provider (too far, take too much time, no good transportation methods, too sick to travel...)</li> <li>- Language barrier</li> <li>- Culture barrier</li> <li>- Other, specify _____</li> <li>- No concern</li> </ul>	

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	<p>Prompt: If the participant said no concern, then prompt service accessibility can be the cost, going to the place, or problem with communication, or something related with culture that create problem for people to get health care.</p> <p><i>Please record all that the participant mentioned.</i></p>		
CC2	<p>The next question is about concerns of health service availability, which means the service is not provided, or some elements required for providing the service is absent or not enough Do you have any concerns related with heath service availability?</p> <p>Prompt: If the participant expressed there is no concern, prompt- is there some health care service they want to use but cannot find the service? Or the service is not fully available because of health facility, health care professionals, equipment- laboratory, bed, ultrasound, or medication are absent or not enough.</p> <p><i>Please record all that the participant mentioned.</i></p>	<ul style="list-style-type: none"> <li>- Physical presence of service (the service is not provided, or not provided all the time or at all. E.g. no dental care in the primary care unit)</li> <li>- Health facility (health centre or hospital)</li> <li>- Health care professionals (doctors/nurses/paramedical professionals)</li> <li>- Beds or equipment</li> <li>- Medication</li> <li>- Other, specify: _____</li> <li>- No concern</li> </ul>	
CC3	<p>The next question is about your concerns on quality of health service, which means the service is available, and you are able to receive the service, but you are not satisfied with the service Do you have concerns in the quality of health service?</p> <p>Prompt:</p>	<ul style="list-style-type: none"> <li>- Safety: quality care should avoid harms to people whom the care is intended</li> <li>- Timely: waiting time and delays</li> <li>- Efficient: maximize the be benefit of available resources</li> <li>- Other, specify _____</li> <li>- No concern</li> </ul>	

	<p>If the participant expressed no concern, prompt it can be related with safety, timely, or efficiency of the service provided.</p> <p><i>Please record all that the participant mentioned.</i></p>		
CC4	<p>We have spoken about concerns related with health services, now Is like you to think about the environment around your household or at work that can potentially harm yours or others' health.</p> <p>Do you have concerns related with your house, around your house, or things/ animals belong to your household, that could harm your health or other's health?</p> <p>Prompt: If the participant expressed no concern, prompt- it can be part of the structure of the house like wall, floor material; or something inside of the house related with health like toilet, drinking water source; or animals the household own; in the yard, garden of the household.</p> <p><i>Please record all that the participant mentioned.</i></p>	<ul style="list-style-type: none"> <li>- House (e.g. wall, roof, floor)</li> <li>- Amenities (e.g. toilet, cooking stove, mosquito net, drinking water)</li> <li>- Animals (e.g. free range pigs in the yard)</li> <li>- Other factors in and around the house, specify_____</li> <li>- No concern</li> </ul>	
CC5	<p>Do you think there are some risks to your or others' health related with work?</p> <p>Prompt: If the participant expressed no concern, prompt: for example, you often risk to get injured when you work, certain things/ products used at your work can harm your health. If you work in the forest or in the rice farm, there are some insects or wild animal can harm you too.</p>	<ul style="list-style-type: none"> <li>- Risk to physical injuries</li> <li>- Risk of chemical exposures</li> <li>- Risk of exposure to nature environment (e.g. mosquito, snake bite)</li> <li>- Other work-related risk factors, specify_____</li> <li>- No concern</li> </ul>	

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	<i>Please record all that the participant mentioned.</i>		
CC6	Do you have other concerns about health of yours or people around you? <i>Please record all that the participant mentioned.</i>	Presence of disease or symptoms (respondent's or other people) Other, specify _____ No other concerns	
CC7	Thank you very much for sharing your concerns. You have told me your concerns are: [show results of CC1-CC6] Now, could you (pick the biggest 3 concerns and) rank them? Start from the biggest concern.  <i>If the participant expressed less than 3 concerns, then rank the concern(s) mentioned, and select "NA" in the unused field.</i>	<b>Top1:</b> _____ <b>Top2:</b> _____ <b>Top3:</b> _____	Automatic showing a list of options selected for CC1-CC6, and pick from the options.

<b>Adult women section</b>			
Code	Question	Answers	Skip logic
W1	Now I would like to talk about family planning - the various ways or methods that a couple can use to delay or avoid a pregnancy. Have you ever heard of (METHOD)? (Check all that applied)	Condom Pill IUD Injectables Implants Female condom Emergency contraception Standard days method Lactational amenorrhea method Rhythm method Withdrawal Female sterilization Male sterilization Other modern method, specify: _____ Other traditional method, Specify: _____ None Refuse to answer	
W2	Are you currently pregnant?	Yes→W5 No or unsure	If yes, W5
W3	Are you or your partner currently doing something or using any method to delay or avoid getting pregnant?  Prompt: are you or your partner doing any of the following to avoid pregnancy: deliberately avoiding sex on certain days, using a condom, using withdrawal or using emergency contraception?	Yes No→W5 Refuse to answer→W5	If No or Refuse to answer, then W5

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W4	<p>What are you currently using?</p> <p><b><u>Do not read the answer, check all that applied.</u></b></p>	<p>None</p> <p>Female sterilization</p> <p>Male sterilization</p> <p>IUD</p> <p>Injectables</p> <p>Implants</p> <p>Pill</p> <p>Condom</p> <p>Female condom</p> <p>Emergency contraception</p> <p>Standard days method</p> <p>Lactational amenorrhea method</p> <p>Rhythm method</p> <p>Withdrawal</p> <p>Other modern method, specify: _____</p> <p>Other traditional method, specify: _____</p>	
W5	<p>Now I would like to ask about all the birth you have had during your life. Have you ever given birth?</p> <p>(if No prompt: including the times that a child was born alive but later died, or born dead)</p>	<p>Yes</p> <p>No → End of the section</p>	<p>If No, then end of the section.</p>
W6	<p>Now I would like to ask some questions about your last birth</p>		
W7	<p>How long ago it was?</p>	<p>_____ years → W9</p> <p>Don't know → W8</p>	
W8	<p>How old is the child now?</p>	<p>Age _____ years</p> <p>Don't know</p>	<p>If W7=don't know</p>
W9	<p>Did you see anyone for antenatal care for this pregnancy?</p>	<p>Yes</p> <p>No → W12</p>	<p>If No, then W12</p>
W10	<p>Where did you receive antenatal care for this pregnancy?</p> <p>Anywhere else?</p>	<p><u>Home</u></p> <p>Her home → W11</p> <p>Other home → W11</p>	<p>If W10= Home/ others then W11</p>

	<p>Check all that apply</p> <p>[Insert locally relevant list of health facilities]</p>	<p><u>Public sector →W12</u>                  Government hospital                  Government health centre                  Government health post                  Other public sector</p> <p><u>Private medical sector →W12</u>                  Private hospital                  Private clinic                  Other private medical facility</p> <p><u>NGO medical sector → W12</u>                  NGO hospital                  NGO clinic                  Other NGO medical</p> <p><u>Other, specify: _____ --&gt;W11</u></p>	
<p>W11</p>	<p>Whom did you see when you received the antenatal care at [her home/ other home]? Anyone else?</p> <p><i>Check all that apply</i></p> <p>Prompt: probe to have information on the health care worker's professional background. Distinguish among different health care professionals.</p> <p>[insert locally relevant list]</p>	<p><u>Health personnel</u>                  Doctor                  Nurse/midwife                  Auxiliary midwife</p> <p><u>Other person</u>                  Traditional birth attendant                  Community health worker/                  Field worker</p> <p><u>Other, specify: _____</u></p>	
<p>W12</p>	<p>Where did you give birth to this child?</p>	<p><u>Home</u>                  Her home →W13                  Other home →W13</p> <p><u>Public sector →End of the section</u></p>	



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		<p>Government hospital Government health centre Government health post Other public sector</p> <p><u>Private medical sector</u> →End of the section Private hospital Private clinic Other private medical sector</p> <p><u>NGO medical sector</u> NGO hospital NGO clinic Other NGO medical <u>Other, specify:</u> _____ --&gt;W13</p>	
W13	<p>Who assisted with the delivery?</p> <p>Prompt: probe to have information on the health care worker’s professional background. Distinguish among different health care professionals.</p> <p>Check all that apply</p>	<p><u>Health personnel</u> Doctor Nurse/midwife Auxiliary midwife</p> <p><u>Other person</u> Traditional birth attendant Community health worker/ Field worker</p> <p><u>Other, specify:</u> _____</p>	If W12= Home

Children's section			
Code	Question	Answers	Skip logic
C1	We would like to ask you question about the [NAME]' health, including breastfeeding, vaccination history. Are you willing to answer the questions? Do you think you are able to answer the questions?	No, I don't want to/ or cannot answer the questions → C2 Yes, I'm willing to and able to answer the questions→C3	If No, then C2
C2	Could you tell us who is the best person to answer the questions about [Name] health?	Identify the member list, and ID	Restart from C1 with the person pointed
C3	Relationship of the person answering the question to the child	Mother Father Adopted/foster/ stepmother adopted/foster/ stepfather Grandmother Grandfather Sister Brother Other, specify: _____	
C4	Has [NAME] ever been breastfed?	Yes No→C7	If No, then C7
C5	Is [NAME] still breastfed?	Yes No→7	If No, then C7
C6	Did (NAME) drink or eat anything other than breast milk yesterday or last night? Including plain water, other milk, non-milk liquid, or complementary food)	Yes No	
	<b>Vaccination history</b>		<b>Only ask if 0-35 months child→ C7-C17, else C18</b>
C7	Now I would like to ask some questions about vaccinations received by [NAME].	Yes, has only a card Yes, has only another document Yes, has card and other document	

	Do you have a card or other document where (NAME)'s vaccinations are written down?	No, no card and no other document → C15	
C8	May I see the card or other document where (NAME)'s vaccinations are written down?	Yes, only card seen Yes, only other document seen Yes, card and other document seen No card and no other document seen → C15	If NO then C16
C9	<i>Don't need to ask the question, compare the record in the vaccination card or document with vaccination schedule of Thailand. Check appropriate vaccines according to the child's age, and choose the option.</i>  <i>(show card)</i> <i>Use the vaccination schedule in the show card to compare with the child's vaccination card</i>	Completed all age-appropriate vaccines → C12 Missing 1 dose age-appropriate vaccine Missing more doses age-appropriate vaccines	If completed all age-appropriate vaccines, then C12
C10	Were age-appropriate doses of hepatitis B vaccination given according to the vaccination card or other document?	Yes, completed all age-appropriate doses – C12 Received the birth dose, but some doses missing according to children's age → C12 There is no record showing hepatitis B vaccination was given	
C11	At or soon after birth, did (NAME) receive a Hepatitis B vaccination, that is, an injection in the thigh to prevent Hepatitis B?	Yes No Don't know	If C11= There is no record
C12	Was a dose of vitamin A supplement given in the past 6 month according to the vaccination card or other document?	Yes → C14 No	
C13	In the past 6 months, did [Name] receive a vitamin A dose. (Show common type of ampules/capsules/syrups)	Yes No Don't know	If C13=No
C14	Ask the respondent for permission to photograph vaccination card or other document where vaccinations are written. If permission is granted, photograph card.	Photograph taken Photograph not taken, permission not received Photograph not taken, other reason	

		➔ End of the section	
C15	Did (NAME) ever receive any vaccinations to prevent (NAME) from getting diseases, including vaccinations received in campaigns or immunization days or child health days?	Yes No → C18 Don't know	If No/ don't know, then C18
C16	How many times did [Name] receive vaccination?	____ times Reported completed all age-appropriate vaccine Don't know	
C17	At or soon after birth, did (NAME) receive a Hepatitis B vaccination, that is, an injection in the thigh to prevent Hepatitis B?	Yes No Don't know	
C18	In the past 6 months, did [Name] received vitamin A dose. Show common type of ampules/capsules/syrups )	Yes No Don't know	All under 5 years

**The end of questionnaire**

# BMJ Open

## DEFINING THE HIDDEN BURDEN OF DISEASE IN RURAL COMMUNITIES IN BANGLADESH, CAMBODIA AND THAILAND: A CROSS-SECTIONAL HOUSEHOLD HEALTH SURVEY PROTOCOL

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## DEFINING THE HIDDEN BURDEN OF DISEASE IN RURAL COMMUNITIES IN BANGLADESH, CAMBODIA AND THAILAND: A CROSS-SECTIONAL HOUSEHOLD HEALTH SURVEY PROTOCOL

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### Abstract

#### Introduction

In low- and middle-income countries in Southeast Asia, the burden of diseases among rural population remains poorly understood, posing a challenge for effective healthcare prioritization and resource allocation. Addressing this knowledge gap, the South and Southeast Asia Community-based Trials Network (SEACTN) will undertake a survey that aim to determine the prevalence of a wide range of non-communicable and communicable diseases, as one of the key initiatives of its first project- the Rural Febrile Illness project (RFI). This survey, alongside other RFI studies that explore fever etiology, leading causes of mortality, and establishing village and health facility maps and profiles, will provide an updated epidemiological background of the rural areas where the network is operational.

#### Methods and analysis

During 2022-2023, a cross-sectional household survey will be conducted across three SEACTN sites in Bangladesh, Cambodia, and Thailand. Using a two-stage cluster-sampling approach, we will employ a probability-proportional-to-size sample method for village, and a simple random sample for household,

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3 selection, enrolling all members from the selected households. Approximately 1500 participants will be  
4 enrolled per country. Participants will undergo questionnaire interview, physical examination and  
5 hemoglobin point-of-care testing. Blood samples will be collected and sent to central laboratories to test  
6 for chronic and acute infections, and biomarkers associated with cardiovascular disease, and diabetes.  
7 Prevalences will be presented as an overall estimate by country, and stratified and compared across sites  
8 and participants' sociodemographic characteristics. Associations between disease status, risk factors, and  
9 other characteristics will be explored.  
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## 12 Ethics and dissemination

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14 This study protocol has been approved by the Oxford Tropical Research Ethics Committee, National  
15 Research Ethics Committee of Bangladesh Medical Research Council, the Cambodian National Ethics  
16 Committee for Health Research, the Chiang Rai Provincial Public Health Research Ethical Committee. The  
17 results will be disseminated via the local health authorities and partners, peer-reviewed journals, and  
18 conference presentations.  
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21 300/300

## 22 Trial registration

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24 Clinicaltrials.gov, NCT05389540.  
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## 27 Strengths and limitations

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- 30 • The study will utilize diverse methods (interviews, physical examinations, and laboratory tests)  
31 to gather extensive data on the prevalence, risk factors, healthcare utilization patterns of both  
32 communicable and non-communicable diseases
  - 33 • The use of two-stage cluster sampling enables the sample to be representative of each study  
34 area.
  - 35 • As an integrated component of the Rural Febrile Illness project, the findings will be synergized  
36 with outcomes of concurrent studies in these specified regions, offering a multidimensional  
37 overview of health and healthcare provision.
  - 38 • The findings are specific to the selected rural areas, and should be interpreted with caution  
39 when considering broader implications for rural populations in the study countries.  
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## 44 Introduction

45 Life expectancy in Southeast Asia increased from 63 to 71 years between 2000 and 2019 (1). These positive  
46 changes can be attributed, in part, to advancements in the region's health systems, which have addressed  
47 traditional high-burden diseases, such as infectious diseases, maternal and neonatal health, and under 5  
48 mortality (2). Despite these improvements, the burden of traditionally significant diseases persists,  
49 particularly in rural areas. Furthermore, there is a transition in disease epidemiology due to rapidly  
50 changing environments, growing economies, and ageing populations (3). The shift is marked by a rising  
51 burden of non-communicable diseases and injuries, along with emerging infectious diseases (e.g. COVID-  
52 19 and chikungunya) (4,5).  
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3 The knowledge of current disease epidemiology in the region, however, is limited, constraining health  
4 systems' ability to identify healthcare priorities and direct future resource allocation (6). While the Global  
5 Burden of Disease study provides insights into disease burdens across countries and diseases, the accuracy  
6 of its results is impeded by the scarcity of recent epidemiological data (6).. Given the limited coverage of  
7 disease reporting and surveillance systems in the region, research data is pivotal in bridging this  
8 information gap. Such data not only offers up-to-date information for modeling studies, but is also critical  
9 for optimizing resource allocation by including factors such as disease severity, the magnitude of the  
10 population affected, and equity (7).

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13 Moreover, the marked systemic disparities in healthcare between rural and urban areas in the region  
14 highlight the need for rural-specific epidemiological data(3). Despite 50%- 85% of the region's population  
15 residing in rural areas, this large population group remains relatively understudied compared to  
16 countrywide estimates (8–13). In this context, cross-sectional surveys are an effective research method  
17 to provide timely estimates of disease prevalence in rural communities, through cost-effective approaches  
18 combining questionnaire interviews, clinical examinations, and laboratory tests.

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21 The newly-formed South and Southeast Asia Community-based Trials Network (SEACTN) aims to establish  
22 a network of community-based healthcare providers and facilities capable of implementing interventions  
23 designed to triage, diagnose, and treat patients within rural communities across five South and Southeast  
24 Asian countries (Bangladesh, Cambodia, Laos, Myanmar, and Thailand) (14). The first project is the Rural  
25 Febrile Illness Project (RFI), dedicated to delineating the epidemiological baseline of febrile illness in  
26 remote and underserved regions, where febrile illness and access to healthcare pose significant health  
27 challenges (14). RFI encompasses diverse initiatives designed to gain a multifaceted understanding of the  
28 health dynamics within these communities to effectively facilitate the identification of interventions for  
29 future studies across SEACTN. Recognizing the gaps in understanding of disease prevalence, a cross-  
30 sectional household health survey has been planned as one of the key initiatives of the RFI.

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32  
33 This survey aims to define the prevalence of a broad spectrum of communicable and non-communicable  
34 causes of health conditions in areas where the network operates. Alongside the survey, other key  
35 initiatives of RFI include a fever etiology study to determine the incidence, causes, and outcomes of febrile  
36 illness; a verbal autopsy study to identify common causes of mortality and the circumstances surrounding  
37 death; and a village and health facility mapping study creating a detailed profile of the study villages,  
38 estimating travel time to health facilities, and identifying health service provision gaps. Each initiative  
39 holds significant value as an independent study, and their results will be complementary providing a  
40 thorough comprehension of healthcare needs and enabling more equitable resource allocation.

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## Methods and analysis

The SEACTN household health survey is a community-based cross-sectional survey aiming to provide an overview of the burden of disease in selected rural areas where the network is operational. The first participant was enrolled on October 3, 2022, and data collection is expected to continue until December, 2023.

## Primary objectives and outcomes

1. To determine the prevalences of selected diseases and exposure to locally prevalent or important pathogens, including, but not limited to:
  - a. Immunoglobulin G (IgG) against selected common pathogens causing fever.
  - b. Hepatitis B and C
    - i. Hepatitis B virus (HBV) surface antigen
    - ii. IgG against Hepatitis C virus (HCV) and presence of HCV
  - c. Selected non-communicable diseases (e.g. diabetes, raised blood cholesterol, hypertension, stroke) according to self-reported disease history, and/or physical examinations, and/or laboratory tests.
  - d. Self-reported illness or injury in the past 30 days.
    - i. Any acute conditions (e.g. fever, persistent cough, watery diarrhea)
    - ii. Injury or death caused by an accident
2. To determine the point prevalence of different self-perceived health statuses.
3. To determine the prevalences of major risk factors for common non-communicable diseases (e.g. smoking, alcohol consumption, overweight).

## Study population and setting

All SEACTN operational areas were selected by partner organizations as they represent poor, remote, and rural communities with limited access to formal healthcare (14). This study will be conducted in three areas, consisting of 391 villages in Bangladesh, Cambodia and Thailand (Figure 1). The other sites will not take part of the study due to operational constraints.

Two-stage cluster sampling will be used to obtain a representative sample from each study site. In the first stage, 75 villages will be selected using the probability-proportional-to-size sample method (15–17). For the second stage, within each village, a simple random sample of five to seven households (adjusted to the average household size) will be selected using computer-generated random sampling from the village household list.

### *Inclusion and exclusion criteria*

For each selected household, all usual household members or visitors who stayed overnight in the households before the survey are eligible to be enrolled (18).

## Sample size

This study is adequately powered to determine the prevalences of all key indicators within each age group, with a design effect of 1.5 and a range of 5-10% degrees of precision, while considering a maximum of 1500 participants per study country (Table 1). To account for a 10% non-response rate, assuming an average household size of 4.5 persons, and enrolling all household members, the final sample size was adjusted to 1667 participants per country (19–21).

The minimal sample size required was calculated based on the estimated prevalences of key indicators overall and within each population age group (Table 1). Prevalence estimates, population proportions within each age group, and average household size, were derived from previously conducted national health surveys and published studies, preferably from the study country, or from countries with a similar

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3 epidemiological context (19–29). When the estimated prevalence of an indicator varied across study  
4 country, the highest prevalence estimates were applied.  
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## 8 Study procedures

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10 Standard operating procedures (SOPs) were developed for field procedures, sample collection and  
11 transportation. Training materials were developed and training sessions were delivered to all the study  
12 staff directly, or using a train-the-trainer model where field supervisors and managers will be trained first  
13 and then subsequently train other field staff. All research staff are experienced in community-based  
14 research or interventions. Experienced phlebotomists were recruited and trained in specimen collection  
15 and processing in the field. A monitoring and evaluation plan was devised to maximize the research quality.  
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### 18 *Patient and Public Involvement Statement*

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20 The potential challenges for the study include comprehensibility of the questionnaires, and willingness of  
21 selected households to participate. We have proactively addressed these concerns by involving the target  
22 population in the questionnaire validation process (section: Questionnaire interviews), and planning  
23 community mobilization events before the survey, tailored to the local context.  
24

25 Collaborators will identify contact points from local stakeholders and communities, such as village leaders,  
26 local health center staff, or community health workers, and determine the most suitable methods for  
27 establishing contact. Main events may involve community engagement meetings to explain the study  
28 purpose, organization and procedures, and the plan for dissemination of study results. Prior to the survey  
29 day for each village, the study team will meet, or call if physical meetings are not feasible, the household  
30 head or members of the selected households. With the support of the key contact persons, this interaction  
31 will create an opportunity to address questions or concerns, enabling the survey teams to work with each  
32 community and selected household to plan an effective data collection schedule.  
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### 35 *Survey schedule*

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37 On the scheduled survey day for each village, stations will be set up at a convenient location within or  
38 near the village. Household members will arrive at the survey location following their appointment to  
39 complete the procedures (Figure 2). If household members do not attend the data collection at the  
40 appointment time, they will be contacted and encouraged to join the survey at another time during the  
41 day, while the research team were in the village.  
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### 44 *Informed Consent*

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46 Participants must sign the informed consent form before any study-specific procedures are performed.  
47 The informed consent will be available in the official local language. It will be presented to prospective  
48 participants by trained study staff detailing the study procedures and implications of study participation.  
49 It will be made explicit that participation is voluntary and participants are free to withdraw from the study  
50 at any time. If necessary, the informed consent process will be interpreted to dialect when participants  
51 do not speak the official local language.  
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53 Adequate time will be given to study participants to consider the information and ask questions. Written  
54 consent will then be obtained from the participants, or the caretakers of participants, in compliance with  
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3 local legal age requirements, using the participant's dated signature or thumbprint (if unable to write) and  
4 dated signature of a person who presented and obtained the informed consent. A copy of the signed  
5 Informed Consent document will be given to the participant. Children aged as dictated by local legislation  
6 and regulations will be required to sign the written informed assent form in addition to their parent or  
7 guardian signing a consent form.  
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### 10 *Questionnaire interviews*

11 The questionnaire consists mostly of questions adapted from well-validated and widely implemented  
12 tools (Appendix A). This approach enables direct comparison of results with previously conducted surveys  
13 by incorporating questions from the Demographic and Health Surveys (DHS), World Health Organization  
14 (WHO) STEPwise surveys for Non-communicable Disease Risk Factors (STEP), and the World Health Survey  
15 (30–32).  
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18 The questionnaire underwent adjustments and validation through pretests using behavior coding and  
19 participant debriefing (33,34). During mock interviews, the observer of each interview pair recorded the  
20 interaction problems for each question, such as “major change in wording”, “question reading interrupted  
21 by the respondent”, or “additional prompt is provided”. All interviewers, interviewees, and the observers  
22 participated in the debriefing. The pretest was conducted initially among peer researchers in English.  
23 Subsequently, the adjusted version was translated into Thai and tested among the target population in  
24 Thailand. This ensured the questionnaire's suitability, comprehensibility, and appropriate length for  
25 administration. The final questionnaire was then translated into the official languages of each study  
26 country (Bangla, Khmer, and Thai) by professional translators or dedicated staff from partner  
27 organizations, and validated by the local research teams. When necessary, during face-to-face interviews,  
28 questions will be interpreted to dialect for participants who do not speak the official local language.  
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32 The questionnaire consists of four sections answered by household members based on their sex and age  
33 (Figure 2, top).  
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- 35 • The household section is completed by the household head, providing information on household  
36 characteristics, and a list of all household members along with any illnesses in the past 4 weeks  
37 and health seeking behavior.
- 38 • The adult section is for household members aged 15 years or older and includes questions on  
39 socio-demographic characteristics (e.g., age, sex, education, marital status, and occupation),  
40 disease history (e.g. tuberculosis, diabetes, cardiovascular disease), self-perceived health status,  
41 health concerns, substance use (e.g., tobacco and alcohol), and other disease risk factors.
- 42 • The women's health section is for female household members aged 15 years or older, and  
43 includes questions on contraception use, utilization of antenatal care and delivery services.
- 44 • The children's health section is answered by caretakers of children under 5 years, providing  
45 information on each child's vaccination and breastfeeding history.  
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### 48 *Physical examination*

49 All household members will undergo weight, height, and tympanic temperature measurements. Children  
50 under 5 years will also have their mid-upper arm circumference (MUAC) measured, and adult household  
51 members ( $\geq 15$  years) will undergo blood pressure measurement (Figure 2, middle). Weight will be  
52 measured with a digital scale, preferably with a taring function allowing a child's weight to be measured  
53 while being held by an adult. Height measurements will be carried out with measuring scales/boards.  
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3 Children younger than 24 months will be measured lying down on the board, while standing height will  
4 be measured for older children. Tympanic temperature will be measured with infrared thermometers.  
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6 All measures will be taken by experienced and trained staff. Consistency and comparability will be ensured  
7 by using the same validated devices previously used in studies in similar settings, whenever possible,  
8 across study sites.  
9

### 10 *Blood sample collection and point-of-care hemoglobin test*

11 Blood samples will be collected from participants aged six months or older (Figure 2, bottom). For  
12 participants aged 6 months to under five years, four dried blood spots (DBS) will be collected via finger or  
13 heel prick. Participants aged five years or older will provide venous blood samples, with four milliliters  
14 collected from those aged five to under 15 years, and six milliliters from participants aged 15 years or  
15 older (Figure 2, bottom). After blood sample collection, appropriate samples will be tested for hemoglobin  
16 using HemoCue® Hb 301 system (HemoCue®AB, Ängelholm, Sweden) to detect anemia.  
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20 The venous blood samples will be temporarily stored in cool boxes between 4°C and 8°C, for a maximum  
21 of 24 hours before centrifugation in the field laboratories. Aliquots of whole blood, serum, plasma, and  
22 packed red blood cells of these samples will be stored at a minimum of -20°C or below without freeze-  
23 thaw until analysis. DBS will be air-dried in the laboratory for at least six hours, after which they will be  
24 placed in a plastic zip-lock bag and stored at room temperature or at 4°C or below.  
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### 27 *Information, consultation and referral*

28 Upon completion of the field procedures, individual participants will receive the results of their  
29 hemoglobin test and physical examinations. Participants with abnormal results will be referred to a study  
30 nurse who will provide recommendations and, if the participant wishes, further referrals in accordance  
31 with local guidelines.  
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### 34 *Non-responders*

35 Household members who fail to attend the survey (who are absent, refuse participation, or for other  
36 reasons) will have their demographic characteristics (e.g., sex, age) summarized from the information  
37 obtained from the household head in the household section of the questionnaire, to determine whether  
38 systematic differences exist between responders and non-responders.  
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## 44 **Analysis of blood samples**

45 Sample aliquots and DBS will be shipped to the central laboratories in Bangkok, Thailand where they will  
46 be analyzed. All laboratory activities will be performed by experienced and trained staff. All laboratory  
47 procedures will be performed using validated SOPs. Multiplex serology tests based on Luminex xMAP  
48 Intelliflex® System will be developed and validated for measures of IgG and immunoglobulin M (IgM) of  
49 common pathogens causing fever; all other methods have already been published in peer-reviewed  
50 journals.  
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53 Malaria quantitative polymerase chain reaction (qPCR) will be performed for all participants to identify  
54 individuals with malaria parasites. The PCR methods typically have a detection level in the range of 100-  
55 1000 parasites per milliliter(35). Genus-specific qPCR targeting Plasmodium 18S rRNA genes will first be  
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3 performed to screen for positive individuals, and then species-specific assays will be performed to  
4 differentiate the parasite species (*Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium*  
5 *malariae*, *Plasmodium ovale*, and *Plasmodium knowlesi*) (36–39).  
6

7 Serology tests for selected common pathogens causing fever including IgG and IgM for Dengue,  
8 Chikungunya, Japanese encephalitis, Zika, SARS-CoV-2, *Plasmodium vivax*, *Plasmodium falciparum*,  
9 *Orientia tsutsugamushi*, *Rickettsia spp.*, and *Leptospira spp.* will be performed for all participants.  
10

11 Tests for hepatitis B and C: all participants will be tested for HBV surface antigen; participants 15 years or  
12 older will also be tested for IgG for HCV, and the positive samples will undergo HCV PCR.  
13

14 Non-communicable disease-related markers: participants 15 years or older will be tested for Hemoglobin  
15 A1c, total cholesterol and high-density lipoprotein cholesterol.  
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18 Additionally, the remaining samples will be tested for exposure to, or presence of, pathogens associated  
19 with selected diseases that are regionally or locally prevalent or important. The final list of diseases,  
20 pathogens, and sample selection will be adjusted based on findings from other SEACTN studies exploring  
21 diagnostics and prognostics in febrile patients, and other available evidence.  
22

## 23 Results feedback

24 Individual-level data collected from physical examinations and hemoglobin tests will be provided on the  
25 same day once all field procedures are concluded for an individual participant (Section: Study procedure-  
26 Information, consultation and referral). Additionally, participants will be thoroughly informed about the  
27 implications of the laboratory tests to be performed during the consent process. They will be presented  
28 with the option to receive the results of hepatitis B and C tests. If they wish to receive them, the results,  
29 once available, will be placed in a sealed envelope and will then be delivered by the local health providers  
30 or village leaders to the participants. It is anticipated that there will be a delay of approximately six months  
31 to one-year from sample collection to results feedback. The timeframe encompasses the completion of  
32 data collection at the entire site, transportation of samples to Bangkok, sample management, analysis,  
33 and the subsequent return of results. The decision on which results to provide to individual participants  
34 is made in consultation with the site research teams and local clinicians, considering factors such as their  
35 clinical relevance, the potential harm that could result from a lack of consultation upon results distribution,  
36 and the accessibility of treatment.  
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## 42 Planned analysis

43 All data obtained through questionnaire interviews, physical examinations, and hemoglobin point-of-care  
44 tests will be collected on tablets using an electronic data collection platform - Open Data Kit (40). The  
45 electronic case report form has built-in validation rules to identify missing or potentially incorrect data.  
46 Stringent checks are applied to variables used to estimate the study outcomes, such as recent fever history,  
47 diabetes history, and weight. Survey interviewers cannot progress to the next question if these data are  
48 missing or outside the defined ranges. Throughout the survey, data will be continuously updated and  
49 monitored for quality. Data queries and quality reports will be generated every two to four weeks for  
50 data verification and correction, and to identify areas needing additional training and support, ensuring  
51 data integrity.  
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3 For descriptive summaries, means and standard deviations (SD) or medians with interquartile range (IQR)  
4 for continuous variables, and proportions for categorical variables will be calculated. Outcomes will be  
5 presented as an overall estimate by country, and with 95% confidence intervals, stratified and compared  
6 across sites and participants' sociodemographic characteristics using appropriate tests, such as the  
7 Student's t-test, Mann-Whitney U tests or chi-squared tests. Associations between disease status, risk  
8 factors, self-perceived health status, and other characteristics will be explored through univariate and  
9 multivariate analyses, and measures of effect will be reported with 95% confidence intervals. Sampling  
10 weights will be accounted for, as needed, in the analysis.  
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## 14 Discussion

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16 This prevalence survey conducted across three rural SEACTN study sites in Bangladesh, Cambodia, and  
17 Thailand aims to provide a comprehensive epidemiological description of the study areas. Employing a  
18 multi-faceted approach, including questionnaire interviews, laboratory tests, and physical examinations,  
19 the study will yield extensive data on the prevalence, risk factors, healthcare utilization patterns of both  
20 communicable and non-communicable diseases. The findings will contribute to improved estimates of the  
21 burden of disease, and deepen the comprehension of findings from other RFI initiatives, offering a  
22 thorough overview of health and healthcare provision in these areas. The survey will be invaluable for  
23 setting healthcare priorities and directing resource allocation for health system development.  
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26  
27 As a core component of RFI, this survey, alongside other initiatives, adopts an integrated approach to  
28 address health challenges more effectively, particularly in the context of the "double burden of disease",  
29 characterized by the rising burden of non-communicable diseases, alongside ongoing challenges posed by  
30 infectious diseases and sub-optimal maternal and child health (2). This survey will encompass various  
31 dimensions of health, allowing for further exploration of associations among disease occurrence, risk  
32 factors, and self-perceived health. Key data from the survey, such as household wealth status, and  
33 community members' perception of their health and health concerns, will contextualize the findings from  
34 the other three RFI studies, and provide insights into potential health disparities and inequalities. By  
35 integrating disease prevalence with fever etiology and causes of death, a multi-layered understanding of  
36 health dynamics in the study area could be attained. Additionally, knowledge from the survey will play a  
37 vital role for estimating incidence. This involves assimilating data on proportion of the population with  
38 fever who visited various healthcare providers from the survey, with the number of fever patients  
39 recruited from the village health workers or health facilities, captured from the fever etiology studies.  
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43 The study will also bridge the gap in community-based seroprevalence estimates for common pathogens  
44 causing fever, minimizing biases related to health-seeking behavior in facility-based studies. The data can  
45 also to be used for population-based incidence estimates (41,42). Furthermore, the updated prevalences  
46 of hepatitis B and C can be instrumental in evaluating the coverage and effectiveness of HBV vaccination  
47 programs, and inform HCV screening and treatment strategies in the region in the era of direct-acting  
48 antiviral agents (43,44). This study also extends its scope to gather insights into the health perspectives  
49 and concerns of community members, facilitating the alignment of future interventions with the needs  
50 and expectations of the population. Specifically, for self-perceived status, while existing studies primarily  
51 focus on the elderly population, this study encompasses a broader age range(45–48). This can inform  
52 tailored interventions to improve the quality of life for a more extensive population (49–51).  
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3 This study encourages regional collaboration by applying consistent research methods and seeking  
4 representative samples across study sites, allowing effective cross-country comparisons and fostering  
5 collaborative approaches to address shared health challenges (3).  
6

7 The findings of this study are limited in their generalizability and should be interpreted with caution  
8 when considering broader implications for rural populations in the study countries. However, the study  
9 was specifically designed for and conducted within the selected rural areas of Bangladesh, Cambodia,  
10 and Thailand, where SEACTN is operational. This focused approach allows for insights into health  
11 challenges and opportunities within these areas. The cross-sectional design and observational nature of  
12 the study is at risk of, such as temporal bias, selection bias, and participation bias. However, to minimize  
13 the bias as much as possible, we designed the survey with appropriate evaluation methods, and  
14 adequate training and supporting material will be well prepared for the field work.  
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18  
19 This planned household prevalence survey will significantly contribute to disease prevention and control  
20 in the region by offering a comprehensive understanding of health conditions of the rural populations.  
21 Complementing the results from other RFI initiatives, it will serve as a foundation for evidence-based  
22 interventions, shaping future research and disease control priorities. The study findings will not only serve  
23 the next phase of SEACTN but also extend to the broader context, ultimately leading to improved health  
24 outcomes in rural communities.  
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## 27 28 Ethics and dissemination

29  
30 This study protocol was approved by the Oxford Tropical Research Ethics Committee (OxTREC Ref: 6-22),  
31 National Research Ethics Committee of Bangladesh Medical Research Council (BMRC/NREC/2022-  
32 2025/69), the Cambodian National Ethics Committee for Health Research (23rd December 2022 NECHR),  
33 the Chiang Rai Provincial Public Health Research Ethical Committee (CRPPHO 75/2565).  
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## 36 Safety considerations

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38 Participants may experience slight discomfort during the blood draw, however, our experienced clinical  
39 staff performing the phlebotomy will take special attention to minimize this discomfort. While some  
40 interview questions may be personal, all data will be handled confidentially, and linked only to study IDs.  
41 Participants will also be informed of their right to skip questions or end the interview if they feel  
42 uncomfortable.  
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## 45 Data deposition and curation

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47 The database and all electronic data will be stored on secure servers that are backed up daily, with  
48 weekly off-site storage. Paper records, if they exist, will be kept in secure storage such as locked  
49 cabinets; if necessary, the record will be scanned and stored electronically. Study data will be archived in  
50 accordance with Mahidol Oxford Tropical Medicine Research Unit (MORU) SOPs. Electronic data will be  
51 de-identified and preserved indefinitely. Paper records will be preserved for five years after study  
52 completion. With participant's consent, electronic data can be shared according to the terms defined in  
53 the MORU data sharing policy with other researchers for future use (52).  
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## Dissemination

The results of the study will be summarized in plain language in both English and the official local language. These summaries will be disseminated via the local health authorities and partners. The findings will also be disseminated internationally through conference presentations and peer-reviewed academic journal publications, aligning with Wellcome Trust policy and guidelines.

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## Declarations

### Authors' contribution

MZ, NSNH, TJP contributed to conception and design of the study, and drafted the manuscript.

SI, AS, MAI, AKN, RT, LD, CP, RC, EMB, WT, JW, SDB, SJL contributed to the design of the study, and provided critical review of the manuscript.

NW, CM contributed to the design of the study, data collection platform development, and provided critical review of the manuscript.

SIZ contributed to the design of the study, provided the study sites' map and critical review of the manuscript.

ML, RJM, NPJD, YL contributed to the conception of the study, and provided critical review of the manuscript.

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### Competing interests

Nothing to declare

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## Tables and figures

Table 1. Required sample size tested against the estimated prevalence of key indicators of the highest prevalence, overall and by age groups of interests.

	Expected number of participants	Indicator (estimated prevalence)	Required sample size *
<b>Overall</b>	1500	Overweight (20%)	369
<b>Age groups (years)</b>			
≥15	1050	Current drinker (55%)	570
<5	150	Anemia (30%)	122
15-49	750	Injury or death caused by recent accident (20%)	414

≥50	300	Hypertension (20%)	257
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\*The formula used for calculating sample size is shown below. Assessing the sufficiency of the sample size for the key indicators of the highest prevalences ensures sufficient statistical power for indicators with lower prevalence. A degree of precision of 5% is applied for the sample size calculation overall and across age groups, except for the under 5 years and the 50 years or older groups, for which degrees of precision of 10% and 6% are applied, respectively.

$$n = DEFF \times \frac{Np(1-p)}{\frac{d^2}{1.96^2}(N-1) + p(1-p)}$$

n: Sample size.

DEFF: Design effect. Design effect of 1.5 is used to account for a slightly expected increase in variance due to clustering.

N: population size

p: expected prevalence of key indicators.

d: degree of precision.

Figure 1. The study sites and population of the Cross-sectional Household Health Survey conducted by the South and Southeast Asia Community-based Trials Network (SEACTN).

The Bangladesh site includes 130 villages from Cox's Bazar and Bandarban districts; the Cambodia site includes 82 villages from Battambang and Pailin provinces; and the Thailand site includes 179 villages located in Chiang Rai province.

HHS: The Household Health Survey; SEACTN: the South and Southeast Asia Community-based Trials Network

Figure 2. Questionnaire interviews, physical examinations, and laboratory procedures administered to study participants according to age and sex.

EDTA: Blood sample collection tubes containing ethylenediaminetetraacetic acid.



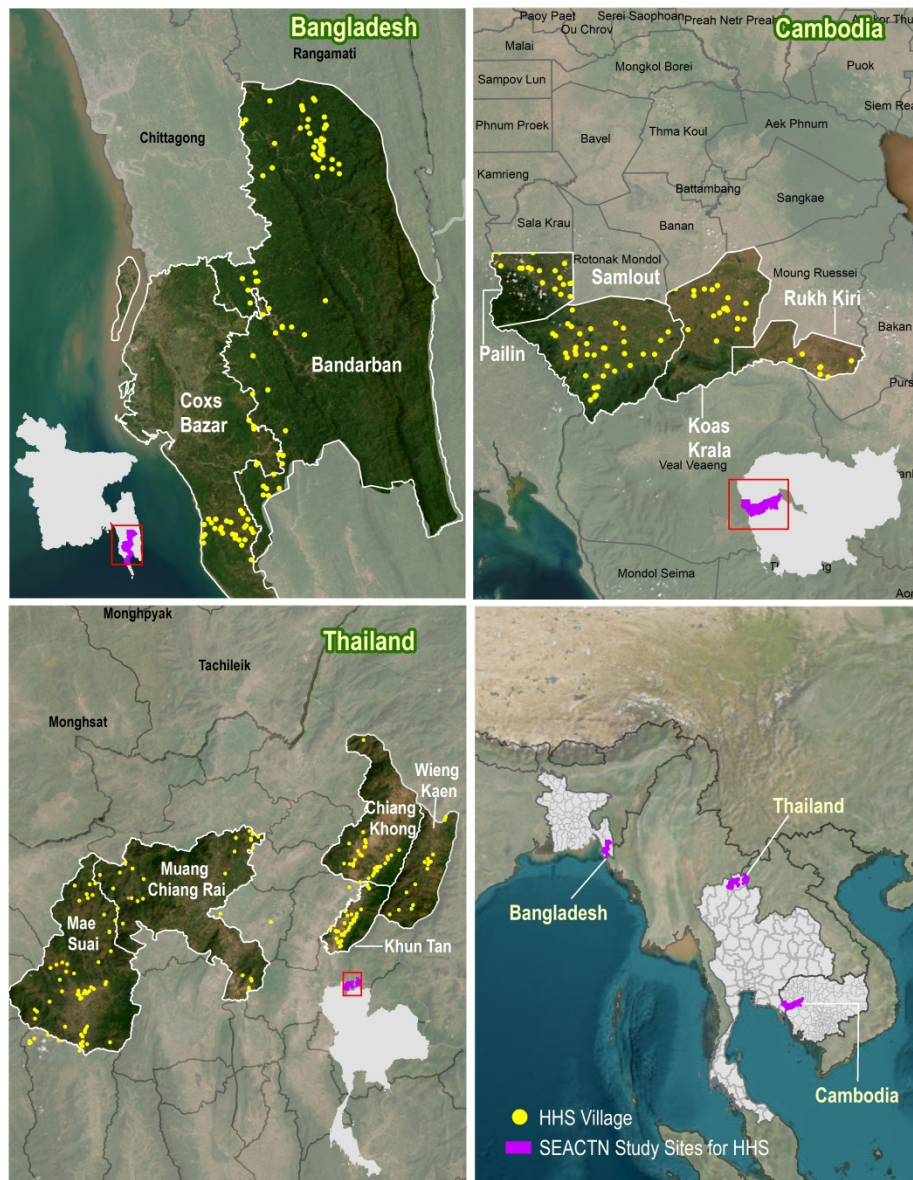


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218x279mm (500 x 500 DPI)



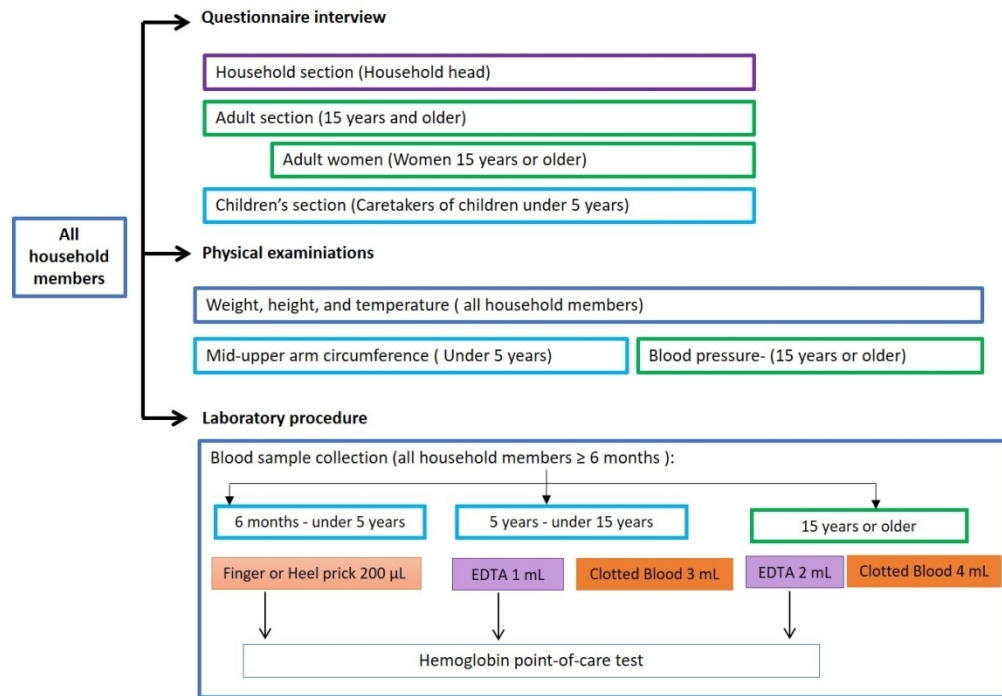


Figure 2. Questionnaire interviews, physical examinations, and laboratory procedures administrated to study participants according to age and sex.

EDTA: Blood sample collection tubes containing ethylenediaminetetracetic acid.

230x161mm (150 x 150 DPI)

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Appendix A. Questionnaire

**DEFINING THE HIDDEN BURDEN OF DISEASE IN RURAL COMMUNITIES IN BANGLADESH, CAMBODIA AND THAILAND: A CROSS-SECTIONAL HOUSEHOLD HEALTH SURVEY PROTOCOL**

Study site:

Village:

Household ID:

For peer review only

Household head section			
Code	Question	Answer	Skip logic
S1a	<p>(Household head or adult member of the household) Please give me the names of the persons who usually live in your household starting from the household head.</p> <p><i>Prompt: Have you told me the names of all the household members, even the ones are not here now?</i></p> <p><i>Record the full name with the study ID in the paper-based household checklist</i></p>	Initials, and assign study ID automatically	
S1b	Could you now give me the names of the guests of the household who stayed here last night?		

S2	What is the relationship of [NAME] to the head of the household?	Head→S3 Wife or husband→S4 Son or daughter→S4 Son-in-law or daughter-in-law→S4 Grandchild→S4 Parent→S4 Parent-in-law→S4 Brother or sister→S4 Other relative→S4 Adopted/ Foster/ Stepchild →S4 Not related→S4 Don't know→S4	If S2=Head then S3, else skip to S4
S3	What is your ethnic group?	Ethnic group1 Ethnic group 2 [insert names of locally relevant ethnic groups]	
S4	Is [NAME] male or female?	Male Female	
S5	Does [NAME] usually live here in the past month?	Yes No	
S6	Did [NAME] stay here last night?	Yes No	
S7	How old is [NAME]?	_____ in year  If age 5-14 years→S8-S10  Else→S1, until completing the information of all the mentioned household members→ S11	Go back to S1 until completing the information of household members.

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S8	Did [NAME] attend school or any early childhood education program at any time during the [2021-2022] school year?	Yes No→S10	If S8=No, then S10
S9	During [this/that] school year, what level [is/was] (NAME) attending?	Early childhood Primary Secondary Higher Don't know  → S1, until the information of all household members is taken →S11	
S10	What is the highest level of school [NAME] has attended?	Early childhood Primary Secondary Higher Don't know  → S1, until the information of all household members is taken → S11	Go back to S1 until completing the list

<b>Household Schedule summary</b>			
Code	Question	Answers	Skip logic
S11	Total persons in household	Auto calculation	
S12	Number of household member >=18 years	Auto calculation	
S13	Number of household member 15-17 years	Auto calculation	
S14	Number of women household member >=15 years	Auto calculation	

S15	Number of school age children 5-14 years old	Auto calculation	
S16	Number of children under 5 years old	Auto calculation	
S17	Just to make sure that I have a complete listing: are there any other people such as small children or infants that we have not listed?	Yes →S1 No	If yes, go to S1
S18	Are there any other people who may not be members of your family, such as domestic servants, lodgers, or friends who usually live here?	Yes→S1 No	If yes, go to S1
S19	Are there any guests or temporary visitors staying here, or anyone else who stayed here last night, who have not been listed?	Yes→S1 No	If yes, go to S1
S20	Is there anybody, who is a household member or a guest who stayed in your household last night, is not here for the survey now?	Yes →S1 No →EQ1	
S21	Can you tell me the names of the people who are not here?	Choose from the Initials and study IDs	
S22	What are the reasons [name] is not here now?	Not available at the time (work or school) Physical illness or disability Mental illness or disability Other reason, specify: _____ Don't know	

<b>Household section</b>			
Code	Question	Answers	Skip logic
	Now I'm going to ask you some questions about your household amenities and possessions. [use Equity Tool of the country. Example Cambodia]		
	Does your household have		
EQ1	... Electricity	Yes No	
EQ2	... a television?	Yes No	
EQ3	... refrigerator?	Yes	

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		No	
EQ4	.... CD or DVD player	Yes No	
EQ5	... wardrobe?	Yes No	
EQ6	...Generator or Battery or Solar panel	Yes No	
EQ7	Does any member of your household own a motorcycle or scooter?	Yes No	
EQ8	... A watch?	Yes No	
EQ9	Does any member of this household have a bank account?	Yes No	
EQ10	What is the main material of the floor?	Ceramic tiles Wood planks Other material	
EQ11	What is the main material of the exterior walls?	Cement blocks Palm / bamboo / thatch Other material	
	<b>Housing</b>		
HH1	<p>What is the main source of drinking water for members of your household?</p> <p><i>(show card)</i> <i>The showcard provided the definitions of the water source categories. Based on the description of the respondent, choose from the categories.</i></p>	<p><u>Piped water</u> Piped into dwelling Piped to yard/plot Piped to neighbour Public tap/standpipe Tube well or borehole</p> <p><u>Dug well</u> Protected well Unprotected well</p> <p><u>Water from spring</u> Protected spring Unprotected spring</p>	If “bottled water”, then HH4

		<p>Rainwater          Tanker truck          Cart with small tank          Surface water          (river/dam/Lake/pond/stream/canal/Irrigation channel)          Bottled water → HH4</p> <p>Other, specify: _____</p>	
HH2	<p>Do you do anything to the water to make it safer to drink?</p> <p><i>Prompt: Participants might not know it's for making the water safer to drink. The interviewer can prompt if they do anything to the water before drinking.</i></p>	<p>Yes          No → HH4          Don't know</p>	
HH3	<p>What do you usually do to make the water safer to drink? Anything else? (check all that apply)</p>	<p>Boil          Add bleach/chlorine          Strain through a cloth          Use water filter (ceramic/sand/composite/etc)          Solar disinfection          Let it stand and settle          Other, specify _____          Don't know</p>	
HH4	<p>What kind of toilet facility do members of your household usually use?</p> <p><i>If the respondent answers in general terms such as "flush toilet," probe to determine where the toilet flushes to; likewise, if the respondent answers "latrine," probe to determine the type of latrine.</i></p>	<p><u>Flush or pour flush toilet</u>          Flush to piped sewer system          Flush to septic tank          Flush to pit latrine          Flush to somewhere else          Flush, don't know where</p> <p><u>Pit latrine</u>          Ventilated improved pit latrine</p>	

	<p><i>(show card)</i></p> <p><i>The show card provides you definitions of types of toilet, according to the description from the respondent choose the appropriate option.</i></p> <p><i>If you cannot choose according to the participants description, show them the pictures on the showcard.</i></p>	<p>Pit latrine with slab</p> <p>Pit latrine without slab/open pit</p> <p>Composting toilet</p> <p>Bucket toilet</p> <p>Hanging toilet/hanging latrine</p> <p>No facility/bush/field</p> <p>Other, specify _____</p>	
HH5	<p>What type of fuel does your household mainly use for cooking?</p>	<p>Electricity</p> <p>Liquefied Petroleum Gas (LPG)</p> <p>Charcoal</p> <p>Wood</p> <p>No food cooked in household</p> <p>Other (specify) _____</p>	
HH6	<p>Does the stove have a chimney or fan?</p>	<p>Yes</p> <p>No</p> <p>Don't know</p>	
HH7	<p>Is the cooking usually done in the house, in a separate building, or outdoors?</p>	<p>In the house</p> <p>In a separate building</p> <p>Outdoors</p> <p>Other, specify: _____</p>	
HH8	<p>Does your household have any mosquito nets?</p>	<p>Yes</p> <p>No → HH10</p>	<p>If HH8=No, then HH10</p>
HH9	<p>How many mosquito nets does your household have?</p>	<p>Number of net _____</p>	
HH10	<p>Do <u>all</u> of your household windows have mosquito/fly screens?</p>	<p>Yes</p> <p>No</p>	



1 2 3 4 5 6 7 8 9 10 11	ST1	How often is your house floor being cleaned (e.g. swept)?	Everyday (7 days/week) Almost everyday (5-6 days/week) Every other day (3-4 days/week) Weekly (1-2 days/week) Monthly (1-3 days/month) Scarcely (a few times/ year) Never	
12 13 14 15 16 17 18 19 20	ST2	How often do you or other members of your household perform activities to maintain grass or weed in or around your household, or work on a vegetable garden?  Prompt: For example, cut or trim weeds, plant or pick vegetables in the yard, garden, by the walls or fences of your household?	Everyday (7 days/week) Almost everyday (5-6 days/week) Every other day (3-4 days/week) Weekly (1-2 days/week) Monthly (1-3 days/month) Scarcely (a few times/ year) Never	
21		<b>Household member check</b>		
22		Now I'm going to asking you some questions about the members of your household including you, if anyone have had an accident, or had illness in the <u>past 30 days</u> .		
23		<b>Accident and illness in the past 30 days</b>		
24	HM1	Was any person of your household injured or killed in an accident? Prompt: anyone injured or killed in an accident <u>any time</u> before the interview.	Yes, how many? ____ No→HM14	If HM1=No, then HM14
25	HM2	What the name of the person got injured or killed in an accident?	Identify the ID code and show initial Not in the list, initial: ____	
26	HM3	Could you tell me in what type of accident (NAME) was injured or killed?	Landmine/unexploded bomb (UXO) Gunshot/weapon Road accident Fire/burning Snake/animal bite Fall from tree/building Drowning	
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		Poisoning (chemical) Violence/assault Other, specify _____ Don't know	
HM4	Is (NAME) still alive?	Yes No → HM6	If HM4 =No, then HM6
HM5	In your opinion, was (NAME'S) injury serious, moderate, or slight?	Serious Moderate Slight DON'T KNOW	
HM6	Was (NAME's) death due to accident?	Yes ] → HM7 No ]	→HM7
HM7	Did the accident happen in the <u>past 30 days</u> ?	Yes No → HM14	If No then HM 14
HM8	Was advice or treatment sought for [Name] after the accident?	Yes No → HM14	If No then HM14
HM9	Where was advice or treatment first sought for [NAME] after the accident?	<u>Public sector</u> Primary care unit/Primary care centers/Community Health centers Community hospital General hospital/Central hospital University hospital Government hospital <u>Private medical sector</u> Poly private clinic/private clinic Private hospital Others <u>source</u> Traditional/herbal medicine Traditional healer Self-bought medicine Relatives/ Friends , specify: _____	

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4	HM10	Where did the money come from to pay for transportation and treatment for the members of your household who had an injury over the <u>past 30 days</u> ?	
5		Record all that mentioned	
6		<i>The payment method for transportation and medical care can be different. If the respond provided one method, the interviewer should probe and confirm if both payment for transportation and treatment are from the same method.</i>	
7		<i>If any out-of-pocket payment method is selected, then proceed to HM11.</i>	
8			Subsidy or exemption → HM14
9			Insurance scheme → HM14
10			Universal coverage card (UC)
11			Social Security/ worker compensated fund (SSSS)
12			civil servant medical benefit scheme (CSMBS)
13			State enterprise
14			Independent agency of the state
15			Local government
16			Private health insurance
17			Health insurance covered by employer
18			Other health insurance, specify _____
19			Out of pocket → HM11
20			Wage/income
21			Loan/borrowed money
22			Sale of assets
23			Gift from relatives/neighbours/friends
24			Saving/ family funds
25			Other, specify _____ → HM14
26			Don't know → HM14
27			
28	HM11	How much in total was spent on [NAME]'s treatment at (name of the place)?	_____ amount of money
29			Don't know
30	HM12	How much in total was spent on transport to go to and return from (name of the place)?	_____ amount of money
31			Don't know
32	HM13	Has the debt been repaid? (If HM10= Loan/borrowed money)	Yes
33			No
34			Don't know
35			
36	HM14	Please tell me if any member of your household (including you) is sick, has an illness now or at any time in the <u>last 30 days</u> ?	Yes, how many? _____
37			No → End of the household head section
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	<p>It can be <b>acute</b> disease or previous diagnosed <b>chronic</b> disease.</p> <p>An acute illness is a condition that appears suddenly: the person did not have it immediately before becoming ill.</p> <p>A chronic disease is an illness that will not go away or takes a long time to go away, even when treated.</p> <p>Prompt if nobody: Is there anyone had fever? Any infant or child in your family was ill?</p>		
HM15	<p>Now I would like to ask you some questions about each person who is sick now or at any time in the <u>last 30 days</u>.</p> <p>Could you tell me his/her/their name(s)? Then we will talk about one person at a time.</p>	<p>Identify all that from the list of the family member (ID number)</p> <p>No body → end of the household head section</p>	
HM16	<p>What type of health problems or symptoms did [name] have or is having during this illness?</p> <p>DO NOT READ. TICK ONE BOX FOR EACH GROUP OF SYMPTOMS MENTIONED.</p> <p><i>If the respondent provide a diagnosis directly, especially for an acute condition, please still probe for the symptoms. Check all the symptoms that apply, and check "other acute condition, specify: ____ and write down the diagnosis.</i></p> <p><i>For example: if the respondent answer " Covid", check "other acute condition, specify: COVID". Then continue probe what did the symptoms the person have, and check all the symptoms that are described.</i></p>	<p><u>Acute conditions</u></p> <ul style="list-style-type: none"> <li>Fever</li> <li>Persistent headaches</li> <li>Persistent cough</li> <li>Running nose</li> <li>Difficulty breathing, fast breathing</li> <li>Difficulty swallowing/ throat pain</li> <li>Difficulty seeing or other eye complaint</li> <li>Stomach pain, nausea, vomiting, could not eat</li> <li>Thirst/ sweating</li> <li>Watery diarrhoea</li> <li>Bloody stools</li> <li>Skin disease, such as rash, irritation, open sores</li> <li>gyn-obstetrics</li> <li>Could not sleep</li> <li>Feeling tired</li> <li>Constipation</li> <li>Convulsion/ seizure</li> </ul>	

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		<p>Musculoskeletal pain (general body pain, back and joint pain)</p> <p><u>Chronic disease</u>                      Hypertension, high blood pressure                      Heart disease, heart attack consequence                      Diabetes, high blood sugar                      Asthma, wheezing, chronic difficulty breathing                      HIV infection, AIDS                      Arthritis, chronic body pain                      High cholesterol                      Ulcer, chronic stomach pain                      Stroke consequence                      Epilepsy, seizures, fits                      Cancer                      Tuberculosis                      Liver disease                      Depression</p> <p>Other acute illness, specify: _____                      Other chronic illness, specify: _____                      Don't know</p>	
HM17	In your opinion, was [NAME]'s illness serious, moderate, or slight?	<p>Serious                      Moderate                      Slight                      Don't know</p>	
HM18	Was advice or treatment sought for [Name]'s illness?	<p>Yes                      No → End of the household head section</p>	If HM18=No, then end of the section
HM19	Where was advice or treatment first sought for [NAME]'s illness?	<p><u>Public sector</u>                      Government hospital                      Government health centre                      Government health post</p>	

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	<p>[insert Country specific list]</p>	<p>Mobile clinic  Community health worker/field worker  <u>Other public sector</u>  <u>Private medical sector</u>  Private hospital  Private clinic  Pharmacy  Private doctor  Mobile clinic  Community health worker/field worker  Other private medical sector  <u>NGO medical sector</u>  NGO hospital  NGO clinic  Other NGO medical</p> <p><u>Other source</u>  Shop  Traditional practitioner  Market  Itinerant drug seller</p> <p>Other, specify: _____</p>	
HM20	<p>Where did the money come from to pay for transportation and medical care for the members of your household who had an illness over the <u>past 30 days</u>? (record all that mentioned)</p> <p><i>The payment for transportation and medical care can be different. If the respond provided one method, the interviewer should probe and confirm if both payment for transportation and treatment are from the same method.</i></p>	<p>Subsidy or exemption → end of the section</p> <p><u>Insurance scheme</u> → end of the section</p> <p>Mutual Health Organization/Community-Based Health Insurance</p> <p>Health Insurance through Employer</p> <p>Social Security</p> <p><u>Out of pocket</u> → HM21</p> <p>Wage/income</p>	

	<p><i>If any out-of-pocket method is recorded, proceed to HM21.</i></p> <p>[Insert locally relevant insurance schemes]</p>	<p>Loan/borrowed money          Sale of assets          Gift from relatives/neighbours/friends          Saving/ family funds          specify _____ --&gt; End of the household head section          Don't know → End of the household head section</p>	
HM21	How much in total was spent on [NAME]'s treatment at (name of the place)?	<p>_____ amount of money          Don't know</p>	If HM20 checked any out of pocket payment.
HM22	How much in total was spent on transport to go to and return from (name of the place)?	<p>_____ amount of money          Don't know            → HM23, if HM20=loan/borrowed money.          → Else, end of the household head section</p>	<p>HM23, if          HM20=loan/borrowed money.          Else, end of the household head section</p>
HM23	Have this debt been repaid?	<p>Yes          No          Don't know</p>	If HM20=Loan/borrowed money

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Adult section			
Code	Question	Answers	Skip logic
<b>Respondent background</b>			
A1	How old were you at your last birthday?	Age in complete years __	
A2	Have you ever attended school?	Yes No → A4	If no, then A4
A3	What is the highest level of school you completed?	No formal schooling Less than primary school Primary school uncompleted Primary school completed Secondary school completed High school/ vocational school completed College/university completed Postgraduate degree	
A4	What is your marital status?	Never married Currently married Separated Divorced Widowed Cohabiting Refuse to answer	



A5	Which of the following best describes your main work status over the <u>past 12 months</u> ?	<u>Government employee</u> <u>Non-government employee</u> State enterprise officer Private company employee  <u>Business</u> Business owner Household business assistance <u>Agriculture</u> Agriculture (landowner and farmer) Agriculture labourer (other's land) <u>Labourer</u> Industrial labourer Day labourer Transport labourer Paid domestic worker Blacksmith/ Goldsmith/other skilled labour <u>Other self-employed</u> <u>Student</u> <u>Home maker/household work</u> <u>Retired</u> <u>Unemployed</u> Unemployed (able to work, e.g. unwilling to work) Unemployed (unable to work, e.g. too sick, disabled)  <u>Other, specify: _____</u> <u>Refuse to answer</u>	
	Now, I'm going to ask you some questions about your behaviour when you are in or around your household, and when you are working, in the <u>past 12 months</u> .		
ST3	In the <u>past 12 months</u> , how often do you sit or lying directly on the floor in your house or lawn?	Everyday (7 days/week) Almost everyday (5-6 days/week)	

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		Every other day (3-4 days/week) Weekly (1-2 days/week) Monthly (1-3 days/month) Scarcely (a few times/ year) Never	
ST4	<p>In the <u>past 12 months</u>, have you worked in forest or high hill (for collecting wood/ bamboo/ mushroom), or rice field, fruit/tea/coffee plantation, or dry farm field for other agriculture products (e.g. vegetable, corn, pineapple)?</p> <p><i>Prompt: the participant might have worked in different areas throughout the year, and worked different length in different area, prompt to record all areas that the participate have worked in the past 12 months.</i></p>	Yes No → WHS1	If no, then WHS1
ST5	<p>Which one of them have you worked in?  <i>Check all that apply</i></p>	Forest or high hill Rice field Fruit/Coffee/tea plantation Dry field	Completing ST6-ST8 for each area checked
ST6	<p>Do you work in the [areas checked above] all year or only when in some seasons?</p> <p><i>Check "all year" if worked every month in the <u>past 12 months</u>. The respondent might work with different frequency in different month, but if he/she has worked in the area in each month in the past 12 month, this option should be checked.</i></p> <p><i>Check "in season" if not every month in the past 12 month.</i></p>	All year → ST8 In season → ST7	

ST7	<p>How many months have you worked in [area] in the <u>past 12 months</u>?</p> <p><i>The number of months should be cumulative including all the months in the past 12 months the respondent has worked in the area. E.g. if the participants worked in March-June, and November, the total months he/she worked in the area is 4 months, "3-5 months" should be checked.</i></p>	<p>9-11 months 6-8 months/year 3-5 months/year 1-2 months/year or less</p>	IfST6= In season
ST8	<p>How often do you work in [area] (when it was the months you worked there)?</p> <p><i>Ask the question accordingly: if the respondent answered only work in the area in some seasons, then read the words in "(when it was the months you worked there)". If different frequency in different month, please use an average.</i></p>	<p>Everyday (7 days/week) Almost everyday (5-6 days/week) Every other day (3-4 days/week) Weekly (1-2 days/week) Monthly (1-3 days/month) Scarcely (a few times/ year)</p> <p>→ ST6, until completed all the areas the participants have listed</p>	ST6 until completed the frequency for all the fields the respondent has worked in the past 12 months.
ST9a	<p>The following questions we will ask you some things you do when you were at work in the area(s) you mentioned before. When you answer them, you need to consider: (all)the area(s) you have mentioned, and the total time you have worked in those area(s) in the <u>past 12 months</u>.</p> <p><i>Repeat the area(s) and the frequencies of working in the area from ST5-ST8</i></p>	Show the area(s) and frequency from ST5-ST8	
ST9	<p>At the time when you work in the area(s), how often do you sit or lay directly on the ground, haystacks, grass or other places in the forest or high hill, or farm field without a mat?</p>	<p>Every time Most times Sometimes Rarely Never</p>	

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ST10	How often do you wear long sleeves?	Every time Most times Sometimes Rarely Never	
ST11	How often do you wear gloves?	Every time Most of times Sometimes Rarely Never	
ST12	How often do you wear shoes with socks or boots without or without socks?	Every time Most of times Sometimes Rarely Never	
ST13	How often do you wash your body after work?	Every time Most of times Sometimes Rarely Never	
ST14	How often do you change your clothes wore at work to clean clothes <u>immediately (i.e., within 30 minutes)</u> when you arrive home?	Every time Most of times Sometimes Rarely Never	
WHS1	I'm going to ask you now your overall health, including both your physical and your mental health.  In general, how would you rate your health <u>today</u> ? Would you say it's very good, good, moderate, bad, or very bad?	Very good Good Moderate Bad Very Bad	

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4	WHS2	The following questions, I'm going to ask you how much difficulty you have when doing some activities. You can give me answers, such as you have no difficulty, mild difficulty, moderate difficulty, or extreme difficulty, or cannot do it at all.	None
5			Mild
6			Moderate
7			Severe
8			Extreme/ Cannot do
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11		Overall in the <u>last 30 days</u> , how much difficulty did you have with work or household activities?	
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16	WHS3	Overall in the <u>last 30 days</u> , how much difficulty did you have with moving around, such as walking or climbing steps	None
17			Mild
18			Moderate
19			Severe
20			Extreme/ Cannot do
21			
22	WHS4	Overall in the <u>last 30 days</u> , how much difficulty did you have with selfcare, such as washing or dressing yourself?	None
23			Mild
24			Moderate
25			Severe
26			Extreme/ Cannot do
27			
28	WHS5	Overall in the <u>last 30 days</u> , how much of bodily aches or pains did you have?	None
29			Mild
30			Moderate
31			Severe
32			Extreme
33			
34	WHS6	Overall in the <u>last 30 days</u> , how much difficulty did you have with concentrating or remembering things?	None
35			Mild
36			Moderate
37			Severe
38			Extreme
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40	WHS7	Do you wear glasses or contact lenses?	Yes
41			No
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1 2 3 4 5 6 7 8	WHS8	In the <u>last 30 days</u> , how much difficulty did you have in seeing (IF WHS7=Yes, even when you wear glasses or contact lenses)?	None Mild Moderate Severe Extreme	
9 10 11 12 13	WHS9	Overall in the <u>last 30 days</u> , how much of a problem did you have with sleeping, such as falling asleep, waking up frequently during the night or waking up too early in the morning?	None Mild Moderate Severe Extreme	
14 15 16 17 18 19	WHS10	Overall in the <u>last 30 days</u> , how much of a problem did you have with feeling sad, low, or depressed?	None Mild Moderate Severe Extreme	
20		<b>Substance use</b>		
21 22 23 24 25 26	SU1	Now I would like to ask you some questions on smoking and tobacco use. Do you currently smoke any tobacco products, such as cigarettes, cigar, or pipes?	Yes No→S6	If No, then S6
27 28	SU2	Do you currently smoke tobacco product <u>daily</u> ?	Yes No	
29 30 31	SU3	How old were you when you first started smoking?	Age _____ years→ S5 Don't know→ S4	If S3=Don't know, then S4, else S5
32 33	SU4	Do you remember how long ago it was?	_____ in year/month/week Don't know	
34 35 36 37 38 39 40 41 42 43	SU5	What type of tobacco do you currently smoke? (Check all that apply)	Manufactured cigarettes Hand-rolled cigarettes Kreteks Pipes full of tobacco Cigars, cheroots, or cigarillos Water pipe (e.g. Baraku/ Hookah/ Shisha) Other, specify: _____	Jump to S10

		→ Select any option, move to S10	
SU6	In the past, did you ever smoke any tobacco products?	Yes No→ S10	If S6=No, then S10
SU7	In the past, did you ever smoke tobacco product daily?	Yes No	
SU8	How old were you when you first stopped smoking	Age _____ years→S10 Don't know→S9	If S8=Don't know, then S9, else S10
SU9	Do you remember how long ago it was?	_____in year/month/week Don't know	
SU10	Now I would like to ask you some questions about drinking alcohol. Have you ever consumed any alcohol, such as beer, wine, spirits, or [ADD OTHER LOCAL EXAMPLES]?	Yes No→S18	If No, then S18
SU11	We count one drink of alcohol as one can or small bottle of beer, one glass of wine, one shot of spirits, or [insert local example].  (Show card)  During the past <u>12 months</u> , how frequently have you had at <u>least one</u> standard alcoholic drink?  <i>Refer to locally relevant examples of one standard drink.</i>	Daily 5-6 days per week 3-4 days per week 1-2 days per week 1-3 days per month Less than once a month Never	If S11=Never, then AS18
SU12	Have you consumed any alcohol in the <u>past 30 days</u> ?	Yes No→S18	If S12=No then S18
SU13	During the <u>past 30 days</u> , on how many <u>occasions</u> did you have at least <u>one standard</u> alcoholic drink?	Number _____ Don't know	

SU14	In the <u>past 30 days</u> , <u>how many standard drinks</u> on average did you have during one drinking occasion?  (Showcard) <i>If the respondent is not able to reply by standard drink, ask on average the amount and type of alcohol he/she consume, and convert by yourself to number of standard drinks.</i>	Number of drinks ____ Don't know	
SU15	In the <u>past 30 days</u> , how many occasions did you have <u>six or more standard alcoholic drinks</u> in a single drinking occasion?  (Showcard)  <i>Prompt: Six standard drinks is roughly about: 6 cans of beer/3 big bottles of beer/ 6 shots of spirit/ a bottle of spirit shared among 3-4 people [insert local examples].</i>	Number of occasions ____ Don't know	
SU16	In the <u>past 30 days</u> , did you consume any home brewed alcohol, any alcohol brought over the border/from another country, any alcohol not intended for drinking or other untaxed alcohol?	Yes No→S18	If S16=No then S18
SU17	How many occasions did you consume any home brewed alcohol, any alcohol brought over the border/from another country, any alcohol not intended for drinking or other untaxed alcohol?	Number of occasions ____ Don't know	
SU18	Do you currently chew betel nuts?	Yes No	If S18=No then S20
SU19	In the last 24 hours, many pieces did you chew?	____pieces	
SU20	Have your ever used heroin, Yama/ice, Ecstasy, Glue, Marijuana, Cocaine, Histamine, Pantazogon, Valium/diazepam, [locally popular drug]?	Yes No Refuse to answer	If No or refuse to answer then D1



SU21	In the past 12 months have you used any of the drugs?	Yes No Refuse to answer	
S22	Have you ever injected drugs?	No Yes, in past 12 months Yes, before past 12 months Refuse to answer	
	<b>Disease and symptom</b>		
D1	Have you ever been diagnosed with chronic lung disease (emphysema, bronchitis, COPD) by a doctor or other health worker?	Yes No→D3	If No, then D3
D2	In the <u>last 30 days</u> , have you been taking any medication or other treatment (like oxygen) for it prescribed by a doctor or other health worker?	Yes No	
D3	In the <u>last 12 months</u> , have you had a tuberculosis (TB) test? I mean, has a doctor examined your sputum (taken a sample of the substance spit out from a deep cough and sent it to a laboratory for analysis) or made an x-ray of your chest?	Yes No→D5	If no, then D5
D4	Have you been taking any medication or treatment during the <u>last 30 days</u> prescribed by a doctor or other health worker?	Yes No	
D5	Have you had fever in the <u>past 30 days</u> ?	Yes No→D7	If No, then D7
D6	How long have you had fever?	One week or more No or less than one week	
D7	Are you currently coughing?  Prompt: If participants answer induced coughing due to environmental factor or substance use, prompt: I mean	Yes No→10	If No, then D10

	coughing throughout the day, even if you are not smoking or in the environment.		
D8	What is the duration of coughing continuously?	Two weeks or more Less than two weeks	
D9	Are you coughing up blood?	Yes No	
D10	Have you lost body weight unintentional/ suddenly?	Yes No	
D11	In the <u>past 30 days</u> , have you experienced drenching night sweats?	Yes No	If D5-D11 checked 2 or more symptoms, or coughing up blood, then refer to TB care
D12	Have you been diagnosed with Asthma (an allergy respiratory disease) by a doctor or other health worker?	Yes No→D14	If No, then D14
D13	In the <u>last 30 days</u> , have you been taking any medication or treatment prescribed by a doctor or other health worker?	Yes No	
D14	Have you ever had your blood pressure measured by a doctor or other health worker?	Yes No→D17	If No, then D17
D15	Have you ever been told by a doctor or other health worker that you have raised blood pressure or hypertension?	Yes No→D17	If No, then D17
D16	In the <u>past 30 days</u> , have you taken any drugs (medication) for raised blood pressure prescribed by a doctor or other health worker?	Yes No	

D17	Have you ever had your blood sugar measured by a doctor or other health worker?	Yes No→D20	If No, then D20
D18	Have you ever been told by a doctor or other health worker that you have raised blood sugar or diabetes?	Yes No→D20	If No, then D20
D19	In the <u>past 30 days</u> , have you taken any drugs (medication) or insulin injection for diabetes prescribed by a doctor or other health workers?	Yes No	
D20	Have you ever had your cholesterol (fat levels in your blood) measured by a doctor or other health worker?	Yes No→D23	If No, then D23
D21	Have you ever been told by a doctor or other health worker that you have raised cholesterol?	Yes No→D23	If No, then D23
D22	In the <u>past 30 days</u> , have you taken any oral treatment (medication) for raised total cholesterol prescribed by a doctor or other health worker?	Yes No	
D23	Have you ever had a heart attack or chest pain from heart disease (angina) or a stroke (cerebrovascular accident or incident)?	Yes No	
D24	Are you currently taking medications regularly to prevent or treat heart disease? (for example: aspirin, statins- Lovastatin/ Simvastatin/ Atorvastatin/ any other statin)	Yes No	
D25	Besides the health conditions we have just spoken about, do you currently have other chronic diseases that have been diagnosed by a doctor or health care provider?  (check all that apply)	<u>No other disease</u> <u>Cancer</u> Liver cancer bronchial and lung cancer Colon and rectal cancer	If mention the disease or symptoms above, go back to the relevant question

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	<p><i>If diseases that are mentioned are not in the list, but you know in which system it belongs, check "other, specify" in that system and fill the name of the disease.</i></p> <p><i>If you do not know which system the disease should be categorized, then check "Other unknow system disease, specify: _____" on the bottom of the list, and fill in the name of the disease.</i></p>	<p>Breast cancer Cervical cancer Leukaemia/lymphoma Other, specify: <u>Endocrine system and metabolic disorder</u> thyroid/goitre Other, specify: _____ <u>Sensor disorders</u> Glaucoma Cataract Hearing loss Other, specify</p> <p><u>Cardiovascular / circulatory disease</u> Enlarged heart congestive heart heart fluttering Cardiac arteriosclerosis Severe cerebrovascular disease Other, specify: _____</p> <p><u>Haematological disease</u> Thalassemia <u>Chronic respiratory disease</u> Chronic emphysema Other, specify: _____</p> <p><u>Digestive disorders</u> Gastritis Acid reflux Liver cirrhosis Other, specify: _____</p> <p><u>Genito-urinary disease</u></p>	
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		<p>Kidney failure/kidney disabilities enlarged prostate/inflammation kidney stone/ bladder stone Other, specify: _____</p> <p><u>Muscular-skeleton disease</u> Gout rheumatoid/ rheumatoid arthritis Chronic knee pain / chronic back pain/ chronic neck pain Paralysis Other, specify: _____</p> <p><u>Chronic infection or defective by infection disease</u> HIV Polio Leprosy Chronic HBV infection Chronic HCV infection Other, specify: _____</p> <p><u>Congenital anomalies</u> abnormal intelligence (Down syndrome) Other, specify: _____</p> <p><u>Oral disorders</u> Periodontitis (gingivitis) Other, specify: _____</p> <p><u>Immune system disorder</u> Allergy Other, specify: _____</p>	
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		<u>Neurological disorder</u> Parkinson's disease Epilepsy/epilepsy Dementia Other, specify: _____  <u>Mental health disorder</u> Alcoholism Depression Other, specify: _____  <u>Other unknow system disease, specify: _____</u>  <u>Unknown _____</u>	
CC0	<p>You have told us the symptoms and diseases affect your health currently.          Now I'd like to ask you about the concerns you have related with health. It can be from the experience of yourself, your family, or your community.          I'm going to ask your concerns from different perspective of health, and in the end, I will ask you to rank the ones that concern you the most.</p>		
CC1	<p>The first 3 questions about different dimensions of health services.</p> <p>I'm going to ask first if you have concerns about accessing health services, which means the service is provided somewhere, but you cannot receive it          Do you have any concerns about health service accessibility?</p>	<ul style="list-style-type: none"> <li>- Affordability- Cost of care</li> <li>- Geographic accessibility- Travel to service provider (too far, take too much time, no good transportation methods, too sick to travel...)</li> <li>- Language barrier</li> <li>- Culture barrier</li> <li>- Other, specify _____</li> <li>- No concern</li> </ul>	

	<p>Prompt: If the participant said no concern, then prompt service accessibility can be the cost, going to the place, or problem with communication, or something related with culture that create problem for people to get health care.</p> <p><i>Please record all that the participant mentioned.</i></p>		
CC2	<p>The next question is about concerns of health service availability, which means the service is not provided, or some elements required for providing the service is absent or not enough Do you have any concerns related with health service availability?</p> <p>Prompt: If the participant expressed there is no concern, prompt- is there some health care service they want to use but cannot find the service? Or the service is not fully available because of health facility, health care professionals, equipment- laboratory, bed, ultrasound, or medication are absent or not enough.</p> <p><i>Please record all that the participant mentioned.</i></p>	<ul style="list-style-type: none"> <li>- Physical presence of service (the service is not provided, or not provided all the time or at all. E.g. no dental care in the primary care unit)</li> <li>- Health facility (health centre or hospital)</li> <li>- Health care professionals (doctors/nurses/paramedical professionals)</li> <li>- Beds or equipment</li> <li>- Medication</li> <li>- Other, specify: _____</li> <li>- No concern</li> </ul>	
CC3	<p>The next question is about your concerns on quality of health service, which means the service is available, and you are able to receive the service, but you are not satisfied with the service Do you have concerns in the quality of health service?</p> <p>Prompt:</p>	<ul style="list-style-type: none"> <li>- Safety: quality care should avoid harms to people whom the care is intended</li> <li>- Timely: waiting time and delays</li> <li>- Efficient: maximize the benefit of available resources</li> <li>- Other, specify _____</li> <li>- No concern</li> </ul>	

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	<p>If the participant expressed no concern, prompt it can be related with safety, timely, or efficiency of the service provided.</p> <p><i>Please record all that the participant mentioned.</i></p>		
CC4	<p>We have spoken about concerns related with health services, now Is like you to think about the environment around your household or at work that can potentially harm yours or others' health.</p> <p>Do you have concerns related with your house, around your house, or things/ animals belong to your household, that could harm your health or other's health?</p> <p>Prompt: If the participant expressed no concern, prompt- it can be part of the structure of the house like wall, floor material; or something inside of the house related with health like toilet, drinking water source; or animals the household own; in the yard, garden of the household.</p> <p><i>Please record all that the participant mentioned.</i></p>	<ul style="list-style-type: none"> <li>- House (e.g. wall, roof, floor)</li> <li>- Amenities (e.g. toilet, cooking stove, mosquito net, drinking water)</li> <li>- Animals (e.g. free range pigs in the yard)</li> <li>- Other factors in and around the house, specify_____</li> <li>- No concern</li> </ul>	
CC5	<p>Do you think there are some risks to your or others' health related with work?</p> <p>Prompt: If the participant expressed no concern, prompt: for example, you often risk to get injured when you work, certain things/ products used at your work can harm your health. If you work in the forest or in the rice farm, there are some insects or wild animal can harm you too.</p>	<ul style="list-style-type: none"> <li>- Risk to physical injuries</li> <li>- Risk of chemical exposures</li> <li>- Risk of exposure to nature environment (e.g. mosquito, snake bite)</li> <li>- Other work-related risk factors, specify_____</li> <li>- No concern</li> </ul>	



	<i>Please record all that the participant mentioned.</i>		
CC6	<p>Do you have other concerns about health of yours or people around you?</p> <p><i>Please record all that the participant mentioned.</i></p>	<p>Presence of disease or symptoms (respondent's or other people)</p> <p>Other, specify _____</p> <p>No other concerns</p>	
CC7	<p>Thank you very much for sharing your concerns. You have told me your concerns are: [show results of CC1-CC6]</p> <p>Now, could you (pick the biggest 3 concerns and) rank them? Start from the biggest concern.</p> <p><i>If the participant expressed less than 3 concerns, then rank the concern(s) mentioned, and select "NA" in the unused field.</i></p>	<p><b>Top1:</b> _____</p> <p><b>Top2:</b> _____</p> <p><b>Top3:</b> _____</p>	<p>Automatic showing a list of options selected for CC1-CC6, and pick from the options.</p>

Peer review only

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<b>Adult women section</b>			
Code	Question	Answers	Skip logic
W1	Now I would like to talk about family planning - the various ways or methods that a couple can use to delay or avoid a pregnancy. Have you ever heard of (METHOD)? (Check all that applied)	Condom Pill IUD Injectables Implants Female condom Emergency contraception Standard days method Lactational amenorrhea method Rhythm method Withdrawal Female sterilization Male sterilization Other modern method, specify: _____ Other traditional method, Specify: _____ None Refuse to answer	
W2	Are you currently pregnant?	Yes→W5 No or unsure	If yes, W5
W3	Are you or your partner currently doing something or using any method to delay or avoid getting pregnant?  Prompt: are you or your partner doing any of the following to avoid pregnancy: deliberately avoiding sex on certain days, using a condom, using withdrawal or using emergency contraception?	Yes No→W5 Refuse to answer→W5	If No or Refuse to answer, then W5
W4	What are you currently using?	None	

	<b><u>Do not read the answer, check all that applied.</u></b>	Female sterilization Male sterilization IUD Injectables Implants Pill Condom Female condom Emergency contraception Standard days method Lactational amenorrhea method Rhythm method Withdrawal Other modern method, specify: ____ Other traditional method, specify: ____	
W5	Now I would like to ask about all the birth you have had during your life. Have you ever given birth? (if No prompt: including the times that a child was born alive but later died, or born dead)	Yes No → End of the section	If No, then end of the section.
W6	Now I would like to ask some questions about your last birth		
W7	How long ago it was?	____ years → W9 Don't know → W8	
W8	How old is the child now?	Age ____ years Don't know	If W7=don't know
W9	Did you see anyone for antenatal care for this pregnancy?	Yes No → W12	If No, then W12
W10	Where did you receive antenatal care for this pregnancy?  Anywhere else?	<u>Home</u> Her home → W11 Other home → W11  <u>Public sector</u> → W12	If W10= Home/ others then W11

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For peer review only

	<p>Check all that apply</p> <p>[Insert locally relevant list of health facilities]</p>	<p>Government hospital Government health centre Government health post Other public sector</p> <p><u>Private medical sector --&gt;W12</u> Private hospital Private clinic Other private medical facility</p> <p><u>NGO medical sector -&gt; W12</u> NGO hospital NGO clinic Other NGO medical</p> <p><u>Other, specify: _____ --&gt;W11</u></p>	
W11	<p>Whom did you see when you received the antenatal care at [her home/ other home]? Anyone else?</p> <p><i>Check all that apply</i> Prompt: probe to have information on the health care worker's professional background. Distinguish among different health care professionals.</p> <p>[insert locally relevant list]</p>	<p><u>Health personnel</u> Doctor Nurse/midwife Auxiliary midwife</p> <p><u>Other person</u> Traditional birth attendant Community health worker/ Field worker</p> <p><u>Other, specify: _____</u></p>	
W12	<p>Where did you give birth to this child?</p>	<p><u>Home</u> Her home -&gt;W13 Other home-&gt;W13</p> <p><u>Public sector -&gt;End of the section</u> Government hospital</p>	

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		<p>Government health centre Government health post Other public sector</p> <p><u>Private medical sector → End of the section</u> Private hospital Private clinic Other private medical sector</p> <p><u>NGO medical sector</u> NGO hospital NGO clinic Other NGO medical <u>Other, specify: _____</u> --&gt;W13</p>	
W13	<p>Who assisted with the delivery?</p> <p>Prompt: probe to have information on the health care worker's professional background. Distinguish among different health care professionals.</p> <p>Check all that apply</p>	<p><u>Health personnel</u> Doctor Nurse/midwife Auxiliary midwife</p> <p><u>Other person</u> Traditional birth attendant Community health worker/ Field worker</p> <p><u>Other, specify: _____</u></p>	If W12= Home

Children's section		
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Code	Question	Answers	Skip logic
C1	We would like to ask you question about the [NAME]' health, including breastfeeding, vaccination history. Are you willing to answer the questions? Do you think you are able to answer the questions?	No, I don't want to/ or cannot answer the questions → C2 Yes, I'm willing to and able to answer the questions→C3	If No, then C2
C2	Could you tell us who is the best person to answer the questions about [Name] health?	Identify the member list, and ID	Restart from C1 with the person pointed
C3	Relationship of the person answering the question to the child	Mother Father Adopted/foster/ stepmother adopted/foster/ stepfather Grandmother Grandfather Sister Brother Other, specify: _____	
C4	Has [NAME] ever been breastfed?	Yes No→C7	If No, then C7
C5	Is [NAME] still breastfed?	Yes No→7	If No, then C7
C6	Did (NAME) drink or eat anything other than breast milk yesterday or last night? Including plain water, other milk, non-milk liquid, or complementary food)	Yes No	
	<b>Vaccination history</b>		<b>Only ask if 0-35 months child→ C7-C17, else C18</b>
C7	Now I would like to ask some questions about vaccinations received by [NAME].  Do you have a card or other document where (NAME)'s vaccinations are written down?	Yes, has only a card Yes, has only another document Yes, has card and other document No, no card and no other document→C15	

C8	May I see the card or other document where (NAME)'s vaccinations are written down?	Yes, only card seen Yes, only other document seen Yes, card and other document seen No card and no other document seen → C15	If NO then C16
C9	<i>Don't need to ask the question, compare the record in the vaccination card or document with vaccination schedule of Thailand. Check appropriate vaccines according to the child's age, and choose the option.</i>  <i>(show card)</i> <i>Use the vaccination schedule in the show card to compare with the child's vaccination card</i>	Completed all age-appropriate vaccines → C12 Missing 1 dose age-appropriate vaccine Missing more doses age-appropriate vaccines	If completed all age-appropriate vaccines, then C12
C10	Were age-appropriate doses of hepatitis B vaccination given according to the vaccination card or other document?	Yes, completed all age-appropriate doses – C12 Received the birth dose, but some doses missing according to children's age → C12 There is no record showing hepatitis B vaccination was given	
C11	At or soon after birth, did (NAME) receive a Hepatitis B vaccination, that is, an injection in the thigh to prevent Hepatitis B?	Yes No Don't know	If C11= There is no record
C12	Was a dose of vitamin A supplement given in the past 6 month according to the vaccination card or other document?	Yes → C14 No	
C13	In the past 6 months, did [Name] receive a vitamin A dose. (Show common type of ampules/capsules/syrups)	Yes No Don't know	If C13=No
C14	Ask the respondent for permission to photograph vaccination card or other document where vaccinations are written. If permission is granted, photograph card.	Photograph taken Photograph not taken, permission not received Photograph not taken, other reason  → End of the section	

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C15	Did (NAME) ever receive any vaccinations to prevent (NAME) from getting diseases, including vaccinations received in campaigns or immunization days or child health days?	Yes No → C18 Don't know	If No/ don't know, then C18
C16	How many times did [Name] receive vaccination?	___times Reported completed all age-appropriate vaccine Don't know	
C17	At or soon after birth, did (NAME) receive a Hepatitis B vaccination, that is, an injection in the thigh to prevent Hepatitis B?	Yes No Don't know	
C18	In the past 6 months, did [Name] received vitamin A dose. Show common type of ampules/capsules/syrups )	Yes No Don't know	All under 5 years

The end of questionnaire