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3 **Title:**

4 Review of layperson screening tools and model for a holistic mental health screener in lower and middle
5 income countries.

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22 **Abstract**

23 **Background:**

24 The needs of people diagnosed with Mental Neurological and Substance-Use (MNS) conditions are
25 complex including interactions physical, social, medical and environmental factors. Treatment requires a
26 multidisciplinary approach including health and social services at different levels of care. However, due
27 to inadequate assessment, services and scarcity of human resource for mental health, treatment of persons
28 diagnosed with MNS conditions in many LMICs is mainly facility-based pharmacotherapy with minimal
29 non-pharmacology treatments and social support services. In low resource settings, gaps in human
30 resource capacity may be met using layperson health workers. A layperson health worker is one without
31 formal mental health training and may be equivalent to community health worker (CHW) or less cadre in
32 primary health care system.

33 **Objectives:**

34 This study reviewed layperson mental health screening tools for use in supporting mental health in
35 developing countries, including the content and psychometric properties of the tools. Based on this review
36 this study proposes recommendations for the design and effective use of layperson mental health
37 screening tools based on the Five Pillars of global mental health.

38 **Methods:**

39 A systematic review was used to identify and examine the use of mental health screening tools among
40 laypersons supporting community-based mental health programs. PubMed, Scopus, CINAHL and
41 PsychInfo databases were reviewed using a comprehensive list of keywords and MESH terms that
42 included mental health, screening tools, lay-person, lower and middle income countries. Articles were
43 included if they describe mental health screening tools used by laypersons for screening, delivery or
44 monitoring of MNS conditions in community-based program in LMICs. Diagnostic tools were not
45 included in this study. Trained research interviewers or research assistants were not considered as lay
46 health workers for this study.

47 **Results:**

48 There were eleven studies retained after 633 were screened. Twelve tools were identified covering
49 specific disorders (E.g. alcohol and substance use, subcortical dementia associated with HIV/AIDS,
50 PTSD) or common mental disorders (mainly depression and anxiety). These tools have been tested in
51 LMICs including South Africa, Zimbabwe, Haiti, Malaysia, Pakistan, India, Ethiopia and Brazil. The
52 included studies show that simple screening tools can enhance the value of laypersons and better support
53 their roles in providing community-based mental health support. However, most of the layperson MH
54 screening tools used in LMICs do not provide comprehensive information that can inform integrated
55 comprehensive treatment planning and understanding of the broader mental health needs of the
56 community.

57 **Conclusion:**

58 Developing a layperson screening tools is vital for integrated community-based mental health
59 intervention. This study proposed a holistic framework which considers the relationship between
60 individual's physical, mental and spiritual aspect of mental health, interpersonal as well as broader
61 contextual determinants (community, policy and different level of the health system) that can be
62 consulted for developing or selecting a layperson mental health screening instrument. More research are
63 needed to evaluate the practical application of this framework.

64 **Introduction**

65 **Mental Health System and MNS Conditions in LMICs**

66 The prevalence of mental, neurological and substance use (MNS) disorders in lower-middle income
67 countries is about two in ten persons(1). It is estimated that 76%-85% of persons affected by MNS
68 disorders in LMICs lack access to mental health services for prevention and treatment resulting in a huge
69 treatment gap(1,2). Mental disorders, if untreated, can cause significant impairment and disability
70 resulting in emotional and economic burden on individuals, their families, caregivers and the society at
71 large. Mental, neurologic and substance use disorders are one of the ten leading causes of disability
72 globally, accounting for over 11% of the global burden of disease (GBD) measured by disability adjusted
73 life years (DALY) and 28% of GBD measured by years lived with disability (YLD) in 2016(3). The
74 magnitude of disability caused by MNS conditions results from early onset of the illness, failure to seek
75 help or delay in initiating treatment. These are in part due to lack of knowledge about mental disorder and
76 available treatment, unavailability of care and barrier caused by stigma(2).

77 Mental, neurological and substance use disorders also affect the overall quality of life of people
78 with MNS disorders and their caregivers. In some jurisdictions, people with mental illness are denied
79 basic rights and are faced with numerous societal barriers especially those arising from stigma and
80 discrimination(4). This in turn can affect their ability to fully participate as members of their societies.
81 Their inability to work constitute economic burden on their families, particularly due to the costs of
82 formal and informal care. The emotional impact includes distress associated care, stigma and lives lost to
83 suicide. The quality of life of people with MNS disorder is worse in LMICs where they are usually
84 neglected in poor living conditions and with no access to quality health care. Also, government
85 expenditure earmarked for mental health in LMIC is not proportionate to the contribution of mental health
86 to disease burden. It was estimated that an average 0.5% of total health expenditures are allocated for
87 mental health in LMICs. This imposes an enormous challenge on the health care system(5).

88 The needs of persons with mental health conditions are complex, including interactions among
89 physical, social, cultural, medical and environmental factors. Therefore the treatment of people diagnosed
90 with MNS disorders ideally requires multidisciplinary approaches including health and social services at
91 different levels of care. However, this is not always the case in low-resource settings like most LMICs
92 where treatment of persons diagnosed with MNS conditions is mainly facility-based pharmacotherapy
93 with minimal non-pharmacology treatments and social support services.

94 The lack of integrated assessment tools could explain the gap in their treatment plan because it is
95 impossible to get information about what is not assessed for. And lack of information about other factors
96 contributing to the general wellbeing of persons with MNS conditions results in treatment gap. There is
97 need for integrated and multi-sectoral approach to the assessment of need of people with MNS conditions
98 in order to provide them with holistic treatment.

99
100 In 2001, the World Health Organization (WHO) published a landmark report on mental health,
101 with the goal of increasing public awareness on the burden of mental disorders and removing barriers that
102 are creating treatment gaps for those that need care. In order to reduce the treatment gap of MNS
103 conditions the WHO proposed recommendations that can be adapted by every country to support people
104 living with MNS conditions(6). Key interventions recommended for improving MH in LMICS include
105 empowering people with MNS disorders and their families to provide support to each other, training non
106 specialist health workers to deliver psychological treatments, integrating economic intervention into
107 mental health care, use of computer-assisted, self-guided psychological therapies, delivering school –
108 based interventions for childhood disorders and providing integrated care for people with mental
109 disorders(5). These strategies have been classified broadly as the integration of mental health services into
110 primary healthcare, expansion of human resources or capacity for mental health through task sharing and
111 training of non-specialist and various innovation to engage lay person in self-care and informal
112 community care in order to enhance access, reduce cost and reduce stigma(7). These strategies create the

113 opportunity to expand the integration of mental health into existing health care system, strengthen human
114 resources, improve delivery of services and care reaching more persons with MNS conditions.

115 **Laypersons Support of Mental Health in LMICS**

116 Engagement of non-professionals, or lay persons, in the screening and delivery of mental health may be a
117 promising mechanism to improve support for persons with MNS conditions. Non-specialist mental health
118 workers have been classified as health professionals/workers that may have received general mental
119 health training but are not specifically trained as mental health professionals (e.g. doctors, nurses, para-
120 professionals and nonprofessional lay providers)(8,9). Non-specialist mental health workers may also
121 include professionals that are not involved in health care directly but play important roles in mental
122 health promotion and detection, such as teachers and community level workers, parents, traditional
123 healers, village elders, community based volunteers and peers(8,9). Evidence shows that lay persons can
124 be engaged in promotion and primary prevention, identification and detection, treatment, care and
125 rehabilitation of MNS disorders(10).

126 Layperson services are commonly used to provide mental health and psychosocial support in contexts
127 where there is scarcity of human resources. There are several examples in which lay community workers
128 or volunteers have been trained to deliver high quality mental health and psychosocial support
129 interventions under the supervision and guidance of trained professionals(8,9,11). In these instances, lay
130 workers also provided basic psychosocial support, group-based counselling, symptom management and
131 referral for specialist psychological support with the aim of reducing distress, improving psychological
132 and psychosocial functioning and improving coping mechanism of individuals and their community.
133 Services provided by these community volunteers also include individual screening/evaluation using
134 different tools(8,9,11). There are many existing system opportunities for the integration of non-health or
135 non-mental health workers into mental health workforce. Lay workers can conduct mental health
136 screening and referral to PHC or hospitals, mental health screening may be integrated into social activities
137 in the community (E.g. schools, social clubs, and religious centers) and other community based

138 organizations (CBO) activities like health outreaches and emergency response can be integrated as
139 support systems. At the crux of these opportunities is the need for a common mechanism, or tool, to
140 support lay workers/volunteers to be able to properly identify and support the needs of those in their
141 communities.

142 **Mental Health Screening Tools in LMICs**

143 Screening tools can be used to provide succinct information about the needs and resources of persons with
144 MNS condition and the community in which they live. Tools can also be used for large scale
145 epidemiological research to determine the mental health of a community or population. Content within
146 screening tools can also be used for training and creating community awareness to reach more people
147 with MNS conditions and improve access to care through community-based activities and outreach.

148 Mental health instruments can be classified based on the purpose they serve and the MNS condition they
149 are used to identify. Typically, mental health screening tools are used for screening, diagnosis or
150 treatment monitoring/evaluation(12), while comprehensive assessment tools help to gather detailed
151 information that is needed for accurate diagnosis and treatment plan that meets the individual need of the
152 patient.(13). Diagnostic tools provide information that are useful for specialist/clinicians to determine the
153 nature and or cause of the presenting complaints in order to make a diagnosis according to DSM
154 classification. Screening tools are different from diagnostic tools in that they provide information used to
155 identify those at risk of MNS disorder and that might need further evaluation by a specialist. Treatment
156 monitoring and evaluation tools are used to track changes in symptoms and functioning to determine the
157 effectiveness of the treatment/intervention. While some instruments fall categorically under one of these
158 classifications, some could actually be used for two or three of these purposes. It is explicit that diagnostic
159 tools are used by mental health specialist or health workers with adequate mental health training, but
160 some screening tools and treatment monitoring tools can be used by trained laypersons.

161 A variety of mental health screening tools have been developed and applied to detect MNS conditions in
162 LMICS(14). Some studies have pooled validation studies of mental screening tools in general and some

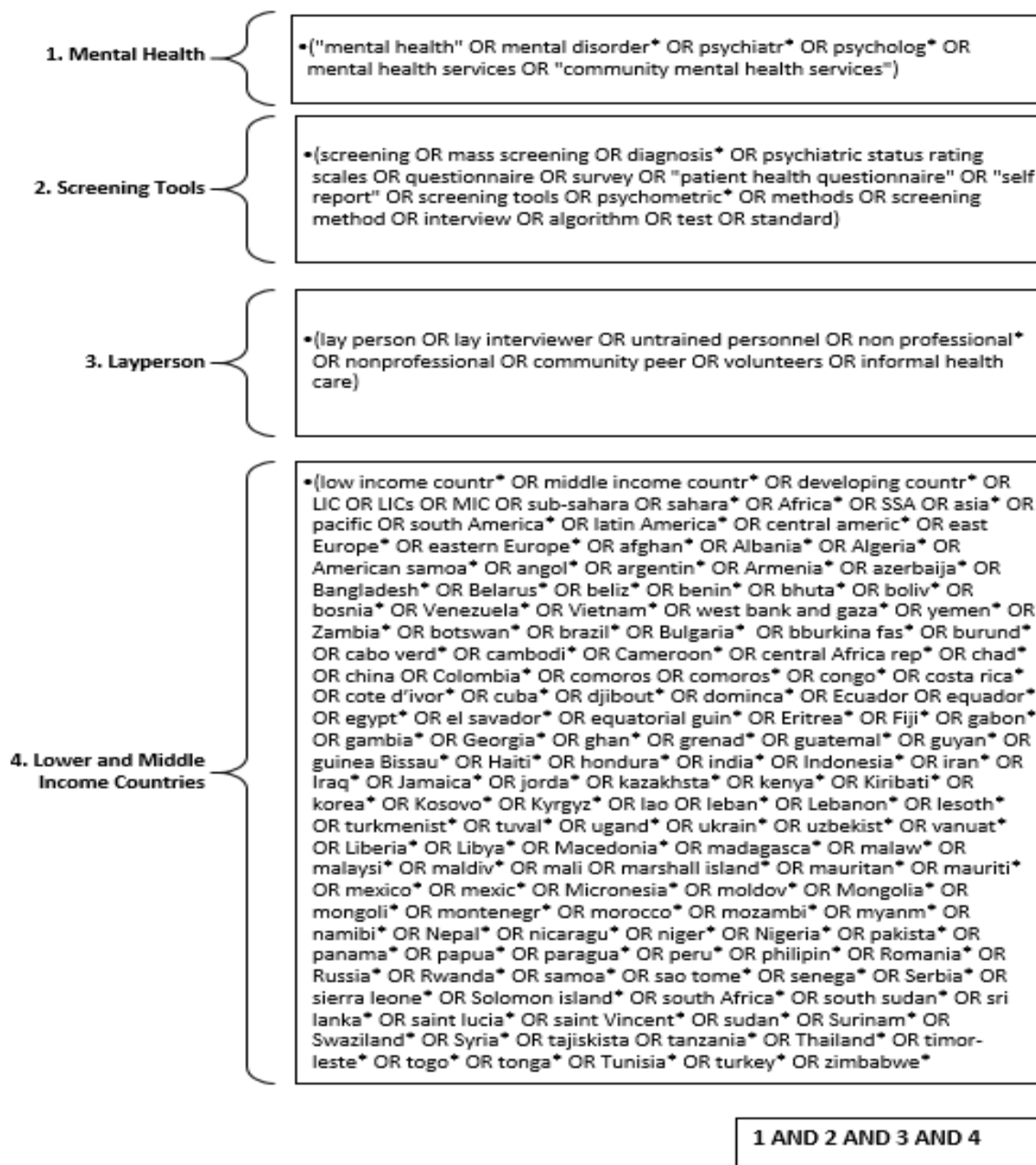
163 for specific mental conditions in particular populations (12,14). A number of these tools require
164 administration by trained professionals while others can be administered by persons with no formal
165 mental health training (14). While tool inventories exist, there is limited evaluation of the feasibility and
166 effectiveness of layperson mental health screening tools, particularly for community-based programs in
167 LMICs. The purpose of this study was to review layperson mental health screening tools for use in
168 supporting mental health in developing countries, including the content and psychometric properties of
169 the tools. Based on this review this study will propose recommendations for the design and effective use
170 of layperson mental health screening tools based on the Five Pillars of global mental health.

171 **Methods**

172 This study uses a systematic review to identify tools and examine their use among laypersons supporting
173 community-based mental health programs. The study was conducted in accordance with the PRISMA
174 recommendations for systematic reviews(15). There was no study protocol published in advance of
175 conducting this review.

176 **Search Strategy**

177 The following keywords were used to conduct the literature search in a systematic manner: mental health,
178 screening tools, lay-person, lower and middle income countries. Combinations of search terms, as shown
179 in Fig 1, were used to identify manuscripts from PubMed, Scopus, CINAHL and psychInfo databases.
180 These databases search was restricted to journals published between 2008 and 5th June 2018.



181

182 **Fig 1: Search terms used to identify manuscripts from the databases.**

183

184 **Inclusion and Exclusion Criteria**

185 Articles were included if they describe mental health tools for use by laypersons for screening, delivery or

186 monitoring of MNS conditions in community-based program in LMICs. Laypersons have been described

187 above as persons that are non-mental health professionals and non-clinicians or non-health workers

188 supporting mental health program or intervention (e.g. teachers, parents, peers, local/community workers,
189 community health worker). Diagnostic tools were not included in this study because these are not
190 expected to be used by laypersons without clinical training. Trained research interviewers or research
191 assistants were also not considered as lay assessors for this study because we could not verify their
192 professional or prior training. Studies in which lay persons were only engaged in providing community-
193 based mental health interventions but not in the assessment or screening of the participants were also
194 excluded from this review. Studies that did not specify who administered the tools were also excluded.
195 Articles published before 2008 and in languages other than English were also excluded.

196 **Study Selection**

197 First level title screening was done to excluded studies that were not related to mental health/mental
198 health screening tools. Abstracts of the remaining articles were reviewed for possible inclusion. Full texts
199 of all articles that were potentially relevant were assessed using the inclusion criteria. The reference lists
200 of the articles included were searched for additional studies. The second author repeated 10% of the study
201 selection at every stage in order to reduce bias caused by human error. The rate of agreement between the
202 two reviewers was quite high and discrepancies were resolved through discussion. Authors of some of the
203 articles were contacted for clarification about validation and definition of users of the screening tools
204 when these are not specified in the studies.

205 **Quality Appraisal**

206 All the studies that met the above inclusion criteria were included in this review irrespective of their
207 methodological quality. This decision is based on scarcity of literature on the topic and the aim to
208 maximize the use of available studies. Instead, methodological considerations were included as points of
209 discussion to drive future research.

210 **Data Extraction**

211 A data extraction template was developed and included the following: MNS conditions, number of items,
212 cost, form, psychometric properties, other conditions assessed, age/study population, study setting,

213 country of study, tool administrators, whether or not use required training and availability of multiple
214 versions.

215 **Conceptual Framework for Study Analysis**

216 The holistic policy and intervention framework (HPIF) also known as the five pillars of global mental
217 health and addiction, provides guidance on the analysis, evaluation, and sustainability of global mental
218 health capacity building interventions (Khenti et al, 2015). The development of this framework was a
219 result of collaborative work between the office of transformative global health and its partners from
220 LMICs based on practical experience, lessons learned and global best practices. For instance, programs
221 aimed at developing international partnership, leadership training for mental health professionals,
222 capacity building for mental health research and knowledge exchange in Sri Lanka and Sub-Saharan
223 Africa demonstrated how capacity building can contribute to improved population mental health(16,17).
224 The contextualization of mhGAP for primary health care in Nigeria also demonstrated the importance of
225 considering the context and sociocultural relevance of mental health intervention in LMICs(18) The
226 pillars of global mental health is a multilevel framework consisting of five central components which
227 include: holistic health, cultural and socioeconomic relevance, partnerships, collaborative action-based
228 education and learning and sustainability(19). The framework is multi-level in the sense that it examined
229 mental health development interventions at multiple levels of healthcare system (social, political,
230 economic, policy, community, organizational, interpersonal and individual levels)(19).
231 The overall objective of HPIF is to improve the health and quality of life of individuals around the world
232 by supporting improvements in mental health care of diverse health systems. The development of this
233 framework is underlined by a fundamental values of equity and human rights against the challenges of
234 stigma and discrimination(19). The first pillar of HPIF emphasizes a *holistic perspective* towards health.
235 This means that in order to successfully develop and implement a context-specific capacity building
236 intervention, it is important to consider the interrelationships between individual, interpersonal,
237 organizational, community, and policy levels of the health system, as well as the relationship between

238 physical, mental and spiritual health. The second pillar emphasizes that interventions need to maintain
239 *cultural and socioeconomic relevance*. Since cultures vary in their perspectives toward mental health
240 conditions, knowledge and understanding of these conditions should come from the community of people
241 for which mental health interventions are provided; this includes the opportunity to critically analyze the
242 western perception of these conditions. Persons with mental health conditions should be important
243 stakeholders contributing to the entire process of the mental health intervention, such as the development,
244 design, planning, implementation, and evaluation of policies and interventions. This will enhance
245 ownership of the project by the community and its sustainability. Therefore, the third pillar focuses on the
246 importance of *collaboration between stakeholders*. For instance, it is essential to establish reciprocal
247 partnership based on trust and respect with local stakeholders including community health workers,
248 religious leaders, and local governance. This will serve as a platform for knowledge exchange,
249 reconciliation of differences and embracing similarities in culture and values. Once a platform is
250 established, the fourth pillar of *capacity building* can be enacted. Capacity building focuses on
251 collaborative action-based education and learning that can be achieved through education and training of
252 trainers. This action-oriented learning includes the identification of gaps, strengths and opportunities in
253 the existing system, addressing the gaps by building on existing strengths and opportunities, training
254 professionals and sharing knowledge. If successful, strategies to support the fifth pillar, *sustainability*, can
255 ensure the long-term impact of mental health addiction interventions.

256 For this study the identified mental health screening tools were examined to evaluate their fit into the
257 HPIF. To determine fit we addressed a number of questions when examining tools, such as: Is the
258 development of the tool based on knowledge of the people of the community in which it will be used? Is
259 the tool adapted, validated and reliable for use in that particular cultural, social and economic context? In
260 addition to mental health, does it also assess physical and spiritual health? Does the use of the tool
261 provide opportunity for training or knowledge acquisition on mental health? Is it sustainable in terms of
262 availability, cost, ease of use and open to review and update?

263 **Results**

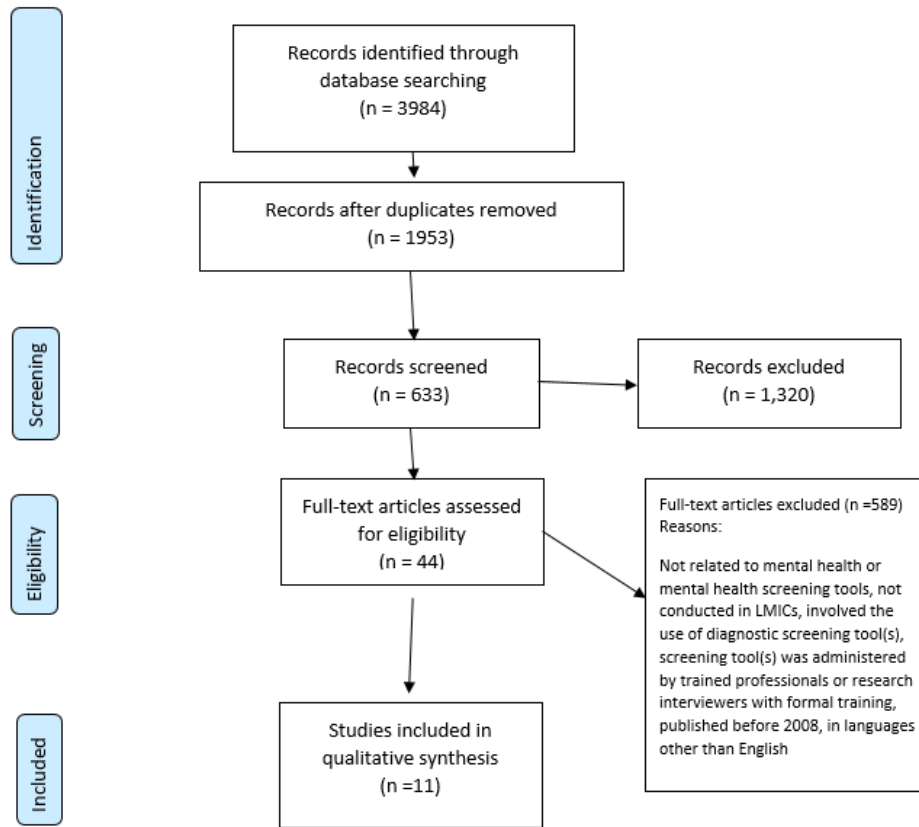
264 **Study Selection**

265 The initial database search on PubMed yielded 2,826 articles, Scopus yielded 33 articles, psychinfo
266 yielded 991, and CINAHL yielded 134 articles. After removing duplicates a total of 1,953 articles were
267 identified. After first level title screening, the abstracts of the remaining 633 articles were screened with
268 589 articles excluded because the study either was not conducted in LMICs, involved the use of
269 diagnostic screening tool(s), or the screening tool(s) was not administered by trained professionals or
270 research interviewers with formal training. The full text of the remaining 44 articles were further screened
271 and their references scanned to identify the final 11 articles reviewed for this study.

272 One systematic review was identified focusing on the review of mental health screening tools that are
273 validated for use in LMICs. This review did not focus specifically on tools validated for lay person use.
274 However, three articles cited in the review that involved laypersons in the validation studies were
275 included in this study. The eleven articles that were reviewed for this study were those which describe
276 use of mental health screening tools by lay persons for screening, delivery or monitoring of MNS
277 conditions in a community-based mental health programs in LMICs(14,20,29,21–28).

278 See PRISMA Flowchart (Fig 2) below

PRISMA Flow Diagram



279

280 **Fig 2: Study selection flow diagram**

281

282 **Study Characteristics**

283 The majority of studies focused on the description or application of laypersons service provision rather
284 than specific evaluation of screening tools. Although the primary focus of these studies was not on the use
285 of screen tools per se, these studies were included as they provided a description of a number of screening
286 tools using within lay person contexts. Four studies evaluated the effectiveness of community-
287 based/primary health care level mental health interventions provided by lay community workers among
288 different populations (20,21,24,25). Two of the studies describe community-based interventions provided
289 by community lay workers trained to identify, counsel and refer people affected by disaster(22,23). These

290 studies describe use of mental health screening tools by laypersons for screening, delivery or monitoring
291 of MNS conditions in community-based mental health programs in LMICs. Within these studies, twelve
292 screening tools were used. Only one study had the explicit purpose of evaluating mental health screening
293 tools, a systematic review of mental health screening tools that have been validated for use in LMICs(14).
294 This review included tools that were designed for use by lay-persons as well as other tools. We also
295 searched the references of this review to determine if there were additional relevant studies to those
296 identified in our review. We identified four additional studies that described the validation of several tools
297 for use by lay persons in a community or PHC setting(26–29). Find the information in Annex II.

298 Across all studies, twelve screening tools were identified. Table 1 below provides a description of the
299 identified mental health screening tools validated for layperson use in low and middle income countries.

Table 1: Summary table of the identified mental health screening tools validated for layperson use in low and middle income countries

Screening tool	Definition of lay person	Length of tool(# of items)	Mode of Administration	Mental Health Condition(s)
Substance abuse and mental illness symptom screener (SAMISS)	Lay adherence counsellors (LAC). LAC had less previous knowledge of mental disorders and are of a lower professional category	13/16 items	paper/computer-administered	multiple mental health and substance use conditions
International HIV Dementia Scale (IHDS)	Lay adherence counsellors (LAC). LAC had less previous knowledge of mental disorders and are of a lower professional category	4 items	paper/computer-administered	Sub-cortical dementia associated with HIV
Shona Symptom Questionnaire	Lay workers are literate female elders supporting community health programs	14 items	Paper	Multiple mental health conditions
Harvard Trauma Questionnaire (Section 4)	Lay community workers	16 items	Paper	Posttraumatic stress disorder
Clinical Interview Schedule-Revised	Medical students (for this study)	14 symptoms group questions	Computerized	Multiple mental health conditions
Aga Khan University Anxiety and Depression Scale (AKUADS)	Minimally trained adult females from the community that can read and write lingua franca Urdu	25 items	Paper	Depression and anxiety
12-Item General Health Questionnaire -12 (GHQ-12)	Lay people from the community trained over few days to conduct the assessment interview	12 items	Paper	Multiple mental health conditions
20-Item Self-reporting Questionnaire-20 (SRQ-20)	Lay people from the community trained over few days to conduct the assessment interview	20 items	Paper	Multiple mental health conditions
Kessler Psychological Distress Scale (K-10, K-6)	Lay people from the community trained over few days to conduct the assessment interview	K-10 is ten-item. The K-6 score can be extracted from K-10	paper/computer-administered	Multiple mental health conditions
9-Item Primary Health Questionnaire (PHQ-9)	Lay people from the community trained over few days to conduct the assessment interview	9 items		Multiple mental health conditions
30-Item Geriatric Depression Scale (GDS-30)	lay-interviewers with at least 11 years of schooling were selected from the community	30 items	Paper	Depression

Edinburgh Postnatal Depression Scale (EPDS)	female high school graduates (tenth grade and above) who had received two days of training in administration of the EPDS and SRQ-20	10 items	Paper	Multiple mental health conditions
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302 **Table 1 continued**

Screening tool	Age range to which it applies	Setting(s) in which it has been used	Psychometric properties (Validity and reliability)	Country of study	Does use require training?
Substance abuse and mental illness symptom screener (SAMISS)	Adult	Clinic	specificity (58%), Sensitivity (94%), criterion validity (0.76)	South Africa	Yes
International HIV Dementia Scale (IHDS)	adult	Clinic (HIV specific setting)	specificity (79%), Sensitivity (45%), criterion validity (0.64)	South Africa	Yes
Shona Symptom Questionnaire	Adult	Clinic	specificity (83%), Sensitivity (67%), criterion validity (0.88)	Zimbabwe	Yes
Harvard Trauma Questionnaire (Section 4)	Adult	Community (Post-disaster)	specificity (73%), Sensitivity (87%), criterion validity (0.83)	Haiti	No. Self-administered, but questions were read out to those that cannot read There is manual for scoring
Clinical Interview Schedule-Revised	Adult/adolescent	clinical community	Specificity (96%), Sensitivity (100%)	Malaysia	Yes
Aga Khan University Anxiety and Depression Scale (AKUADS)	Adult	community	Specificity (81%), sensitivity (74%),	Pakistan	Yes
12-Item General Health Questionnaire -12 (GHQ-12)	Adult, Older adults (>75 years)	Community, population-based study	Specificity (90%), Sensitivity (73%) and criterion validity (0.89).	India, Brazil	The interviewers received one week training
20-Item Self-reporting Questionnaire-20 (SRQ-20)	Adult	Primary Health Care, community outreach	sensitivity of 85.7%, specificity of 75.6% and internal consistency of 0.84,	Ethiopia, India	The interviewers received one week training
Kessler Psychological Distress Scale (K-10, K-6)	Adult	Primary Health Care	Sensitivity of 65% and 58%, specificity of 89% and 91% and internal consistency of 0.8 and 0.74 respectively	India	The interviewers received one week training
9-Item Primary Health Questionnaire (PHQ-9)	Adult	Primary Health Care	internal consistency of 0.79	India	The interviewers received one week training
30-Item Geriatric Depression Scale (GDS-30)	Older adults (>75 years)	Population-based study	Sensitivity of 73.3%, specificity of 65.4%, internal consistency of 0.87 and criterion validity of 0.74.	Brazil	Not specified
Edinburgh Postnatal Depression Scale (EPDS)	Adult	Community	Sensitivity of 76.5%, specificity of 36.1% and internal consistency of 0.47	Ethiopia	Lay interviewers received two days of training

303

304 **Analysis of the Identified Layperson Mental Health Screening Tools**

305 Most of the layperson screening tools identified were originally developed and validated as self-report
306 tools. Several have been administered by interviewers, especially in contexts where literacy levels of the
307 target population is low(14). Table 3 provides a summary classification of the identified screening tools.
308 Analysis of the identified tools shows that most tools were being used as interviewer-administered tools
309 even though they were originally developed and validated for self-report. Information was not available
310 as to whether this difference in mode of administration affects the measured outcome or score on these
311 instruments.

312 For this study, we included mental health screening tools that have been developed or validated and used
313 at the community level by lay persons that are non-mental health professionals and non-clinicians or non-
314 health workers supporting mental health program or intervention (e.g. teachers, parents, peers,
315 local/community workers). A systematic review of validated mental health screening tools in LMICs
316 identified 21 screening tools that were validated for use by lay interviewers. However, all these tools were
317 used by research assistants or trained interviewers rather than lay health workers in applied settings. For
318 this current study, twelve layperson mental health screening tools that have been used in applied settings
319 are described in Table 1. Some of these tools were developed in the western/high income countries and
320 validated for use in LMICs while others were developed primarily for LMICs, including the SAMISSI,
321 IHDS and AKUADS. Some were developed for specific mental health conditions (EPDS, GDS, HTQ and
322 IHDS) while others are for common mental disorders. EPDS, GDS and IHDS were also developed for use
323 in specific population ante- or post-natal women, geriatric and people living with HIV/AIDS respectively.

324 *Substance abuse and mental illness symptom screener (SAMISS)*: The SAMISS consists of 13-item or 16-
325 items paper/computer administered screening tools developed to identify alcohol, substance use and
326 common mental disorders (anxiety, depressive, adjustment and bipolar disorders) among people living
327 with HIV/AIDS (PLWHA). The 16-item version contains items from alcohol use disorder identification
328 test, 2-item conjoint screener, composite diagnostic interview and some items specifically designed for

329 SAMISS. Initially developed in the USA, the SAMISS has been validated for use by lay counselors
330 among people living with HIV/AIDS in South Africa with specificity (58%), sensitivity (94%) in
331 detecting symptoms of common mental illness and substance abuse and significantly correlated (0.76)
332 with the Mini International Neuropsychiatric Interview (MINI) administered by a mental health
333 nurse(20).

334 International HIV Dementia Scale (IHDS): The IHDS is a 4-item paper or computer administered
335 screening tool specifically designed to assess sub-cortical dementia associated with HIV in different
336 cultures, and by people with no formal training in neurology. The four items assess memory registration,
337 motor speed, psychomotor speed and memory recall. The specificity and sensitivity of IHDS in detecting
338 HIV dementia has been evaluated among in USA and Uganda(30). It has also been validated against
339 neuropsychological test battery for use by lay technicians among PLWHA in South Africa with
340 specificity (79%), Sensitivity (45%), criterion validity (0.64) in detecting subcortical dementia in this
341 population(20). In the validation studies among South Africans living with HIV, researchers have noted
342 that cultural, linguistic, or education of lay assessors may have affected the criterion validity of the IHDS.
343 As such, further evaluation of the IHDS among lay assessors is warranted.

344 Shona Symptom Questionnaire: This tool was designed to provide indigenous and culturally-relevant
345 mental health screening among indigenous populations in Sub-Saharan Africa. It is a 14-item common
346 mental disorders (CMD) screening tool, adapted from the self-reporting questionnaire-20 (SRQ-20)(31),
347 was developed for Shona speaking countries (Zimbabwe, Botswana and Mozambique) to assess common
348 psychiatric symptoms and responses in binomial format. Five items are measures of indigenous idioms of
349 distress of mental disorder that were not captured by SRQ-20. Its validity has been established among
350 adolescent and young adult population in Zimbabwe by researchers(32). It was validated against SRQ-
351 20 at optimal cut off point of five or more. Validation testing of the SSQ among the adult population
352 shows good psychometric properties with specificity of (83%), Sensitivity (67%) and criterion validity
353 (0.88) in detecting symptoms of depression and other CMD(32). It was used by lay worker (community

354 health promoters) to screen PLWHA for symptoms of depression and other common mental disorders in
355 Zimbabwe(21).

356 *Harvard Trauma Questionnaire (Section 4)*: This tool was used by lay health workers as a self-report
357 instrument to monitor PTSD symptoms among survivors of 2010 Haiti earthquake, but questions were
358 read out to those that cannot read (22). The original version of HTQ has four sections assessing history of
359 traumatic event, personal description of the event, injury to the head and trauma symptoms. In this study
360 only the first 16 items in section 4 were used to assess posttraumatic symptoms. Validity of the self-
361 administered French version of this tool has also been established among survivors of torture and
362 organized violence from sub-Saharan Africa(29). The content of the original version was first assessed
363 for cultural relevance and adapted as appropriate. It was then translated into French using the Brisling's
364 back-translation method after which the French version was validated against Structured Clinical
365 Interview for DSM (SCID). The validity study shows that HTQ is a good tool for assessing PTSS among
366 the study population with specificity (73%), Sensitivity (87%) and criterion validity (0.83).

367 *Clinical Interview Schedule-Revised*: Although this was originally developed as a fully structured
368 diagnostic instrument (Structured Clinical Interview Schedule-CIS) for use by psychiatrists, the
369 modified/revised version had been developed to be used by trained lay interviewers or as self-
370 administered questionnaire in assessing minor MNS conditions in the non-specialist settings. It is used to
371 screen for the following 14 psychiatric symptom groups among adolescent and adults: (1) Somatic
372 symptoms; (2) Fatigue; (3) Sleep problems; (4) Irritability; (5) Physical health worries; (6) Depression;
373 (7) Depressive ideas; (8) Worry; (9) Anxiety; (10) Phobias; (11) Panic; (12) Compulsive behaviors; (13)
374 Obsessive thoughts; (14) Forgetfulness/concentration problems. Scores on each symptom group ranged
375 from .0 to 4 (and 0 to 5 for depressive ideas). The higher the score the higher the level of
376 symptomatology. There are computerized self-administered version and interviewer administered
377 versions suitable to be used by trained lay interviewers in assessing minor psychiatric morbidity in the
378 community, primary health care and general hospital. The computer algorithm format of this tool enables

379 generation of ICD-10 diagnosis without psychiatric consultation using the Programmable Questionnaire
380 System (PROQSY). The Malay version of CIS-R has been validated against the structured clinical
381 interview for DSM (SCID) for use by lay interviewers among adult population in Malaysia which
382 showed 100% sensitivity and 96 % specificity at a cut off score of 9.

383 Aga Khan University Anxiety and Depression Scale (AKUADS): The AKUADS is designed to work as a
384 self-administered or lay interviewer-administered depression and anxiety screening tool. The 25-items
385 questionnaire made up of 13 psychological and 12 somatic items was developed from verbatim notes
386 taken from persons speaking lingua franca Urdu to describe their symptoms of anxiety and
387 depression(33). Each item has four response options scored from 0 – 3 with a cut-off score of 19 for
388 positive screening test. It was validated for use by community health workers (CHW) against the
389 psychiatrist's interview to detect depression and anxiety among adult population with specificity of 81%
390 and sensitivity of 74% at cut off point of 19(34). It has also been used by trained lay community women
391 to detect and monitor symptoms of anxiety and depression in new mothers receiving lay counseling(25).

392 12-Item General Health Questionnaire: Is a 12-item self-reporting screening tool originally developed in
393 the United Kingdom as a brief and general measure of psychiatric wellbeing assessing anxiety,
394 depression, social dysfunction and loss of confidence(35). Each item assess the severity of a mental
395 problem over the past few weeks using a 4-point Likert-type scale (from 0 to 3). The score was used to
396 generate a total score ranging from 0 to 36. The positive items were corrected from 0 (always) to 3
397 (never) and the negative ones from 3 (always) to 0 (never). High scores indicate worse health. It has been
398 validated for use by lay interviewers (lay community workers) against CIS-R as gold standard among
399 adults in primary health care setting in India with specificity of 90%, Sensitivity of 73% and criterion
400 validity of 0.89 in detecting symptoms of CMD (25,27).

401

402 Edinburgh Postnatal Depression Scale: Is a ten-item scale asking about common psychiatric symptoms
403 experienced in the preceding week. Amharic version of EPDS was validated for use by lay interviewers
404 (female high school graduates of tenth grade and above) against psychiatrist assessment using
405 Comprehensive Psychopathological Rating Scale (CPRS) among post-natal women during a vaccination
406 outreach in Ethiopia. It performed poorly in detecting CMD and MDD when compared to CPRS with
407 internal consistency of 0.47, sensitivity of about 77% and specificity of 36%(26). One of the problems
408 identified in the application of this tool among the study population was that it was difficult to translate
409 some items to Amharic hence it was not well understood by the participants.

410 20-Item Self-Reporting Questionnaire (SRQ): The 20-item questionnaire has been evaluated in Ethiopia
411 against the EPDS. The SRQ-20 had better psychometric properties in detecting CMD among the
412 Ethiopian study population compared to EPDS, with internal consistency of 0.84, sensitivity of 85.7%
413 and specificity of 75.6% when evaluated against CPRS(26). This is similar to the result from India where
414 SRQ-20 shows internal consistency of 0.8 when compared against Revised Clinical Interview Schedule
415 (CIS-R). This shows that SRQ-20 is a valid instrument to detect CMD among the study population when
416 used by lay assessors.

417 30-Item Geriatric Depression Scale: The Geriatric Depression Scale is a self-report 30-item questionnaire
418 to assess depression in older people(36). Scores of 0-9 are considered normal, 10-19 indicate mild
419 depression and 20-30 indicate severe depression. A validity study of the tool administered by lay-
420 interviewers (with at least 11 years of schooling) who were selected from the community was conducted
421 against the gold standard of the Schedules for Clinical Assessment in Neuropsychiatry (SCAN) among
422 the general population age 75years and above in Brazil(28). The result shows sensitivity of 73.3%,
423 specificity of 65.4%, internal consistency of 0.87 and criterion validity of 0.74 in detecting geriatric
424 depression(28). This shows that 30-GDS is a valid instrument for use by lay assessors in detecting
425 depression among the study population.

426 Kessler Psychological Distress Scale (K-10, K-6): The K10 is a 10-item questionnaire developed to
427 measure anxiety and depression. A shortened 6-item version of the questionnaire (K6) has also been
428 advocated as a screening measure. There are self-report and interviewer-administered versions. The
429 validation study of the use of K-10 and K-6 to detect CMD by lay interviewers against CIS-R among
430 adults attending PHC in India shows sensitivity of 65% and 58%, specificity of 89% and 91% and
431 internal consistency of 0.8 and 0.74 respectively.

432 9-Item Primary Health Questionnaire: The nine-item PHQ (PHQ-9) is the depression screening module
433 of the full PHQ, a self-administered version of the Primary Care Evaluation of Mental Disorders (PRIME-
434 MD) diagnostic instrument for CMDs. It has been used for screening depression among primary-care
435 patients. It is brief and has the ability to establish DSM-IV-based diagnosis of major depression. Its
436 validity to detect CMD by lay interviewers among PHC attendees in India has also been established as
437 poor internal consistency of 0.79. Sensitivity and specificity data were not reported in the reviewed study.

438 **Discussion**

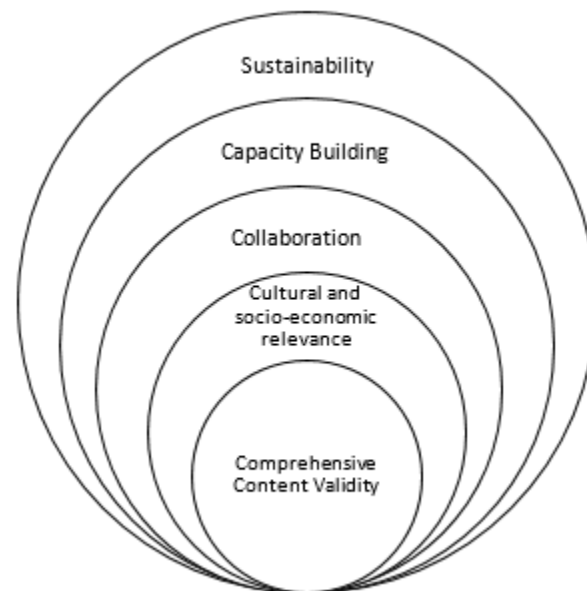
439 The lack of understanding of MNS issues and the huge treatment gap in LMICS is in part due to lack of
440 information about the magnitude of MNS conditions, inability to understand the determinants of mental
441 health issues and inadequate knowledge on how best to direct policy for improving support. This
442 information is lacking because most of the mental health screening tools used in LMICs focused only on
443 psychiatric symptoms in small sample survey or research. Incorporating the use of comprehensive
444 screening tools used routinely or in large epidemiological studies will be able to provide comprehensive
445 information that can inform integrated treatment planning at individual level and broader understanding
446 of the needs and available resources in the community. Lay person health workers could play a key role
447 within such initiatives if they are provided the right tools to accurately screen for mental health
448 conditions.

449 There are a number of strengths of the lay person screening tools identified in this review. These include
450 the relative brevity of most tools, the ease of administration among tools with bivariate responses, the

451 minimal training requirements, low literacy requirements for completion, and the ability some tools to
452 detect psychiatric conditions in physically ill patients. They also have strong psychometric properties in
453 the study populations. In terms of limitations, most of these tools assess psychiatric symptoms alone and
454 are restricted to the somatic manifestations usually ignoring the cognitive and emotional domains. Also,
455 most of these tools were originally developed for use in the western world (except for SSQ and
456 AKUADS) and translated into other languages to be used in other countries. Therefore care should be
457 taken in interpreting the psychometric properties of the translated tools whose content might not
458 necessarily be the appropriate cultural or indigenous idioms for mental distress in that population.
459 Furthermore, the validation of some of these tools were done by health or mental health professionals in
460 health facilities while the tools are expected to be used by laypersons for screening in the general
461 population. Therefore there is need for more research exploring whether or not using a self-reporting tool
462 as an interviewer-administered tools have any effect on the measured outcome or score. SSQ and
463 AKUADS while they are culturally-relevant tools with good psychometric properties, are limited in their
464 scope to assess comprehensive needs of the target population.

465 Khenti et al, 2015 proposed that mental health interventions, such as the development of a comprehensive
466 mental health screening tool, should be developed by considering the five pillars, or the holistic policy
467 framework, of global mental health. The five pillars are consideration of the broader determinants of
468 mental health and sociocultural relevance of the mental health interventions. It consults relevant
469 stakeholders especially, including the target population, in the design, development and monitoring of the
470 intervention. Engagement of the target population provides opportunity for capacity building and
471 reciprocal learning as well as sustainability of the intervention. Kentia et al recommended that when
472 designing a mental health intervention, the knowledge or contribution/input from the people/community
473 in which the tools will be used should be considered. For instance, in the case of the tools reviewed for
474 this study there is little evidence that they have been developed with input from local communities. The
475 tool should be adapted, validated and its reliability tested by taking into consideration the unique

476 sociocultural belief of that particular context. In addition to using co-design with local communities,
477 screening tools should assess not just MNS conditions but explore physical/medical, social and economic
478 factors that can influence the mental wellbeing of the person. Furthermore the use of the tool should
479 provide opportunity for knowledge acquisition either through training of the user/administrator or the
480 information provided to the patient/caregiver during the screening process. Lastly the tool should be easy
481 to access and use.



482

483 **Fig 3: Five pillars of mental health screening tools (Adapted from the 5 Pillars of Global Mental**
484 **Health and Addiction Work)**

485 In Fig 3 we are proposing a framework for developing and choosing tools for use by lay persons to screen
486 for mental health and addictions This reference framework will lay the foundation for designing or
487 selecting an integrated mental health screening tool that can be used by laypersons with the general
488 population at community or primary care level in LMICs or low resource settings.

489 **1. Comprehensive Content Validity**

490 Validity is the extent to which a measurement method measures what it is intended or supposed to do, or
491 the range of interpretations that can appropriately be placed on a measure(37). Validation studies can be
492 done in clinical, research or community-based settings to evaluate whether the tool is valid for the purpose
493 it was developed and whether it was applicable in the particular context. Aspects of validity testing to
494 consider could include content, criterion and construct validity. Content validity could be checked using
495 the content matrix/table and having experts in the field review the technical content of the tool.

496 **a) Technical Content**

497 Technical content of a screening tool should be comprehensive in assessing psychiatric conditions, non-
498 mental condition as well as other factors contributing to general wellbeing. In the reviewed studies some
499 of the tools are used to screen for specific psychiatric conditions while some are used for general
500 psychiatric symptoms. Some are designed for use in the general population while some are designed for
501 use in a particular population. None of the screening tools were able to provide information about non-
502 mental issues that might be contributing to the relevant mental condition.

503 The content of a comprehensive screening tool should contain the following groups of items:

- 504 i. Items that are common to all health issues at all level of care such as cognitive skills for decision
505 making, communication, functional status, activities of daily living (e.g., personal hygiene, toilet
506 use, eating), mood (e.g., negative statements, persistent anger, crying/tearfulness), behavior
507 problems (e.g., verbal abuse, resisting care), falls, and physical/medical health symptoms (e.g.,
508 pain frequency and intensity, fatigue).
- 509 ii. Items common to social and other relevant services and or broader determinants of health such as
510 instrumental activities of daily living (e.g., meal preparation, financial management, phone use),
511 stamina, additional health conditions (e.g., extrapyramidal symptoms, abnormal thought
512 processes, delusions), medication adherence, and preventive interventions and screening (e.g.,

513 influenza vaccination, breast screening), hearing aid use, social support and life events,
514 family/close friends feeling overwhelmed by the person's illness, environmental factors
515 iii. Specialized items that are specific to mental health such as mental state indicators including
516 number of lifetime psychiatric admissions, unrealistic fear or panic, intrusive thoughts or
517 flashbacks, mood disturbance, command hallucinations, suicidal ideation, use of illicit drug,
518 police intervention for criminal behavior, history of sexual violence or assault as perpetrator.

519

520 **b) Psychometric properties**

521 The criterion validity could be checked by comparing different domain of the screening tool with gold
522 standard for each domain of the tool and construct validity could be checked by comparing the result of
523 the screening tool in two extreme groups (e.g. those with and those without MNS conditions). Construct
524 validity could also be evaluated using the convergent/divergent approach(37). Reliability testing measures
525 how reproducible the results of the tool are under different conditions(37). Aspects of reliability testing to
526 consider include internal consistency, inter-rater and intra-class reliability. Internal consistency which is
527 calculated by Cronbach's alpha measures how well the items in the measure correlate with each other to
528 determine whether the items all seem to be measuring the same thing. If the mode of administration of the
529 screening tool would be self-administered, the intraclass Correlation Coefficient (ICC) will be used for
530 test-retest or intra-rater reliability in addition to internal consistency (Cronbach's alpha). For interviewer-
531 administered mode of administration, the inter-rater reliability (Interclass Correlation Coefficient) will
532 also be checked. Pearson correlation coefficient could also be used but while ICC gives consideration to
533 errors/biases that two raters might introduce into the measure, Pearson correlation has been found to be
534 theoretically incorrect in this aspect(37). Percentage agreement is also commonly used, as is kappa and
535 weighted kappa statistics. While ICC and Kappa yield identical results, ICC might be easier to calculate.
536 There is also the alternate form reliability testing which requires creating another version of the tool
537 although this is rarely used(37). Reliability of the screening tool could also be tested or piloted in an

538 heterogeneous sample to evaluate the reliability of the tool to detect the defined attributes in people at risk
539 and those not at risk of developing MNS condition. Evaluation of the psychometric properties of the tools
540 should be done at similar settings in which the tools will be used. Since the screening tool will used
541 among general population or those at risk of MNS conditions to make a decision whether an individual
542 should be referred for further evaluation and possible treatment, the result of the reliability testing
543 (Cronbach's alpha, the intraclass or interclass correlation coefficient) higher than 0.7 might be considered
544 good reliability of the tool in the target population compared to diagnostic tools that might require higher
545 level of reliability. The ability of the tool to correctly identify those that are actually at risk of or with
546 MNS condition (sensitivity) and those that are actually not at risk of or without MNS condition
547 (specificity) could also be tested. Effort should be aimed at achieving high sensitivity of the measure to
548 minimize false positive result due to high stigma associated with MNS condition in the target population.

549 **c) Validation for layperson**

550 Many validation studies for most of the layperson mental health screening tools in LMICs shows good
551 psychometric properties. However, it is important to note that selection and use of screening tools
552 developed in another context in a different cultural setting without proper validation can result in
553 inaccurate results. Reliability and validity of instruments should consider the assessor and context. Many
554 of the tools reviewed here were originally designed and validated either as self-report tools or as
555 completed by a clinician or researcher; further validation in the lay person context was required. It will be
556 beneficial to examine whether or not the settings in which the tools have been validated/used will affect
557 the score or outcome measurement of the tools. Ethical approval by appropriate research ethic committee
558 should be obtained for the validation study and the research team should comply with the "Do no harm"
559 principles.

560 **2. Cultural and socio-economic relevance**

561 The design, development and psychometric evaluation of the screening tool should be done considering
562 the cultural and socioeconomic context in which it will be used. For new tools or tools requiring
563 adaptation, local people should be engaged throughout the development/adaptation process. Language
564 used should be comprehensible by the target population. The design, format and presentation of the tools
565 should be culturally acceptable. Samples of the expected users should be trained to administer the tools
566 among target common population and setting in a culturally-sensitive manner. The users should be trained
567 using the instruction manuals for the tools after which they will complete the assessment for selected
568 individuals from the general population. Information about the experiences of the users of the tools can be
569 collected through focus group discussion or questionnaire. This approach will provide the opportunity to
570 conduct real world assessment and training/capacity building of laypeople that will use the tools. Lessons
571 learned, observations, feedback and recommendations from users and participants can be applied when
572 improving the version of the tool.

573 **3. Collaboration**

574 The development of the tool's content should be a collaborative effort of external mental health
575 specialists, researchers and lay community members. The tool should be design such that it can be
576 integrated with common clinical assessment. For instance the output or results for the layperson screening
577 tool could provide basic understanding of the person's needs, while the clinical assessment goes into
578 greater depth to understand those needs in relation to treatment options. While specialists provide the
579 basis for the technical contents of the tools and ability of the results to inform further intervention, the
580 knowledge of the local people of the community where the tools will be used are important to ensure
581 cultural relevance and acceptability. Collaboration in the development of user manuals is also important
582 for maintaining the reliability and validity of the content by providing item descriptions, process
583 instructions and examples. There should be communication and collaboration between community-lay
584 person and the PHC or hospital staff for the use of the tool in practice. This is important to enhance
585 supervision and opportunity for incremental training and support which can lead to *task shifting*.

586 **4. Capacity Building (Training)**

587 The development and the use of mental health screening tools should provide opportunities for training
588 lay community workers that will administer these tools. In addition, the use of the tools with the general
589 population or people affected by MNS conditions should provide information on awareness and improve
590 their knowledge of MNS issues.

591 Self-report tools usually include instructions or come with separate instruction manuals for completing
592 and scoring them and so does not require training. In the reviewed studies interviewers were trained on
593 how to administer the tools and score the responses. Mental health screening tools should have
594 accompanying instruction manual on how to complete and score them. These manual can be used for
595 training the users, especially the computer-based algorithm type.

596 The assessors should be trained to use various information sources such as observation, interview with the
597 person and those accompanying them (friends/family).

598 **5. Sustainability**

599 Sustainability will be the outcome of a tool that has been developed with adequate consideration of the
600 initial four pillars. These pillars should not be considered as isolated pillars but all inclusive. The
601 development of a holistic screening tool for a mental health intervention that is sustainable requires that
602 the tool is accepted and demand for use which will depend on the ease of use (length of the tools,
603 language used and cost). And finally the tool should be easy to adapt to different culture or setting.

604 *Acceptability and Utility:* One way to ensure acceptability and utility of a layperson mental health
605 screening is to engage the community from the design/development of the tools through its validation,
606 provide feedback on its use, contribution to evaluation of its effectiveness and review. This will
607 promote community ownership. Also the use of the tool should provide interpretation of results or
608 score and the next step to take. The data should be collected such that it can be easily integrated into
609 the health information system.

610 *Ease of Use:* The screening tools are either in paper form, electronic form or computerized
611 applications with each item coded. When electronic format is not available, paper form can be
612 completed and records entered locally into the database. Each item should be in simple clear
613 sentence(s) that can be easily understood. Each item should have standardized set of simple responses
614 with clear definition and timeframe. While lay assessors would be trained on how to use all sources of
615 information in completing the tools, this should not include clinical judgment although a clinician can
616 also administer the tool. Also, while many of the short versions of the mental health screening tools
617 focus on psychiatric symptoms only, the length of some of the majority of the tools reviewed depends
618 on the version being used. Some tools have both long and short versions. The number of items on a
619 screening tool should be appropriate for collecting adequate relevant information. Tools should be in
620 the local language of the community which can be done through translation and back translation.
621 People should be screened free of charge therefore the tool should be licensed for free and easily
622 accessible.

623 The incorporation of the five pillars into the design of layperson screening tools is expected to improve
624 the reach, utility, and impact of the lay person screening process supporting a more responsive health
625 system. Therefore, in order to reach more people and create a more responsive mental health system, the
626 effort needs to include developing a holistic tool that is of cultural relevance. This as a matter of fact
627 cannot be achieved by a handful of people. Rather there is need to partner with different stakeholder or
628 partners for knowledge exchange, and pool different innovations and experiences that these diverse ideas
629 can bring. Capacity building is also not just focused on the researchers but also on the users of the tools.
630 The use of the tools should create opportunities for creating or raising awareness about mental issues,
631 increase the knowledge of the participants and their caregivers and help them in the understanding of the
632 determinants of mental health. The interviewer should also use different sources to gather as much
633 information as possible. There should be room for interaction between the clients and the assessor. There

634 should be opportunities to ask questions and also receive feedback. And the feedback should be used to
635 improve the design or the delivery of the tools.

636 **Limitations of the Study**

637 This study did not do technical review and analysis of pooled psychometric data of the identified tools
638 because this is not the purpose of this review. The purpose of this study is to conduct a qualitative review
639 and examine the characteristics of mental health screening tools proposed for use by layperson as
640 described above. This study also did not review grey literature reports which could also have biased the
641 selection of the studies chosen for these review.

642 **Conclusion**

643 The needs of people living with MNS conditions are multifaceted and interlinked in a complex manner.
644 Inability to accurately identify these needs is a major contributor to the treatment gap in their
645 management. Screening tools can provide comprehensive information about these needs to inform holistic
646 care and responsive health system. Community layperson can reach more people in needs with
647 information and access to care. Developing a layperson screening tools is vital for integrated community-
648 based mental health intervention. This study has proposed a holistic framework that can be consulted for
649 developing or selecting a layperson mental health screening instrument.

650 More research are needed to evaluate the practical application of this framework. Other research
651 questions unanswered by this study include whether or not there are impact or effect on measured
652 /outcome if self-report tools are used as interviewer-administered tool against being used as self-
653 administered tool in order to know which version is more effective in low resource settings.

654

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785 **Supporting information captions**

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