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Measuring the Prevalence of Mental Disorders in Adolescents in Kenya, Indonesia, and Vietnam: Study Protocol for the National Adolescent Mental Health Surveys

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A B S T R A C T

Purpose: In low- and middle-income countries, there are limited data on mental disorders among adolescents. To address this gap, the National Adolescent Mental Health Surveys (NAMHS) will provide nationally representative prevalence data of mental disorders among adolescents in Kenya, Indonesia, and Vietnam. This paper details the NAMHS study protocol.
Methods: In each country, a multistage stratified cluster sampling design will be used. Participants will be eligible pairs of adolescents aged 10–17 years and their primary caregiver. Adolescents will be assessed for social phobia, generalized anxiety disorder, major depressive disorder, attention-deficit/hyperactivity disorder, conduct disorder, and post-traumatic stress disorder using the Diagnostic Interview Schedule for Children, version 5. Demographics, risk and protective factors, and service use information will also be collected. In the parallel clinical calibration study, diagnoses of major depressive disorder, social phobia, and generalized anxiety disorder made using

IMPLICATIONS AND CONTRIBUTION

The National Adolescent Mental Health Surveys (NAMHS) will provide nationally representative prevalence estimates for mental disorders in adolescents in Kenya, Indonesia, and Vietnam. Such data are necessary for service planning,

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the Diagnostic Interview Schedule for Children, version 5 will be calibrated against a diagnostic assessment by in-country clinicians in a separate sample.
Results: Data collection for the national survey and clinical calibration study will commence in 2021, with dissemination of findings and methodology due to occur in 2022.
Conclusions: Accurately quantifying the prevalence of mental disorders in adolescents is essential for service planning. NAMHS will address this lack of prevalence data, both within the NAMHS countries and within their respective regions, while establishing a gold-standard methodology for data collection on adolescent mental health in low- and middle-income countries. More broadly, NAMHS will encourage capacity building within each country by establishing linkages between researcher, clinician, government, and other networks.
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resource allocation, and advocacy. Further, NAMHS will establish a methodology for future surveys in these countries and surrounding regions.

Adolescence is a critical period of development, which is distinct from both childhood and young adulthood [1,2]. Globally, adolescents account for approximately 16% of the global population, with 89% living in low- and middle-income countries (LMICs) [3]. However, prevalence data for mental disorders in adolescents are often limited, despite these conditions being among the leading causes of disability in younger ages [4] and leading to adverse outcomes in later life [5,6]. Erskine et al. found that the representativeness (or 'coverage') of available prevalence data for mental disorders for ages 5–17 years globally was only 6.7% [7]. This figure, however, masks a large difference between high-income countries (26.4%) and LMICs (4.5%).

Globally, few nationally representative mental health surveys of adolescents have been conducted, with virtually no such surveys available from LMICs. Limited prevalence data present a significant challenge to mental health advocates, public health policymakers, and governments when attempting to address the impact of mental disorders on adolescent populations. The NAMHS aims to directly address the lack of prevalence data by conducting nationally representative household surveys of mental disorders among adolescents aged 10–17 years in Kenya (K-NAMHS), Indonesia (I-NAMHS), and Vietnam (V-NAMHS). This paper details the NAMHS study protocol.

Methods

Aims

The core aim of NAMHS is to determine the prevalence of mental disorders in adolescents aged 10–17 years in Kenya, Indonesia, and Vietnam. The rationale for the selection of these three countries is outlined in Appendix A. The mental disorders in scope are social phobia (SoPh), generalized anxiety disorder (GAD), major depressive disorder (MDD), attention-deficit/hyperactivity disorder (ADHD), conduct disorder, and post-traumatic stress disorder. NAMHS will also identify risk and protective factors associated with mental disorders in adolescents, as well as patterns of service utilization, barriers to care, and perceived need. Further, diagnoses of selected mental disorders from the interviewer-administered measure used in NAMHS will be compared with in-country clinician diagnoses as part of a separate clinical calibration study. This will assist in the interpretation of findings from the national surveys in each country.

Design

NAMHS has been designed and implemented by five organizations: the University of Queensland (UQ; lead organization of NAMHS), the African Population and Health Research Center (lead organization of K-NAMHS), the Center for Reproductive Health of Universitas Gadjah Mada (lead organization of I-NAMHS), the Institute of Sociology (lead organization of V-NAMHS), and Johns Hopkins Bloomberg School of Public Health (JHSPH; collaborating NAMHS partner).

All aspects of the project were developed collaboratively, with inputs from all NAMHS investigators. This approach aimed to standardize the methodology across the three countries while accounting for cultural considerations, legal implications, logistic and infrastructure factors, and other considerations unique to each country. Where required, country-specific variations have been made.

Pilot data collection was completed in late 2019/early 2020. In each of the three countries, this involved administering the NAMHS instrument to approximately 50 households. Findings from the pilot study (results not published) informed changes to the NAMHS instrument (e.g., translations) and processes (e.g., self-administration) prior to the national survey and clinical calibration study. Data collection for the national survey and clinical calibration study is scheduled to commence in 2021.

Ethics approvals. Overarching ethical approval for NAMHS has been granted by the UQ Human Research Ethics Committee B (approval no. 2019001268). Each country has received ethical approval from their relevant in-country ethics committee or institutional review board. K-NAMHS has received approval from the African Medical and Research Foundation Ethics and Scientific Review Committee (approval no. P654/2019) and National Commission for Science, Technology and Innovation granted the research permit for conducting the study in Kenya (license no. NACOSTI/P/19/837). I-NAMHS has received approval from the Medical and Health Research Ethics Committee at Universitas Gadjah Mada (approval no. KE/FK/1212/EC/2019). V-NAMHS has received approval from the Ethical Review Board for Biomedical Research at Hanoi University of Public Health (approval no. 499/2019/YTCC-HD3). JHSPH received a waiver from their respective institutional review board. UQ worked with each country to ensure that the content of the in-country applications was consistent with the content of the overarching ethical approval from UQ.

Study population

Participants. Participants in all countries will be eligible pairs of adolescents aged 10–17 years and their primary caregiver living in households.

Adolescent. Eligible adolescents will be those aged between 10 and 17 years who do not endorse any of the exclusion criteria set by NAMHS. While the World Health Organization defines adolescents as individuals aged between 10 and 19 years [2], a high proportion of older adolescents are likely to be living away from the family due to work, schooling, and/or marriage. Additionally, diagnostic measures for young adolescents are not designed to be administered to people aged 18 years and over.

Primary caregiver. For the purposes of NAMHS, the primary caregiver is defined as the person who self-identifies as having responsibility for the adolescent, cares for the adolescent, and is best able to provide information about the adolescent. This individual will be identified as part of the consent and assent process, and confirmed in the interview.

Exclusion criteria. The exclusion criteria apply at both the household and participant level. If either a household or participant is excluded, the reason for this will be recorded. By virtue of the study design and sampling frame, adolescents who are homeless or living in a group facility are excluded, as they do not have a set residential address and a primary caregiver who can reliably provide information may not be available. The exclusion criteria are as follows:

1. There are no adolescents aged between 10 and 17 years living in the household more than 50% of the time. This restriction accounts for joint custody arrangements and minimizes the chance of the same adolescent being recruited twice from two different households.
2. The adolescent is living independently (i.e., with no primary caregiver) or is married.
3. Either the primary caregiver or adolescent do not speak the language required by the interview (K-NAMHS: English or Kiswahili; I-NAMHS: Bahasa Indonesia; V-NAMHS: Vietnamese).
4. The adolescent is unable to participate due to severe physical or cognitive impairments.
5. Privacy for the interview cannot be assured.

Sampling methodology. A multistage stratified cluster sampling design will be used in each country to elicit a nationally representative sample. Relevant statistical agencies and census data from each country will determine the sampling frame, with each country required to conduct mapping and listing to varying degrees to supplement available data. The sample size for each country (K-NAMHS: 5,290; I-NAMHS: 6,580; V-NAMHS: 6,000) was determined using standard survey methodology and incorporating available prevalence estimates, response rates of previous large-scale surveys, relevant design effects, and allowed margin of error. Sampling will be without replacement as nonresponse was factored into the sample size for each country. More information on the sampling methodology for each site, including sample size, is available in Appendix B.

Measures

The NAMHS instrument collectively refers to the primary caregiver and adolescent instruments, with each including unique modules. The modules include measures of mental disorders, risk and protective factors, service use, and demographics. The NAMHS instrument was developed collaboratively by all collaborating investigators and designed to be administered by trained lay interviewers with no clinical training.

Translations of the NAMHS instrument were an iterative process. All measures were translated into the local language before being back-translated into English by native speakers and compared with the original English versions by the UQ investigators. Additionally, the local language versions were reviewed by in-country clinicians involved in the project for linguistic specificity and cultural appropriateness. Further edits were made in response to feedback received during the initial interviewer training and after the pilot study. Any inconsistences or disagreements between the local language and original English versions were discussed and resolved between the UQ investigators and the respective country.

Modules

Diagnostic Interview Schedule for Children, version 5. The Diagnostic Interview Schedule for Children (DISC) is a highly structured diagnostic tool which measures mental disorders in children and adolescents by assessing the presence or absence of symptoms required for diagnosis [8]. It is modularized, with assessment and diagnosis of each mental disorder fully contained within the relevant independent module, and is designed to be administered by trained lay interviewers. The DISC-5 was chosen as the most appropriate measure for NAMHS given that the DISC has been used in previous studies in both high-income countries and LMICs [9–13], the DISC-5 utilizes the most up-to-date diagnostic criteria (i.e., DSM-5) [14], and is available to use free-of-charge with permission. The final reason was considered particularly important for establishing a methodology that could be used in future surveys in LMICs.

For NAMHS, six DISC-5 diagnostic modules are included: SoPh, GAD, MDD, ADHD, conduct disorder, and post-traumatic stress disorder. The mental disorders selected represent the most common internalizing and externalizing mental conditions of adolescence [4], are included in the Global Burden of Disease Study [4,15], and have been identified by the in-country investigators as having policy relevance within their country. An 'Introductory' DISC-5 module is also included in NAMHS which identifies significant personal events from the past 12 months to assist the participant with recall. Selected disorders, i.e., SoPh, GAD, and MDD, will also be assessed for concurrent validity, by comparing the DISC-5 to clinician diagnoses (see Appendix C for details on the clinical calibration study).

All DISC-5 modules are administered to the adolescent except for ADHD, which is addressed to the primary caregiver. This approach, whereby primary caregivers have been the respondents for the ADHD (and other diagnostic) module, is consistent with other surveys with adolescents [9] and based on clinical advice that adolescents often have poor insight into the symptoms associated with ADHD. Consistent with this, primary caregivers were determined as the most reliable reporters of ADHD symptoms in adolescents.

The Introductory module is administered to both the adolescent and the primary caregiver. For diagnoses in NAMHS, both past 12-month and past 4-week prevalence are assessed. Any changes to the original instrument were made based on the cultural and logistic requirements of NAMHS, e.g., removal of open-ended questions not required for diagnosis, while ensuring

the integrity of the instrument was maintained in terms of concept and for future comparability.

Other measures. Other measures included in the NAMHS instrument incorporate existing measures, adapted measures, and measures specifically designed for NAMHS through the collaborative process involving all investigators. Risk and protective factors were chosen based on several factors including existing evidence for associations with mental disorders [16,17], availability of existing valid measures, feasibility of measurement within the survey frame, and in-country priorities as identified by the in-country investigators.

Additional measures were included for K-NAMHS and I-NAMHS, to assure country relevance and response to specific concerns. For K-NAMHS, this included interviewer observations of the dwelling's structure and additional wealth index [18] questions regarding ownership of agricultural land and animals. Measures assessing problematic internet use and e-cigarettes were developed collaboratively by all NAMHS investigators and retained in K-NAMHS after the pilot study. For I-NAMHS, a series of questions around health insurance was added, along with an additional question on religiosity.

Tables 1 and 2 outline all modules (DISC-5 and other modules) included in the primary caregiver and the adolescent instruments. Any existing or adapted measures are noted and referenced [19–28]. Based on feedback from the pilot study and evidence from previous studies [29,30], a subset of modules in the adolescent instrument was designed for self-administration to improve reporting of potentially sensitive information (Table 2).

Platform. The NAMHS interview will be conducted using a smartphone or tablet. The NAMHS instrument will be programmed in SurveyCTO [31], a mobile data collection platform used in other research studies such as the Global Early Adolescent Study [32]. SurveyCTO is based on Open Data Kit (ODK), a free open source software designed for data collection in low-resource settings and previously used in research settings by the World Health Organization, Red Cross, and Google [33]. For K-NAMHS and V-NAMHS, the instrument was accessed via the SurveyCTO Collect application (app) downloaded onto the device. Given the strict requirements regarding server location according to Indonesian law, the ODKCollect app will be used in place of SurveyCTO. ODKCollect [33] is also based on ODK and differs from SurveyCTO in terms of programming functionality, whereby the functionality is more limited. Throughout programming and testing, steps will be taken to ensure consistency in content and function between SurveyCTO Collect and ODKCollect. The I-NAMHS instrument will be programmed in both SurveyCTO and ODKCollect to ensure consistent output across both platforms.

Procedure

Interviewers. Where possible, interviewers with survey experience will be recruited from existing employment pools from each participating organization. Where feasible, interviewers will be recruited from geographic regions where data collection will be conducted. This will minimize unnecessary travel between different regions, while also potentially helping to facilitate acceptance of the survey due to increased awareness of local culture, norms, and practices.

Training. Training of interviewers will involve three main components: content (focusing on mental health and the instrument), administration (including ethical requirements and fieldwork protocols), and role-play/practice. The content component of the training was developed by the UQ investigators in consultation with all countries, with JHSPH providing a section on adolescent health, assuring consistency across all countries.

Table 1
Modules included in the primary caregiver instrument (in order of administration)

Module	Overview
Demographics	Partly adapted from the demographics modules of the Australian YMM study [9] and the GEAS (www.geastudy.org). Collects demographic information pertaining to the adolescent, primary caregiver, and household. It includes the Washington Group Short Set of Questions on Functioning [19] to screen for severe physical or cognitive disability that would preclude the adolescent from meaningfully participating in NAMHS.
Chronic illness	Based on expert advice. Measures serious or chronic illness experienced by the adolescent or caregiver(s).
Pediatric Symptom Checklist-17 [20]	A brief screening questionnaire that assesses internalizing and externalizing symptoms in children. In NAMHS, it is used to measure the primary caregiver's report of the adolescent's mental health.
Patient Health Questionnaire-9 [21]	A brief screening measure of depressive symptomology. In NAMHS, it is used to screen the primary caregiver's depressive symptomology.
GAD-7 [22]	A brief screening measure of GAD symptomology. In NAMHS, it is used to screen the primary caregiver's GAD symptomology.
DISC-5 Introductory module	Establishes a timeline of significant events in the past 12 months to assist the participant with recall, instructs participants on how to answer questions in the DISC-5 modules, tests their understanding of these instructions, and reiterates the significant events. For NAMHS, demographic questions were removed as this information was already sourced through the Demographics module.
DISC-5 ADHD module	Measures the prevalence of ADHD in the past 12 months and the past 4 weeks. Also assesses age of onset and impairment.
Service use	Partly adapted from YMM [9] and based on expert advice. Collects information from the primary caregiver about mental health service use, barriers to mental health care, and perceived need for mental health care in relation to the adolescent.
COVID-19	Measures awareness of and exposure to COVID-19, stigma, economic impact on the household, primary caregiver substance use, and the adolescent's mental health in the context of COVID-19.

ADHD = attention-deficit/hyperactivity disorder; DISC-5 = Diagnostic Interview Schedule for Children, version 5; GAD = generalized anxiety disorder; GEAS = Global Early Adolescent Study; NAMHS = National Adolescent Mental Health Surveys; YMM = Young Minds Matter.

Table 2
Modules included in the adolescent instrument (in order of administration)

Module	Overview
DISC-5 Introductory	Establishes a timeline of significant events in the past 12 months to assist the participant with recall, instructs participants on how to answer questions in the DISC-5 modules, tests their understanding of these instructions, and reiterates the significant events. For NAMHS, demographic questions were removed as this information was already sourced through the Demographics module in the primary caregiver instrument.
DISC-5 SoPh	Measures the prevalence of SoPh in the past 12 months and the past 4 weeks. Also assesses age of onset and impairment.
DISC-5 GAD	Measures the prevalence of GAD in the past 12 months and the past 4 weeks. Also assesses age of onset and impairment.
DISC-5 MDD	Measures the prevalence of MDD in the past 12 months and the past 4 weeks. Also assesses age of onset and impairment. In addition to the questions related to suicide already contained in the DISC-5 MDD module (as required for diagnosis), additional questions were added to more comprehensively capture suicidality (inclusive of ideation, planning, and attempts).
NSSI	Partly adapted from YMM [9] and based on expert advice. Measures the prevalence, age of onset, and recency of NSSI.
DISC-5 CD	Measures the prevalence of CD in the past 12 months and the past 4 weeks. Also assesses age of onset and impairment.
DISC-5 PTSD	Measures the prevalence of PTSD in the past 12 months and the past 4 weeks. Also assesses symptom onset and impairment.
Service use	Partly adapted from YMM [9] and based on expert advice. Collects information about help-seeking behavior and self-management strategies. Supplements information collected in the equivalent primary caregiver module.
Self-rated health and body image	Partly adapted from GEAS (www.geastudy.org). Measures the adolescent's self-rated health and body image.
Physical activity	Based on expert advice. Measures the adolescent's physical activity.
Rosenberg self-esteem scale [23,24]	Brief measure of self-esteem.
Bullying	Partly adapted from the Global School Health Survey [25] and based on expert advice. This module serves as a measure of bullying victimization and perpetration frequency, including the mode of bullying.
School and education	Partly adapted from YMM [9] and GEAS (www.geastudy.org). Measures academic aspirations (both current and past aspirations depending on current school enrolment), expectations, and pressure.
Peer relationships and loneliness	Partly adapted from GEAS (www.geastudy.org) and an existing three-item loneliness scale [26]. Collects information about the adolescent's friendships (including peer deviance) and loneliness.
GEAS family connectedness	Collects information about the adolescent's relationship with their primary caregiver (www.geastudy.org).
Religiosity	Measure of externalizing religiosity as an indicator of additional social support.
Safety and security	Partly adapted from GEAS (www.geastudy.org). Measures perceived personal safety in different contexts e.g., home, school, and the neighborhood.
Sexual behavior[a]	Partly adapted from GEAS (www.geastudy.org). Collects information on the adolescent's sexual behavior, sexuality, and gender identity.
Adverse Childhood Experiences questionnaire [27][a]	Measures lifetime exposure to multiple types of abuse, neglect, violence between parents or caregivers, other kinds of serious household dysfunction, and violence.
Substance use[a]	Partly adapted from YMM [9] and based on expert advice and existing guidelines [28]. Measures of use of cigarettes, alcohol, and illicit drugs.
COVID-19	Measures awareness of and exposure to COVID-19, education impacts, household risk factors, and mental health in the context of COVID-19.

ADHD = attention-deficit/hyperactivity disorder; CD = conduct disorder; DISC-5 = Diagnostic Interview Schedule for Children, version 5; GAD = generalized anxiety disorder; GEAS = Global Early Adolescent Study; MDD = major depressive disorder; NAMHS = National Adolescent Mental Health Surveys; NSSI = non-suicidal self-injury; PTSD = post-traumatic stress disorder; SoPh = social phobia; YMM = Young Minds Matter.
[a] Modules that are self-administered. All other modules are interviewer administered.

A 'training-of-the-trainers' model was employed whereby the UQ investigators conducted face-to-face training in each country in late 2019, focusing specifically on content. The administration and role-play training components were planned and delivered by the in-country investigators. This also served as the training for the pilot study interviewers. Additional training-of-the-trainers on content will be provided online by UQ to each country prior to the main training.

The main training will be conducted by each country, using the resources developed by the UQ and in-country investigators. The UQ investigators will also provide ongoing online support to each country throughout the training period. A combination of independent learning, online teaching, and face-to-face sessions will be used by the in-country investigators to cover the three training components.

Administration. While there are differences between countries, necessitated by cultural, geographical, and ethical considerations, the standardized administration procedure for national survey data collection is described below. The procedure was developed collaboratively with all NAMHS investigators to ensure methodologic consistency across countries, with in-country investigators then adapting this methodology to their specific context.

Once household mapping and listing is completed, interviewers will approach households and invite participation in the survey. In instances where a household is unavailable during the first approach, the household will be approached an additional two times before being considered 'non-responding' (with the reason for non-participation recorded).

Consent will first be obtained from the primary caregiver who will provide consent for both themselves and their adolescent to participate. Assent will then be obtained from the adolescent. Both consent and assent are required for the interviews to proceed. The consent and assent forms and processes were developed by UQ, in line with the guidelines and principles outlined in the Australian National Statement on Ethical Conduct in Human Research [34], and then adapted by each country.

Each primary caregiver and adolescent interview will be conducted separately in a private place to ensure response confidentiality. The interview cannot proceed if privacy cannot be guaranteed (e.g., if the primary caregiver insists on listening to the adolescent's interview). In these instances, a household will be considered non-responding. The survey reference adolescent

will be randomly selected from eligible adolescents within the household using a computerized algorithm obviating primary caregiver or interviewer bias. If the primary caregiver insists on a different adolescent being interviewed then the interview will not proceed. The primary caregiver interview will be conducted first given that it will be the single source of demographic information which will further inform questions and skip patterns in the adolescent interview. Tokens of appreciation (i.e., a small gift valued under US$5) have been determined by the in-country investigators.

Participants can choose not to answer any question and are free to withdraw at any time. The UQ investigators developed a distress protocol which has been adapted and operationalized by each country. This outlines what steps an interviewer must take where follow-up is deemed necessary or in instances of imminent risk i.e., where there is an imminent risk of harm to the participant, by the participant, or to the interviewer. Interviewers are trained to follow the distress protocol in instances where participants appear distressed or upset, or exhibit symptoms of distress such as visibly shaking, tearful or crying, avoiding eye contact (if culturally relevant), verbal expression of anger and irritation, or visible shift in mood/demeanor. If an interview needs to be paused on more than two occasions or if the distress escalates, the interview will be stopped. All countries have confirmed that mandatory reporting is only required in cases where the participant voluntarily discloses information (i.e., information outside of the survey questions) that indicate they are at imminent risk. If this occurs, the distress protocol is enacted and established procedures are followed. Participants are advised of this as part of the consent and assent process so that they are aware of the implications of sharing such information. At the conclusion of each interview, each participant (i.e., both the primary caregiver and the adolescent) will be given an information sheet outlining mental health services available in their area.

Clinical calibration study

The DISC-5 will be calibrated against clinician diagnosis by comparing diagnoses made by the DISC-5 to clinical diagnoses in order to assess the agreement between the two. The purpose of the clinical calibration study is to allow for additional interpretation of the findings of NAMHS. For example, specific aspects of DSM-5 diagnostic criteria will be investigated by altering certain symptom and duration requirements in the DISC-5 scoring algorithms to determine the effect on agreement between DISC-5 and clinical diagnoses. This will address a gap in the current knowledge about the applicability of existing diagnostic criteria and the performance of diagnostic tools in non-Western contexts. The clinical calibration study will also establish a methodology for conducting such research in low-resource settings. More information about the clinical calibration study is available in Appendix C.

Impact of COVID-19

The advent of COVID-19 in early 2020 has significantly impacted the NAMHS timeline and methodology. All data collection, originally planned for 2020, was postponed to 2021. Each country has developed specific protocols for COVID-19, including personal protection and safety protocols. The safety of each enumeration area will be assessed prior to and during data collection using multiple sources of information, such as government data and local reporting. To better understand the impact of COVID-19 on the findings, a COVID-19 module has been added to the primary caregiver and adolescent instruments. The purpose of these questions is to measure COVID-19 exposure and interpret variations in the prevalence of mental disorders in adolescents in each country, as well as to directly measure risk factors exacerbated by COVID-19.

Results

Data ownership

All data will be co-owned by UQ and each respective country, with JHSPH given full access for data cleaning and analysis.

Data security and monitoring

All data will be anonymous, with all names deleted prior to data being uploaded to the server. No other personal identifying information will be collected. Once the interview is finalized, the data are locked and encrypted within the data collection app which prohibits any access to or alteration of the data. Once internet access is available, the encrypted data will be uploaded to a secure and password-protected server. To prevent unsecure data being stored on the device for any length of time, the data security protocol prohibits splitting the same interview (i.e., either the primary caregiver interview or the adolescent interview) over multiple days. Data on the secure server will be managed by JHSPH in conjunction with the Data Manager of each country. UQ will also have access to the data as per agreed upon protocols.

Collection of data will be monitored while interviewers are in the field using tracking markers such as household approaches, refusals, completion rates, and interview length. The primary caregiver and adolescent interviews will be completed and uploaded to the server as separate forms, as will the clinician interviews. This necessitates the use of identification codes based on non-identifiable data to link the forms. Once all forms are linked at the completion of data collection, the identification codes will be replaced with a random code to assure anonymity of all data.

Data cleaning and analysis

Initial data cleaning will be conducted by JHSPH using a protocol approved by all collaborating sites. Descriptive statistics of the prevalence of mental disorders will be calculated and disaggregated by disorder, age (10–14 years, 15–17 years), and sex (female, male). The prevalence of risk and protective factors will be reported. Associations between risk and protective factors and mental disorders will be examined using multivariable logistic regression. Service utilization and other service-related data will be analyzed. For the clinical calibration study, Cohen's Kappa scores will be calculated for MDD and anxiety disorders (SoPh or GAD) to indicate the level of agreement between DISC-5 and clinician diagnosis. Sensitivity, specificity, and positive and negative predictive values will also be generated.

Discussion

Accurately quantifying the prevalence of mental disorders in adolescence is essential for service planning and prioritization, as well as for advocacy and public health campaigns targeted at increasing awareness and reducing stigma. The lack of data on the prevalence of mental disorders among adolescents, particularly those living in LMICs, effectively renders mental health invisible at a population level. The core aim of NAMHS is to directly address this lack of data. The data from NAMHS will contribute to more accurate estimates of disease burden in the Global Burden of Disease Study, the results of which are freely available and used by governments, international organizations, development and aid agencies, and philanthropic organizations to determine action on adolescent mental health.

The NAMHS methodology, along with the unique challenges and general lessons learned, can be carried forward to help guide future surveys of adolescent mental health in LMICs. More broadly, NAMHS will encourage capacity building within each country by establishing linkages between researcher, clinician, and government networks. NAMHS will also strengthen links between the different countries to ensure ongoing knowledge sharing and collaboration, as well as encouraging future research.

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Supplementary Data

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