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Yue Zhang

Geographic distribution and determinants of mental health stigma in central  
Mozambique

Yue Zhang

A thesis

submitted in partial fulfillment of the  
requirements for the degree of

Master of Public Health

University of Washington

2018

Committee:

Deepa Rao

Bradley H. Wagenaar

Program Authorized to Offer Degree:

Global Health

University of Washington

**Abstract**

Geographic distribution and determinants of mental health stigma in central Mozambique

Yue Zhang

Chair of the Supervisory Committee: Deepa Rao  
Associate Professor  
Department of Global Health  
Department of Psychiatry and Behavioral Sciences

*Purpose:* This study aims to describe community-level patterns of stigma towards MI in Mozambique, which is hypothesized to be one of the main barriers to the provision of effective mental health care. *Methods:* Data for this study come from a representative community household survey of 2,933 respondents >18 years old in Manica and Sofala Provinces, Mozambique. Six mental health stigma questions represented primary research outcomes. Bivariate and multivariate analyses were done to examine the relationship between key explanatory factors and each stigma question. Spatial and space-time point pattern analyses were done to analyze smoothed geographic distribution of responses to each question and to explore the association between geographic location and mental health stigma controlling

for individual-level covariates. *Results:* Mental health stigma is prevalent in Central Mozambique. Analyses showed that males, people who live in urban places, divorced and widowed individuals, the youngest age group, those with lower education, those endorsing no religion, and those in lower wealth quintiles tended to have significantly higher levels of stigmatizing attitudes towards MI. Individuals endorsing depressive symptoms scored significantly higher on some key stigmatizing questions potentially indicating internalized stigma. Geographic location is significantly associated with people's response to five of the stigma questions adjusting/not adjusting for individual level factors. *Conclusion:* Greater awareness regarding the stigmatization of mental illness is needed. Further investigation on mental health stigma should be done in Mozambique as well as other LMICs. Community-level stigma interventions are urgently needed and could be targeted towards populations that were identified at higher risk.

## **Introduction**

Mental, neurological and substance use disorders are the leading causes of disability worldwide and profoundly impact the social and economic well-being of individuals and communities.[1,2] This is also true in low- and middle-income countries (LMICs) such as Mozambique, where mental illness (MI) disorders are estimated to account for more years lived with disability than HIV, TB, malaria, neglected tropical diseases, diarrhea, lower respiratory infections, and neonatal conditions combined.[3] However, mental health treatment gaps exceed 90% in many LMICs, and in Mozambique, this is no exception.[4] Academic leaders have argued that stigma attached to MI disorders is one of the main barriers to the provision of effective care and treatment for those suffering from mental ill-health.[5] However, these barriers notwithstanding, there has never been an assessment of mental health stigma in Mozambique.

Recent multi-country studies have found very high rates of negative discrimination for patients with schizophrenia, including that 70% of individuals feel the need to conceal their illness.[6] A recent study from Ethiopia found that 75% of respondents felt that keeping individuals with MI conditions locked in their house was the best way to deal with their illness.[7] Stigmatizing attitudes have not only been confined to serious MI; additional cross-national studies have shown that the level of stigmatization directed at individuals with depression can be similar to individuals with schizophrenia.[8] The most frequently reported stigmatizing beliefs about, or actions against, individuals with MI include: a lack of trust to allow individuals to care for loved ones, a lack of willingness to have individuals with MI as in-laws, negative perceptions such as potential for violence and unpredictability, and that individuals with mental illnesses should be isolated from others in society.[8]

Mental health stigma can result in negative consequences for the management of mental disorders including delays in seeking care, sub-standard treatment outcomes, as well as an overall decline in quality of life.[9-11] Stigmatizing attitudes against MI among health providers has been associated with lower effectiveness of care provided. Studies have shown that health providers are less likely to refer patients with MI for essential primary healthcare compared with the general population.[12-14] While reducing mental

health related stigma in health-care settings is increasingly becoming an important focus for research, programming, and intervention in high-income countries (HICs),[15,16,10] little attention has been paid to address mental health and mental health stigma LMICs, where stigma around MI is often more prevalent and mental health treatment gaps are greater. [17,18] Significant investments are being made to close the global mental health treatment gap with a focus on scaling-up training of lower-level mental health providers.[19] However, with this focus on task-sharing with lower-level providers, less attention has been paid to widespread stigmatizing attitudes among communities and health workers alike that impede care-seeking, and the provision of effective mental health care in LMICs.

Studies on factors associated with stigmatizing attitudes have found that: (1) males tend to have more stigmatizing attitudes towards MI than females[20,21,7,22]; (2) that education level was inversely related to MI stigma[23,7]; (4) single individuals had lower stigmatizing attitudes than married people;[7] (5) people at older age group generally hold more stigmatizing attitudes;[24,23] (6) socio-economic status was also inversely related to stigma;[24,23] (7) several studies have suggested that religion plays a critical role in individual understandings of causation and treatment of MI, although its relationship with mental health stigma has not been thoroughly examined in LMICs;[25-28] and that (3) location and neighborhood also plays a role in shaping stigma against MI. For example, a study in Ethiopia found that individuals living in a neighborhood with someone suffering from a MI generally had lower stigmatizing attitudes than those who only encountered individuals with MI in the street or another locale.[7,23] Rural respondents tended to have more positive opinions compared to urban populations in Ethiopia,[22] however the opposite has been found in South Sudan.[25]

In Sub-Saharan African (SSA) settings, compared to mental health stigma, HIV stigma is relatively well-studied and documented. Similar to the studies on mental health stigma, numerous studies have shown that HIV stigma acts as major barrier to uptake of healthcare and undermines effectiveness of prevention and treatment programs.[29-33] Innovative work in Kenya has found significant geographic heterogeneity of externalized HIV stigma, even after controlling for individual-level factors – suggesting that externalized stigma may be driven more by cultural beliefs, whereas internalized stigma may be more the result of individual-level

characteristics outside of the domain of community influence.[29] More population-level research is needed to identify factors associated with mental health stigma to identify potential structural drivers of stigma to inform how and where community-level interventions can be most effective.

This paper aims to be, to our knowledge, the first assessment of community-level mental health stigma in Mozambique. We explore the geographic distribution of mental health stigma, as well as individual-level determinants of stigma. We also analyze whether MH stigma shows geographic heterogeneity after controlling for key individual-level characteristics. We hypothesize that individuals in the same geographic region may harbor similar levels of mental health stigma due to sharing of information, social networks, influential political and religious leaders, and shared cultural domains.[34] We aim for these analyses to help identify specific individual and community-level factors associated with MH stigma that can motivate targeted intervention strategies.

## **Methods:**

### *Study Setting – Sofala and Manica Provinces, Mozambique*

Sofala Province is located in central Mozambique with an estimated population of more than 1.8 million, 37% of which is urban. Of the 11 provinces in Mozambique, Sofala ranks among the poorest, but key health indicators are slightly above the country average and have improved at a more accelerated pace than other provinces over the past 10 years.[35,36] Manica Province is located to the west of Sofala with an estimated population of 1.4 million.[37] Manica has similar population density as Sofala as well as similar results of key health indicators.[38] Wealth distribution is more even in Manica (Gini coefficient: 0.44) than in Sofala (Gini coefficient: 0.55).[38] As an example of mortality trends, both Sofala and Manica's under-5 mortality rates (U5MR) exceeded the national average in 2000 at 187 and 178 per 1,000 live births, respectively. However, by 2010, Sofala's U5MR was below the national average at 83, with Manica's U5MR lagging behind the average at 107.[36]

Resources for the development of mental health services in Mozambique are very scarce. As of 2011, Mozambique allocated only 0.16% of the Ministry of Health budget to mental

healthcare.[39] However, even with limited financial resources allocated to mental health services, Mozambique has been a leader in accelerating task-shared delivery of community-based mental healthcare in LMICs. The vast majority of mental healthcare is provided by psychiatric technicians who have been trained since 1996 to diagnose all categories of mental health conditions and treat them by using brief psychotherapy and all therapeutic categories of psychotropic medications.[40,41] As of 2014, there are 13 psychiatrists (0.04 per 100,000 population) in the country, together with 241 psychiatric technicians (0.94 per 100,000 population), 109 psychologists (0.42 per 100,000 population), and 44 psychiatric nurses (0.17 per 100,000 population).[40] Although there has been an increased number of mental health professionals and facilities during the past seven years as a result of the implementation of the *National Mental Health Program and the Strategy and Action Plan for Mental Health*, gaps remain. For example, there limited availability of essential psycho-tropic medicines, and psychiatric technicians are limited mostly to district-level health facilities.[42,40,43] There is also a gap in care seeking and mental health care for patients with common MI – currently over 70% of outpatient mental health consults in Sofala Province are for more severe mental illnesses (epilepsy and schizophrenia) – with less than 4% for any mood disorder.[44]

#### *Data Sources*

Data for this study come from a representative community household survey conducted in Manica and Sofala Provinces, Mozambique from September 2016 to February 2017. A detailed account of the sampling procedures has been previously published.[45] Briefly, this survey was part of a program evaluation of a seven-year health system strengthening intervention in Mozambique.[35] Survey teams used satellite imagery to digitize buildings and develop a representative community sampling frame to visit a total of 3,096 households with 1,549 in Sofala and 1,538 in Manica.[45] For the purpose of the present study, the mental health stigma questions asked to the 3080 participants who was the first individual interviewed at each household. We excluded those who failed to answer all 6 mental health stigma questions and those who were under 18 years of age, yielding a final sample of 2,933.

Mental health stigma variables are categorized into two groups: 3 questions that assessed social distance towards people living with MI and 3 questions that

assessed general perceptions of mental health. The social distance questions were drawn from Pescosolido et al.[8] while the general perception questions were sourced from unpublished surveys conducted by the Ministry of Health and Carter Center's Mental Health Collaboration in Liberia. Each question was a Likert-scale format ranging from 0-3, with 0 representing the least stigmatizing response and 3 representing the most stigmatizing (see Table 2 for the question list).

### *Explanatory factors*

We selected explanatory variables on the basis of the existing scientific literature on mental health stigma with a focus on limited existing literature from LMICs.[24,46-50,7,8] These explanatory factors included: (1) age; (2) gender; (3) urban or rural household location; (4) education attainment; (5) wealth index by quintile; (6) marital status; (7) religion; (8) self-reported lifetime suicidal ideation; (9) self-reported of experience with depressive-like symptoms; (10) previous mental health care-seeking; and (11) household location based on latitude and longitude (see Table 1 for categorization of explanatory variables). A wealth index score is generated from the first component of the principal component analysis (PCA) of household characteristics (type of floor, roof, latrine, source of drinking water and main cooking energy) and ownership of household items (radio, TV, bed, fridge, bicycle, motorcycle, car, boat, mobile phone and landline phone). Then wealth index quintiles are generated[51,52].

### *Statistical analyses*

Our analysis plan included: (1) univariate analyses of individual variables to determine how to best categorize groups and to visualize potential missing data issues; (2) bivariate analyses of each explanatory factor's individual relationship with each stigma question; (3) multivariable analyses including age, gender, urban or rural household location, education attainment, wealth index by quintile, religion, and marital status in one model simultaneously to examine the relationship of each variable on each stigma question while controlling for other potential confounding factors; (4) the development of spatial and space-time point pattern analyses to develop smoothed geographic maps of responses to each question; and (5) exploratory spatial data analysis to explore the spatial distribution of each stigma question when controlling for our

list of individual-level explanatory factors. Initial correlation matrices were conducted prior to multivariable analyses to ensure that multicollinearity was not an issue.

Spatial regression was performed to identify clustering of individuals scoring high stigma (those who scored 2 or 3 to the question) relative to that of individuals scoring low stigma (those who scored 0 or 1), adjusting for potential confounding by location of individual-level variables that might account for any observed spatial pattern of stigma. These variables include age, gender, marital status, education level, wealth quintile, and religion. Incorporating the longitude and latitude data of each household, maps of adjusted odds were produced using a locally weighted regression smoother in a generalized additive model (GAM) framework for case-control data using a logistic link function and a nonparametric component for the residual spatial surface.

All analyses were done in the R statistical package version 3.4.3.[53] For bivariate and multivariable analyses of explanatory factors on each stigma question, we used cumulative link mixed models (ordinal package), controlling for clustering by each primary sampling unit from the community survey. Spatial and space-time point pattern analyses were conducted using the R *splanx* package and geo-referenced coordinates of each household.

## **Results:**

### *Basic demographic characteristics*

Among the 2,933 participants in this study, 53% were female, 83% were married, and 70% lived in rural areas. The mean age was 38 (Median: 33). 19% of the participants had never attended any school, 52% had basic literacy or had attended primary school, and 27% had higher than primary school education. Over 16% of participants claimed no religion; 13% were Catholic; 46% were Evangelical or Pentecostal; 17% reported that they had no religion, and 13% were Zion. In terms of mental health, 19% ever had experienced depressive-like symptoms (who ever had a period of sadness or loss of energy that lasted more than 2 weeks), 16% had ever had thoughts of suicide, and 3% had sought care for a mental health problem (Table 1).

### *Descriptive results for stigma questions*

The full distribution of responses to mental health stigma questions is listed in Table 2. Briefly, 70% of respondents were “definitely unwilling” to have a friend with MI. Over 92% were unwilling to have someone with MI take care of their children. Last, over 64% of participants “agreed completely” or “somewhat” that mental health problems are caused by witchcraft or a curse placed on someone. By contrast, over 65% were willing to assist someone with MI. A combined 34% of participants “agreed completely” or “somewhat” that individuals with MI should be chained, tied, and locked in their homes. Over 90% of participants disagree that “It is possible to catch mental illness from treating or helping someone who is mentally ill”.

### *Gender and stigma*

All statistically-significant relationships between stigma questions and gender showed males to have significantly higher levels of stigmatizing attitudes towards MI compared to females. For example, in adjusted associations, males were 2.2 times more likely (adjusted Odds Ratio [54]: 2.2; 95% Confidence Interval [CI]: 1.8, 2.7) to score higher on unwillingness to have a friend with MI, 1.6 times more likely (aOR: 1.6; CI: 1.1, 2.3) to score higher on unwillingness to let someone with MI care for their children, and 1.2 times more likely (aOR: 1.2; CI: 1.0, 1.5) to score higher on agreement that people with MI should be chained, tied, and locked in their homes compared to females.

### *Urban / rural location and stigma*

People who lived in urban places tended to have significantly higher levels of stigmatizing attitudes towards MI than those who lived in rural places. Significant relationships include people who live in urban places are more likely to score higher on unwillingness to have a friend with mental illness (aOR: 2.0; CI: 1.5, 2.6) and agreeing that mental health problems are caused by witchcraft or a curse placed on a person by someone else (OR: 1.4; CI: 1.1, 2.7).

### *Marital status and stigma*

Compared to those who were married, those who were divorced were more likely to have significantly higher levels of stigmatizing attitudes towards MI on unwillingness to have a friend

with MI or assist someone with MI (aOR: 1.6 CI: 1.1, 2.4), unwillingness to let someone with MI take care of their children (aOR: 3.1, CI: 1.2, 7.9), and unwillingness to assist someone with MI (aOR: 1.5, CI: 1.1, 2.1). Besides, individuals who were widowed also scored higher on unwillingness to have a friend with MI (aOR: 1.4 CI: 1.0, 2.0). By contrast, people who were single were less likely to be unwilling to have a friend with MI (OR: 0.57, CI: 0.36, 0.91).

#### *Age and stigma*

Compared to the age group 18-24, older age groups tended to have less stigmatizing attitudes toward MI. For example, individuals who were in the age group 45-54 were 0.49 times less likely to be unwilling to let someone with MI take care of their children (aOR: 0.49, CI 0.28, 0.86) and those in the age group 25-34 were less likely to be unwilling to have a friend with MI (aOR: 0.77, CI: 0.61, 0.96). However, people who were 55-99 years old were 1.8 times more likely to be unwilling to have a friend with MI (OR: 1.8, CI: 1.3, 2.4), though this relationship becomes not significant after adjusting for other factors.

#### *Education and stigma*

On average, compared to individuals with secondary or higher education, those with basic or no schooling had higher stigmatizing attitudes. For example, individuals who had no education were more likely to score higher on agreeing that it is possible to catch MI from treating or assisting someone who is mentally ill (aOR: 1.5, CI: 1.0, 2.2) and MI is caused by witchcraft (aOR: 1.4; CI: 1.0, 1.8).

#### *Religion and stigma*

Compared with no religion, individuals who identified with a religious (e.g., Catholic, Muslim, Evangelical/Pentecostal) showed less stigmatizing attitudes toward MI. However, in fully-adjusted model, those who had religions other than those specified in our questionnaire were 2.0 times more likely to be unwilling to have a friend with MI (aOR: 2.0, CI: 1.1, 3.8).

#### *Wealth and stigma*

The relationship between wealth and stigma was consistent across the 3 of our stigma questions including “not willing to have a friend with mental illness”, “agree that people with MI should be chained in their home”, and “agree that MIs are caused by curse”— compared with individuals who were at the highest wealth quintile, people at all other wealth quintiles were more likely to score higher on these three questions.

#### *Mental health factors and stigma*

People who ever had depressive-like symptom held more stigmatizing attitudes toward people with MI, scoring significantly higher on “not willing to assist someone with mental illness” (aOR: 1.5, CI: 1.2, 1.8), “agreeing that people with mental illness should be chained, tied, and locked in their homes” (aOR: 1.2, CI: 1.0, 1.5), and “agreeing that mental health problems are caused by witchcraft or a curse placed on a person by someone else” (aOR: 1.5, CI: 1.2, 1.8). On the other hand, people who ever sought care for a mental health problem were less likely to score higher on these questions, but they were more likely to score higher on “agreeing that it is possible to catch mental illness from treating or helping someone who is mentally ill” (aOR: 2.9 CI: 1.8, 4.5). No significant association was found between the factor of having ever had thoughts of suicide or self-harm and our stigma questions.

#### *Spatial Analysis results*

People’s attitude towards people with MI varies across regions. In our analyses, we found geographic location is significantly associated with people’s response to our six MI stigma questions except for the question “Do you agree that people with MI should be chained, tied, or restrained in their house”. The associations are significant even after adjusting for individual level factors, and the five adjusted maps did not show significant changes compared to the unadjusted maps, meaning location may have stronger influence on people’s stigmatizing attitudes toward MI than individual level factors. However, there is no consistent geographic pattern across these six questions, meaning no particular area is found to have higher risk for all six questions.

#### **Discussion:**

To our knowledge, this is the first analytical assessment of stigma towards MI in Mozambique. We used data from a representative community household survey in Sofala and Manica Provinces, Mozambique to identify patterns in the distribution of MI stigma with the aim to inform stigma reduction interventions in Mozambique and other similar LMICs. As have been observed in studies conducted in other LMICs, the prevalence of MI related stigma was generally high. For example, 70% of respondents were “definitely unwilling” to have a friend with MI and 92.5% were “definitely unwilling” to have someone with MI take care of their children. These findings are similar to those found in Pescosolido et al. (2013), where MI stigma was analyzed across 16 countries, finding that “a lack of trust to allow individuals to care for loved ones” was one of the most frequently-reported stigmatizing attitude.[8] In addition, in our study, a combined 34% of participants thought individuals with MI should be chained, tied, and locked in their homes. While this is one of the more direct views into attitudes towards potential healing approaches for individuals with MI, our findings are lower than the 75% of respondents in Ethiopia who reported that “keeping patients with MI behind locked doors is the best way of handling patients”.[7] It may not be surprising that separating individuals with MI from society is a commonly-accepted way to deal with individuals with MI given that over 64% of individuals agreed that MI is caused by witchcraft or a curse – potentially suggesting that individuals with MI “deserve” this as a punishment for some sort of transgression. By contrast to these high rates of stigmatizing attitudes, 82% of respondents were willing to assist someone with MI, which, when combined with the low percent of participants who believe that MI is contagious (<11%), suggests a general willingness to engage on at least a surface level with those suffering from MI.

In our study, factors that were found to be generally associated with higher stigmatizing attitudes included being male, living in urban areas, having lower education, being at lower socio-economic status, and having had period of sadness or lost of energy for more than 2 weeks. These factors are generally consistent with what has been found in other studies. Other studies conducted in Jimma Town in Ethiopia, Kenya, and Australia also found that males tend to have more stigmatizing attitudes towards MI than females.[20,21,7,22] This could be explained by male and female’s potentially different perceptions on MI and the intersection of stereotypes about gender and mental disorders. When asking questions about MI generally,

male and female may picture different types of MI, and it was found that the perception of disorders as masculine was positively correlated with stigma.[21] The study in Ethiopia also found that rural respondents tended to have more positive opinions compared to urban populations,[22] however the opposite has been found in South Sudan.[25] And our findings between SES, marital status and education and stigma are also consistent with findings from Ethiopia, Kenya, and Slovak—SES and education level was inversely related to MI stigma single individuals had lower stigmatizing attitudes than married people.[7,24,23] Finding between location and stigma was also detected in a study done in Ethiopia—they found that individuals living in a neighborhood with someone suffering from a MI generally had lower stigmatizing attitudes than those who only encountered individuals with MI in the street or another locale.[7,23] This may explain the significant role location and neighborhood plays in shaping stigma against MI in our study—those areas that had particularly high or low percentage of people scored higher on certain stigma questions may be a result of having higher percentage of people with MI living in the neighborhood or having mental health care facilities, organizations, or leaders active in the area. Several studies have suggested that religion plays a critical role in individual understandings of causation and treatment of MI. Ayazi et al. found that people with Christian or Muslim beliefs, compared with traditional beliefs, were negatively associated with social distance in South Sudan,[25] which is different from what we found about religion and social distance in our study area—Christian was not found to be at a lower likelihood of having lower stigmatizing attitudes for social distance questions, but we found Christian to be at lower likelihood of having lower stigmatizing attitudes for one of the mental health perception questions—they were less likely to believe that MI was caused by curse. And different from what has been found in studies done in Slovakia, respondents in the age category 35–44 years was not found to have lower stigmatizing attitudes.[23]

We also found some patterns and stigma-associated factors that, to our knowledge, have not been previously reported in LMICs. We found that there is an association between depressive symptoms and having higher stigmatizing attitudes. Specifically, controlling for all other factors, those expressing depressive symptoms were 50% more likely to score higher on that people with MI should be chained. The results between having depression symptom and having stigmatizing attitudes toward MI potentially indicate internalized stigma. A number of

studies have shown that is common that people with MI often feel the need to conceal their conditions, that is, stigma against themselves.[7] But there is also the fact that internalized stigma has the prerequisite of having MI first then stigma follows but we didn't know the temporality between "depression" and stigma, meaning there is also the possibility of that having stigma put individuals at higher risk of having "a period of sadness or loss of energy that lasted more than 2 weeks". Interesting patterns were also observed in individuals who had ever sought care for a MI. Those who had previously sought care for a MI had lower levels of stigmatizing attitudes, being more likely to have a friend with MI, more likely to allow someone with MI take care of their children, and more likely to assist someone with MI. However, one of the strongest associations seen in the entire study was that individuals who had previously sought care for MI were almost 3 times as likely to score highly on "agreeing it is possible to catch mental illness from treating or helping someone with MI. This might suggest that allopathic and/or non-allopathic mental health care providers might be propagating stigmatizing attitudes themselves. Further investigation on care-seeking pathways and the attitudes of providers towards MI is needed to ensure that the limited available care for individuals with MI does not propagate stigmatizing beliefs around MI. Consistent with the HIV/AIDS stigma study done in Kenya,[55] we also found significant geographic heterogeneity of MH stigma, even after controlling for individual-level factors – suggesting that individuals in the same geographic region may harbor similar levels of mental health stigma due to sharing of information, social networks, influential political and religious leaders, and shared cultural beliefs.

One of the main limitations of this study is that the stigma measurements used in this study were not validated in Mozambique, it cannot be assured that these questions reflect, or to what extent reflect stigma towards MI among the study population. Second, the scoring and analysis methods for stigma used in this study may not be accurately reflect the true degree of people's stigmatizing attitudes as it assumes, for example, the increase from 0 to 1 equals to the increase from 1 to 2, which might not be true—people who scored 2 on a certain question may hold more than twice of stigmatizing attitudes than those who score 1. Third, people in different cultures have different perception and definition of MI, without validating whether or not the participants' perception of MI is the same as what is commonly perceived in the mainstream mental health field, further interpretation and possible intervention are hard to proceed.

Besides, not all mental disorders are equally stigmatized, stigma toward specific mental disorders may vary widely, but we did not further specify what type of MI we were asking to our participants. Lastly, our data are cross sectional, no causal relationship between exploratory factors and mental health stigma can be deduced.

### **Conclusions:**

Stigma towards MI is prevalent in Mozambique. A particularly high percentage of people were unwilling to have someone with MI take care of their children and unwilling to have a friend with MI. However, the high prevalence of willingness to assist and low prevalence of general thoughts of MI being contagious suggest individuals may be willing to interact with individuals with MI on a cursory level. In our study, factors that were found to be generally associated with higher stigmatizing attitudes included being male, living in rural areas, having lower education, being at lower socio-economic status, having no religion, being at the youngest age group, and having had period of sadness and lost of energy for more than 2 weeks. Future stigma interventions should weigh these data and all relevant factors and consider devoting limited resources to focusing on the high-risk population. Mapping exercise shows that a comprehensive list of individual-level covariates only explains a small amount of variation in stigmatizing attitudes, this suggests that community-wide approaches to change these community attitudes may be needed. We also found evidence of internalized stigma, which suggests approaches to build resilience and self-care for individuals with MI may be key for better mental health care. In addition, strong association between having had south care for MI and believing MI is contagious suggests health care providers might be propagating stigmatizing attitudes. Greater awareness regarding the stigmatization of mental illness is needed. More researches on mental health stigma should be done in LMICs so that more effective and appropriate interventions to eliminate mental health stigma and thus to deliver mental health services can be designed.

Table 1. Demographic characteristics among 2,933 participants from a representative household survey conducted in urban and rural Sofala and Manica provinces in Mozambique, 2017

<b>Characteristic</b>	<b>N (%)</b>
<b>Gender</b>	
Male	1349 (46.0)
Female	1547 (52.7)
Missing	37 (1.3)
<b>Urban/rural</b>	
Urban	878 (29.9)
Rural	2042 (69.6)
Missing	13 (0.4)
<b>Marital status</b>	
Married/Common Law marriage	2430 (82.9)
Divorced	163 (5.6)
Widowed	233 (7.9)
Single/Never married	67 (2.3)
Missing	40 (1.4)
<b>Age</b>	
18-24	576 (19.6)
25-34	952 (32.5)
35-44	634 (21.6)
45-54	336 (11.5)
55-99	397 (13.5)
Missing	38 (1.3)
<b>Highest level of schooling you attended</b>	
No School	557 (19.0)
Basic	1513 (51.6)
Higher	775 (26.4)
Missing	88 (3.0)
<b>Religion</b>	
No religion	486 (16.6)
Catholic	381 (13.0)
Muslim	38 (1.3)
Zione	383 (13.1)
Evangelical/Petencostal	1342 (45.8)
Anglican	41 (1.4)
Johan Masowe	32 (1.1)
Christian	120 (4.1)
Others	84 (2.9)
Missing	26 (0.9)
<b>Wealth quintile</b>	

Lowest	589 (20.1)
Second	586 (20.0)
Middle	572 (19.5)
Fourth	579 (19.7)
Highest	597 (20.4)
Missing	10 (0.3)
<b>Ever had a period of sadness or loss of energy that lasted more than 2 weeks?</b>	
No	2336 (80.7)
Yes	558 (19.0)
Missing	9 (0.3)
<b>Ever in your life had thoughts of suicide or self-harm?</b>	
No	2449 (83.5)
Yes	477 (16.3)
Missing	7 (0.2)
<b>Ever sought care for a mental health problem?</b>	
No	2818 (96.1)
Yes	102 (3.5)
Missing	13 (0.4)

Table 2. Responses to general mental health questions among 2,933 participants from a representative household survey conducted in urban and rural Sofala and Manica provinces in Mozambique, 2017

Questions	Stigma score (higher score = more stigmatizing)	N (%)
<b><i>Social Distance Questions</i></b>		
Would you be willing to have a friend with mental illness?		
Definitely willing	0	445 (15.2)
Probably willing	1	350 (11.9)
Probably unwilling	2	86 (2.9)
Definitely unwilling	3	2052 (70.0)
Would you be willing to let someone with mental illness take care of your children?		
Definitely willing	0	72 (2.5)
Probably willing	1	89 (3.0)
Probably unwilling	2	59 (2.0)
Definitely unwilling	3	2713 (92.5)
Would you be willing to assist someone with mental illness?		



Married/Common Law marriage	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Divorced	1.3 (0.90, 1.9)	0.16	1.6 (1.1, 2.4)*	0.01	2.6 (1.1, 6.5)*	0.04	3.1 (1.2, 7.9)*	0.02
Widowed	1.1 (0.81, 1.5)	0.55	1.4 (1.0, 2.0)*	0.04	0.80 (0.50, 1.3)	0.36	1.2 (0.68, 2.0)	0.55
Single/Never married	0.57 (0.36, 0.91)*	0.02	0.69 (0.42, 1.1)	0.13	1.4 (0.5, 4.1)	0.50	1.3 (0.46, 3.9)	0.59
<b>Age</b>								
18-24	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
25-34	1.2 (0.93, 1.4)	0.19	0.99 (0.78, 1.3)	0.91	0.90 (0.58, 1.4)	0.63	0.88 (0.56, 1.3)	0.59
35-44	1.2 (0.91, 1.5)	0.25	0.79 (0.60, 1.0)	0.08	0.78 (0.49, 1.2)	0.30	0.70 (0.42, 1.2)	0.18
45-54	1.3 (0.95, 1.7)	0.11	0.83 (0.60, 1.2)	0.27	0.53 (0.32, 0.87)**	0.01	0.49 (0.28, 0.86)*	0.02
55-99	1.8 (1.3, 2.4)**	<0.01	1.1 (0.75, 1.5)	0.74	0.72 (0.44, 1.2)	0.23	0.62 (0.34, 1.2)	0.13
<b>Highest level of schooling attended</b>								
Secondary or higher	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Basic literacy or primary	1.3 (1.03, 1.5)*	0.02	1.1 (0.90, 1.4)	0.28	1.0 (0.73, 1.5)	0.85	1.1 (0.72, 1.6)	0.68
No school	1.1 (0.84, 1.4)	0.58	1.2 (0.86, 1.6)	0.30	0.81 (0.53, 1.2)	0.34	1.0 (0.58, 1.8)	0.94
<b>Religion</b>								
No religion	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Catholic	0.75 (0.57, 1.0)	0.05	0.81 (0.60, 1.1)	0.16	1.1 (0.64, 1.8)	0.79	1.1 (0.64, 1.9)	0.72
Muslim	0.46 (0.24, 0.89)*	0.02	0.63 (0.31, 1.3)	0.21	0.52 (0.20, 1.4)	0.19	0.77 (0.25, 2.5)	0.66
Zionist	1.3 (0.93, 1.7)	0.13	1.3 (0.93, 1.7)	0.13	0.82 (0.50, 1.3)	0.44	0.82 (0.49, 1.4)	0.43
Evangelical/Pentecostal	1.0 (0.83, 1.3)	0.73	1.1 (0.87, 1.4)	0.43	1.2 (0.80, 1.3)	0.37	1.2 (0.76, 1.8)	0.50
Anglican	1.8 (0.82, 4.1)	0.14	2.0 (0.89, 4.6)	0.09	3.2 (0.42, 24.3)	0.26	3.1 (0.41, 24.2)	0.27
Johanna Maranga	1.4 (0.61, 3.2)	0.43	1.6 (0.71, 3.8)	0.24	0.44 (0.15, 1.3)	0.12	0.46 (0.16, 1.3)	0.15
Christian	0.96 (0.63, 1.5)	0.85	1.0 (0.64, 1.6)	0.96	2.7 (0.95, 7.9)	0.06	3.3 (0.98, 11.2)	0.05
Others	2.1 (1.1, 3.8)*	0.02	2.0 (1.1, 3.8)*	0.03	1.5 (0.55, 3.9)	0.45	1.3 (0.48, 3.5)	0.60
<b>Wealth quintile</b>								
Highest	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Fourth	1.7 (1.3, 2.1)**	<0.01	1.8 (1.4, 2.4)**	<0.01	1.4 (0.87, 2.2)	0.17	1.2 (0.73, 2.0)	0.47
Middle	1.8 (1.4, 2.4)**	<0.01	2.3 (1.6, 3.2)**	<0.01	1.2 (0.75, 1.9)	0.45	1.1 (0.59, 2.0)	0.82
Second	1.6 (1.2, 2.2)**	<0.01	2.1 (1.5, 2.9)**	<0.01	1.4 (0.88, 2.3)	0.14	1.4 (0.72, 2.6)	0.34
Lowest	1.7 (1.3, 2.2)**	<0.01	2.1 (1.5, 3.0)**	<0.01	1.3 (0.80, 2.1)	0.30	1.2 (0.62, 2.3)	0.60
<b>Mental health status related factors</b>								
<b>Ever had period of sadness or loss of energy that lasted more than 2 weeks?</b>								
No	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Yes	1.0 (0.85, 1.3)	0.70	<sup>a</sup> 1.1 (0.86, 1.3)	0.56	0.94 (0.66, 1.3)	0.74	<sup>a</sup> 0.89 (0.62, 1.3)	0.55

**Ever in your life had thoughts of suicide or self-harm?**

No	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Yes	1.2 (0.92, 1.4)	0.22	<sup>b</sup> 1.2 (0.94, 1.5)	0.16	1.2 (0.83, 1.9)	0.30	<sup>b</sup> 1.3 (0.87, 2.0)	0.20

**Ever sought care for a mental health problem?**

No	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Yes	0.55 (0.37, 0.81)**	< 0.01	<sup>c</sup> 0.67 (0.45, 1.0)	0.06	0.36 (0.21, 0.63)**	<0.01	<sup>c</sup> 0.34 (0.19, 0.62)**	<0.01

Abbreviations: OR: Odds ratio; CI: 95% Confidence Interval; aOR: Adjusted odds ratio; adjusted for individual level factors including gender, age, urban/rural, wealth quintile, education, marital status, and religion;

a: adjusted for individual factors and “ever had period of sadness and lost of energy for more than 2 weeks”;

b: adjusted for individual factors and “ever in your life had thoughts of suicide or self-harm”;

c: adjusted for individual factors and “ever sought care for a mental health problem”;

\*\*p<0.05; \*\*\*p<0.01

Table 3. Bivariate and multivariate analyses of mental health stigma among 2,933 participants from a representative household survey conducted in urban and rural Sofala and Manica provinces in Mozambique, 2017

Characteristic	Not willing to assist someone with mental illness				Agreeing that people with mental illness should be chained, tied, and locked in their homes.			
	OR (95% CI)	p value	aOR (95% CI)	p value	OR (95% CI)	p value	aOR (95% CI)	p value
<b>Gender</b>								
Female	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Male	0.92 (0.78, 1.1)	0.29	1.0 (0.82, 1.2)	0.86	1.2 (1.1, 1.4)**	<0.01	1.2 (1.0, 1.5)*	0.02
<b>Urban/rural</b>								
Rural	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Urban	1.1 (0.84, 1.3)	0.63	1.1 (0.82, 1.4)	0.58	0.85 (0.70, 1.0)	0.10	1.0 (0.81, 1.3)	0.82
<b>Marital status</b>								
Married/Common Law marriage	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Divorced	1.5 (1.1, 2.1)*	0.01	1.5 (1.1, 2.1)*	0.03	1.1 (0.79, 1.5)	0.62	1.2 (0.86, 1.7)	0.28
Widowed	1.2 (0.92, 1.6)	0.17	1.1 (0.78, 1.5)	0.66	1.1 (0.83, 1.4)	0.64	1.1 (0.81, 1.5)	0.55
Single/Never married	1.5 (0.90, 2.4)	0.13	1.4 (0.86, 2.3)	0.17	1.2 (0.77, 1.9)	0.39	1.4 (0.89, 2.3)	0.14
<b>Age</b>								
18-24	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
25-34	0.77 (0.61, 0.96)*	0.02	0.79 (0.63, 1.0)*	0.05	1.0 (0.82, 1.2)	0.96	0.98 (0.79, 1.2)	0.86
35-44	0.92 (0.72, 1.2)	0.48	0.93 (0.71, 1.2)	0.57	1.1 (0.87, 1.4)	0.46	0.99 (0.78, 1.3)	0.96
45-54	1.1 (0.82, 1.4)	0.54	1.1 (0.82, 1.5)	0.46	1.3 (0.98, 1.6)	0.08	1.1 (0.83, 1.5)	0.48
55-99	1.1 (0.80, 1.4)	0.73	0.95 (0.68, 1.3)	0.75	1.2 (0.95, 1.6)	0.11	1.1 (0.81, 1.5)	0.57
<b>Highest level of schooling attended</b>								
Secondary or higher	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Basic literacy or primary	1.1 (0.90, 1.33)	0.38	1.0 (0.82, 1.3)	0.83	1.4 (1.1, 1.6)**	<0.01	1.2 (1.0, 1.5)	0.53
No school	1.4 (1.1, 1.8)**	<0.01	1.3 (0.96, 1.8)	0.09	1.3 (1.0, 1.6)*	0.04	1.2 (0.87, 1.5)	0.33
<b>Religion</b>								
No religion	1 (reference)		1 (reference)		1 (reference)		1 (reference)	

Catholic	0.67 (0.52, 0.87)**	<0.01	0.64 (0.47, 0.87)**	<0.01	0.67 (0.52, 0.87)**	<0.01	0.73 (0.55, 0.96)*	0.02
Muslim	1.1 (0.57, 2.1)	0.77	0.31 (0.13, 0.72)**	<0.01	1.1 (0.57, 2.1)	0.77	1.49 (0.75, 3.0)	0.25
Zione	0.99 (0.76, 1.3)	0.92	0.72 (0.54, 0.97)*	0.03	0.99 (0.76, 1.3)	0.93	1.0 (0.78, 1.3)	0.92
Evangelical/ Petencostal	0.82 (0.67, 1.0)	0.05	0.81 (0.65, 1.0)	0.07	0.82 (0.67, 1.0)	0.05	0.88 (0.71, 1.1)	0.22
Anglican	0.92 (0.50, 1.7)	0.80	0.70 (0.35, 1.4)	0.32	0.92 (0.50, 1.7)	0.80	1.0 (0.55, 1.9)	0.94
Johan maranga	0.84 (0.43, 1.6)	0.60	0.54 (0.25, 1.2)	0.12	0.84 (0.43, 1.6)	0.60	0.90 (0.46, 1.7)	0.75
Christian	0.81 (0.55, 1.2)	0.30	0.92 (0.59, 1.4)	0.73	0.81 (0.55, 1.2)	0.30	0.92 (0.61, 1.4)	0.70
Others	0.68 (0.42, 1.1)	0.10	0.60 (0.35, 1.0)	0.06	0.68 (0.42, 1.1)	0.10	0.74 (0.46, 1.2)	0.21
<b>Wealth quintile</b>								
Highest	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Fourth	1.3 (1.0, 1.7)*	0.05	1.3 (0.95, 1.7)	0.11	1.3 (0.99, 1.6)	0.06	1.2 (0.92, 1.6)	0.17
Middle	1.1 (0.84, 1.5)	0.42	1.0 (0.73, 1.5)	0.86	1.6 (1.3, 2.1)**	<0.01	1.5 (1.1, 2.1)**	<0.01
Second	1.0 (0.76, 1.4)	0.87	0.95 (0.66, 1.4)	0.79	1.4 (1.1, 1.8)*	0.01	1.3 (0.92, 1.8)	0.15
Lowest	1.2 (0.91, 1.7)	0.17	1.0 (0.72, 1.5)	0.83	1.6 (1.2, 2.0)**	<0.01	1.4 (1.0, 2.0)*	0.05
<b>Mental health status related factors</b>								
<b>Ever had period of sadness or loss of energy that lasted more than 2 weeks?</b>								
No	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Yes	1.4 (1.2, 1.7)**	<0.01	<sup>a</sup> 1.5 (1.2, 1.8)**	<0.01	1.2 (1.0, 1.5)*	0.04	<sup>a</sup> 1.2 (1.0, 1.5)*	0.03
<b>Ever in your life had thoughts of suicide or self-harm?</b>								
No	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Yes	1.1 (0.90, 1.4)	0.32	<sup>b</sup> 1.1 (0.89, 1.4)	0.34	0.86 (0.71, 1.0)	0.13	<sup>b</sup> 0.86 (0.70, 1.1)	0.15
<b>Ever sought care for a mental health problem?</b>								
No	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Yes	0.53 (0.32, 0.88)*	0.01	<sup>c</sup> 0.55 (0.33, 0.93)*	0.02	1.3 (0.87, 1.8)	0.22	<sup>c</sup> 1.3 (0.90, 1.9)	0.16

Abbreviations: OR: Odds ratio; CI: 95% Confidence Interval; aOR: Adjusted odds ratio; adjusted for individual level factors including gender, age, urban/rural, wealth quintile, education, marital status, and religion;

a: adjusted for individual factors and “ever had period of sadness and lost of energy for more than 2 weeks”;

b: adjusted for individual factors and “ever in your life had thoughts of suicide or self-harm”;

c: adjusted for individual factors and “ever sought care for a mental health problem”;

\*\*p<0.05; \*\*\*p<0.01

Table 3. Bivariate and multivariate analyses of mental health stigma among 2,933 participants from a representative household survey conducted in urban and rural Sofala and Manica provinces in Mozambique, 2017

Characteristic	Agreeing that it is possible to catch mental illness from treating or helping someone who is mentally ill.			Agreeing that mental health problems are caused by witchcraft or a curse placed on a person by someone else.				
	OR (95% CI)	p value	aOR (95% CI)	p value	OR (95% CI)	p value	aOR (95% CI)	p value
<b>Gender</b>								
Female	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Male	0.91 (0.74, 1.1)	0.33	1.0 (0.79, 1.3)	0.92	0.94 (0.82, 1.1)	0.43	1.0 (0.85, 1.2)	0.88
<b>Urban/rural</b>								

Rural	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Urban	1.1 (0.84, 1.4)	0.61	0.98 (0.72, 1.3)	0.91	1.4 (1.1, 1.7)*	0.01	1.8 (1.4, 2.3)	<0.01
<b>Marital status</b>								
Married/Common Law marriage	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Divorced	1.1 (0.69, 1.6)	0.83	1.1 (0.68, 1.6)	0.82	1.15 (0.86, 1.55)	0.35	1.1 (0.78, 1.5)	0.69
Widowed	1.2 (0.83, 1.6)	0.39	1.2 (0.79, 1.8)	0.42	1.1 (0.82, 1.4)	0.68	1.1 (0.81, 1.5)	0.57
Single/Never married	0.96 (0.51, 1.8)	0.91	0.98 (0.50, 1.9)	0.95	0.67 (0.42, 1.1)	0.08	0.77 (0.48, 1.2)	0.29
<b>Age</b>								
18-24	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
25-34	0.87 (0.66, 1.2)	0.34	0.79 (0.59, 1.1)	0.12	1.1 (0.87, 1.3)	0.59	1.0 (0.82, 1.3)	0.89
35-44	1.1 (0.82, 1.5)	0.50	1.0 (0.72, 1.4)	1.0	1.1 (0.86, 1.3)	0.52	0.96 (0.76, 1.2)	0.75
45-54	1.0 (0.73, 1.5)	0.82	0.81 (0.54, 1.2)	0.30	1.0 (0.78, 1.3)	0.91	0.85 (0.63, 1.1)	0.25
55-99	0.91 (0.65, 1.3)	0.61	0.75 (0.49, 1.1)	0.17	1.0 (0.79, 1.3)	0.94	0.85 (0.64, 1.1)	0.28
<b>Highest level of schooling attended</b>								
Secondary or higher	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Basic literacy or primary	1.1 (0.87, 1.4)	0.41	1.2 (0.87, 1.5)	0.31	1.6 (1.4, 1.9)**	<0.01	1.5 (1.2, 1.8)**	<0.01
No school	1.4 (1.1, 1.9)*	0.02	1.5 (1.0, 2.2)*	0.03	1.5 (1.2, 1.9)**	<0.01	1.4 (1.0, 1.8)*	0.02
<b>Religion</b>								
No religion	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Catholic	0.75 (0.53, 1.1)	0.10	0.69 (0.47, 1.0)	0.05	0.59 (0.45, 0.76)**	<0.01	0.59 (0.45, 0.77)**	<0.01
Muslim	1.96 (0.97, 4.0)	0.06	2.0 (0.96, 4.3)	0.06	0.58 (0.32, 1.1)	0.08	0.69 (0.37, 1.3)	0.25
Zione	0.82 (0.58, 1.2)	0.27	0.84 (0.59, 1.2)	0.35	0.80 (0.62, 1.0)	0.10	0.76 (0.58, 1.0)	0.05
Evangelical/Petencostal	0.69 (0.53, 0.90)**	<0.01	0.68 (0.52, 0.90)**	<0.01	0.64 (0.53, 0.79)**	<0.01	0.63 (0.51, 0.78)**	<0.01
Anglican	0.70 (0.30, 1.6)	0.42	0.70 (0.30, 1.6)	0.41	0.52 (0.28, 0.96)*	0.04	0.51 (0.27, 0.95)*	0.03
Johan maranga	0.94 (0.40, 2.2)	0.88	0.94 (0.40, 2.3)	0.89	0.84 (0.42, 1.7)	0.61	0.80 (0.40, 1.6)	0.52
Christian	0.45 (0.24, 0.84)*	0.01	0.46 (0.24, 0.87)*	0.02	0.49 (0.33, 0.73)**	<0.01	0.56 (0.38, 0.85)*	<0.01
Others	0.57 (0.29, 1.1)	0.10	0.59 (0.30, 1.2)	0.13	0.76 (0.48, 1.2)	0.23	0.70 (0.44, 1.1)	0.14
<b>Wealth quintile</b>								
Highest	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Fourth	0.90 (0.65, 1.2)	0.47	0.89 (0.63, 1.3)	0.52	1.5 (1.2, 1.9)**	<0.01	1.4 (1.1, 1.9)**	<0.01
Middle	1.0 (0.70, 1.4)	0.87	0.92 (0.61, 1.4)	0.70	1.8 (1.4, 2.4)**	<0.01	1.8 (1.3, 2.5)**	<0.01
Second	0.82 (0.59, 1.1)	0.23	0.69 (0.45, 1.1)	0.10	1.5 (1.2, 2.0)**	<0.01	1.4 (1.0, 2.0)*	0.04

Lowest	0.91 (0.65, 1.3)	0567	0.77 (0.49, 1.2)	0.25	1.7 (1.3, 2.3)**	<0.01	1.7 (1.2, 2.4)**	<0.01
<b>Mental health status related factors</b>								
<b>Ever had period of sadness or loss of energy that lasted more than 2 weeks?</b>								
No	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Yes	1.1 (0.81, 1.4)	0.73	<sup>a</sup> 1.1 (0.81, 1.4)	0.70	1.4 (1.2, 1.7)**	<0.01	<sup>a</sup> 1.5 (1.2, 1.8)**	<0.01
<b>Ever in your life had thoughts of suicide or self-harm?</b>								
No	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Yes	0.81 (0.61, 1.1)	0.15	<sup>b</sup> 0.76 (0.57, 1.0)	0.06	1.1 (0.90, 1.3)	0.51	<sup>b</sup> 1.1 (0.89, 1.3)	0.45
<b>Ever sought care for a mental health problem?</b>								
No	1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Yes	2.7 (1.7, 4.1)**	<0.01	<sup>c</sup> 2.9 (1.8, 4.5)**	<0.01	0.81 (0.57, 1.2)	0.25	<sup>c</sup> 0.93 (0.64, 1.4)	0.71

Abbreviations: OR: Odds ratio; CI: 95% Confidence Interval; aOR: Adjusted odds ratio; adjusted for individual level factors including gender, age, urban/rural, wealth quintile, education, marital status, and religion;

a: adjusted for individual factors and “ever had period of sadness and lost of energy for more than 2 weeks”;

b: adjusted for individual factors and “ever in your life had thoughts of suicide or self-harm”;

c: adjusted for individual factors and “ever sought care for a mental health problem”;

\*\*p<0.05; \*\*\*p<0.01

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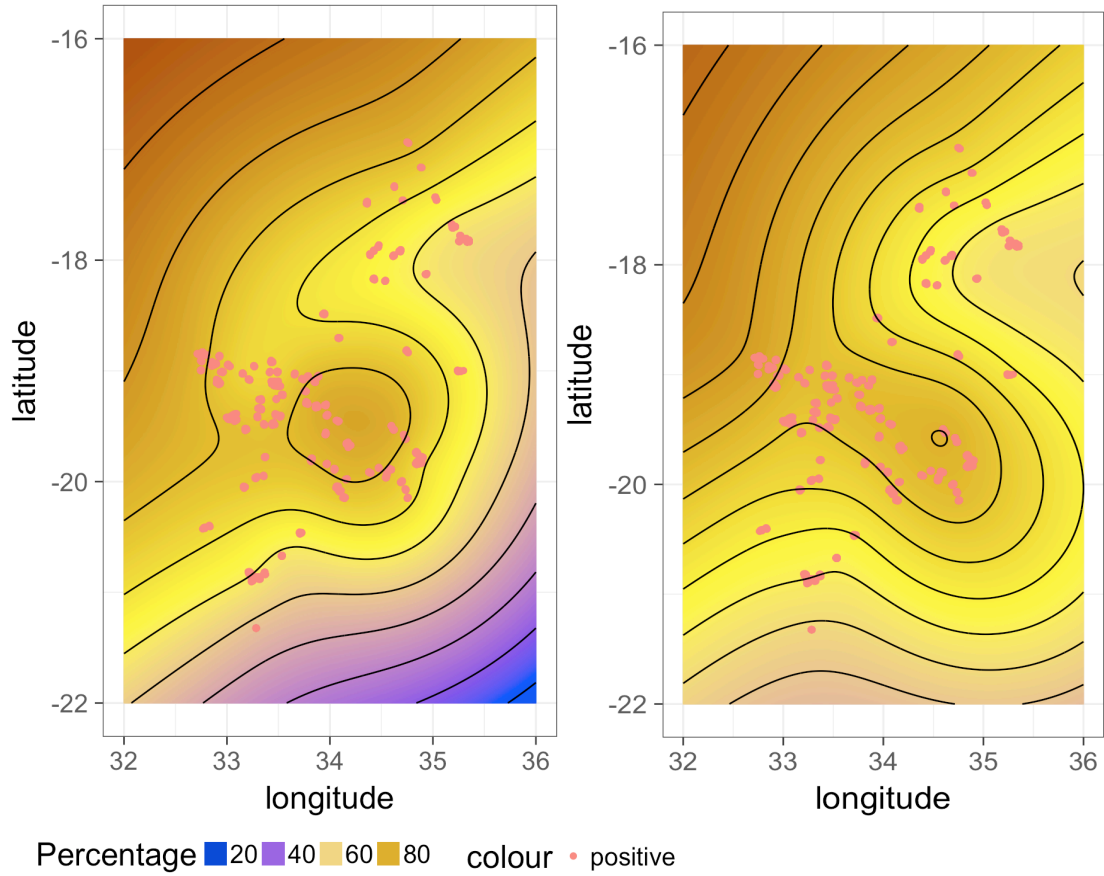
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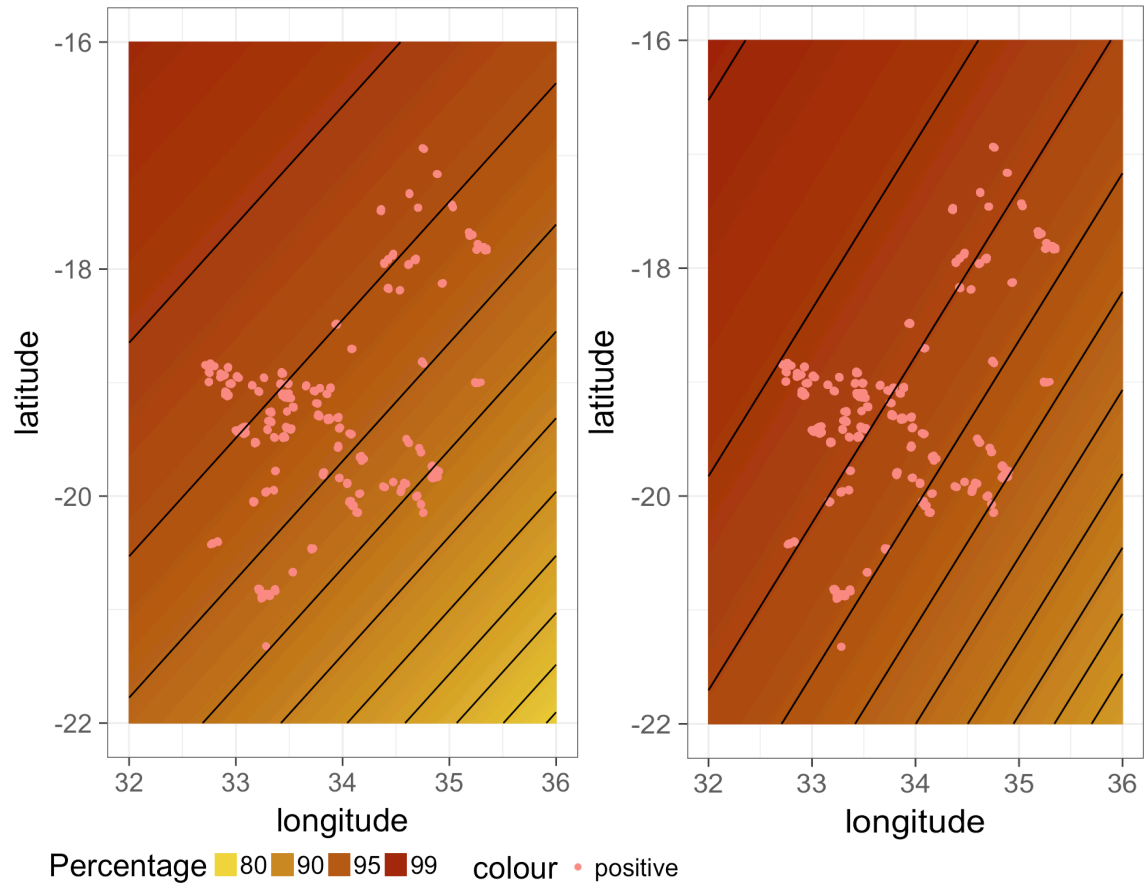
## APPENDIX A

Smoothed geographic maps of response of the question “Are you willing to have a friend with MI” (left: unadjusted map,  $p < 0.01$ ; right: adjusted map,  $p < 0.01$ )



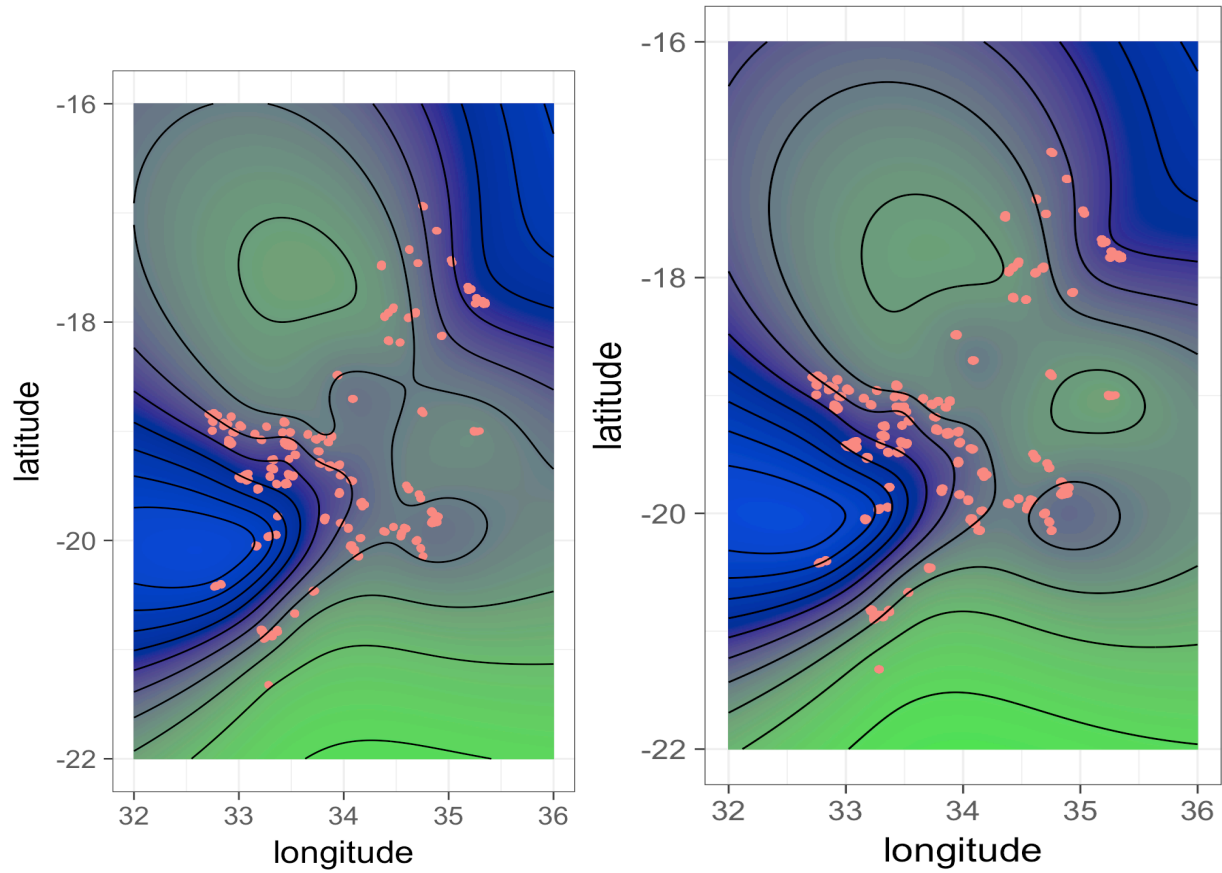
## APPENDIX B

Smoothed geographic maps of response of the question “Are you willing to let someone with MI to take care of your children” (left: unadjusted map,  $p < 0.01$ , right: adjusted map,  $p < 0.01$ )



## APPENDIX C

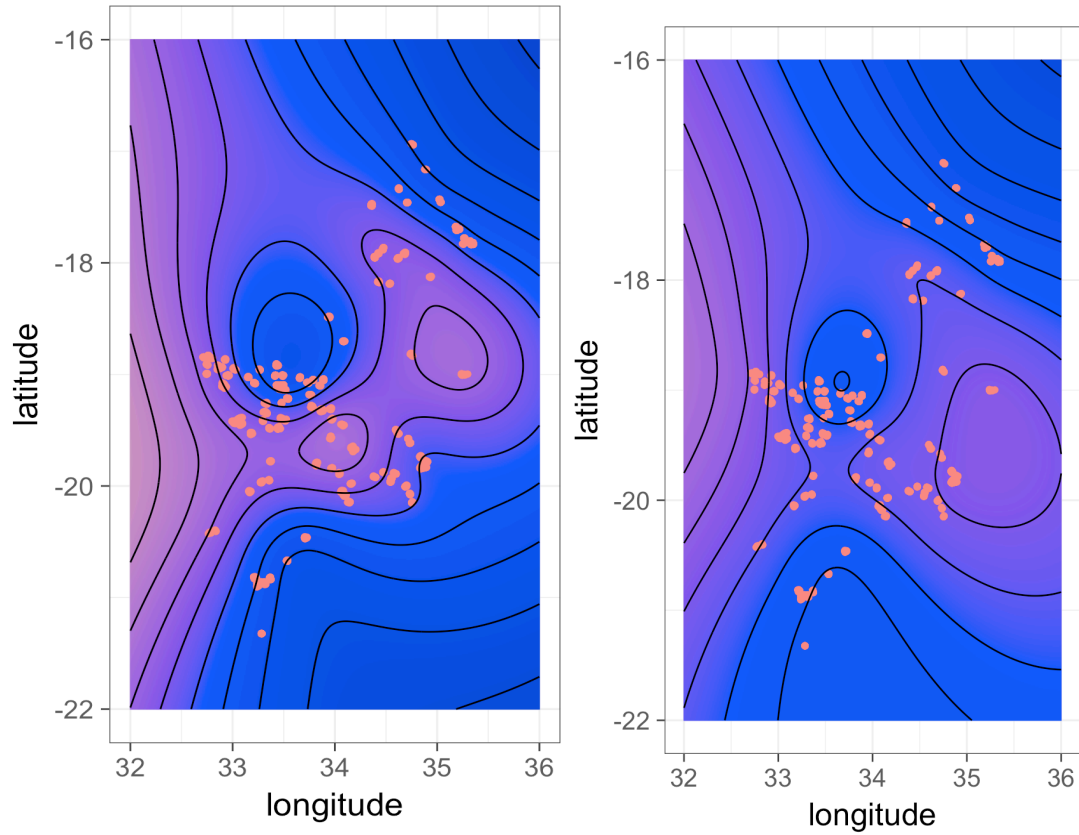
Smoothed geographic maps of response of the question “Are you willing to assist someone with MI” (left: unadjusted map,  $p < 0.01$ ; right: adjusted map,  $p < 0.01$ )



Percentage 10 20 30 40 50 colour • positive

## APPENDIX D

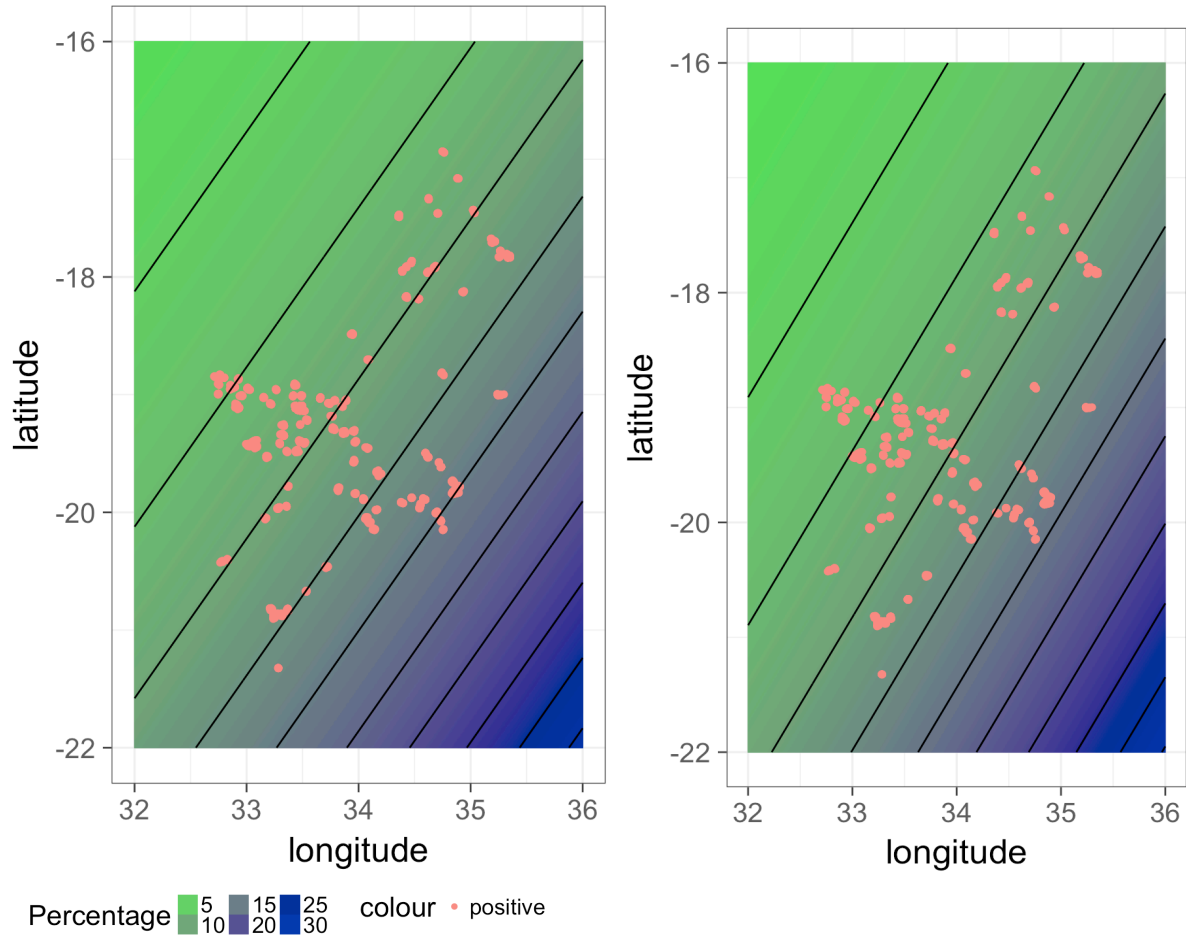
Smoothed geographic maps of response of the question “Do you agree that people with MI should be chained, tied and locked in their homes” (left: unadjusted map,  $p < 0.01$ ; right: adjusted map,  $p = 0.45$ )



Percentage 20 40 60 80 colour • positive

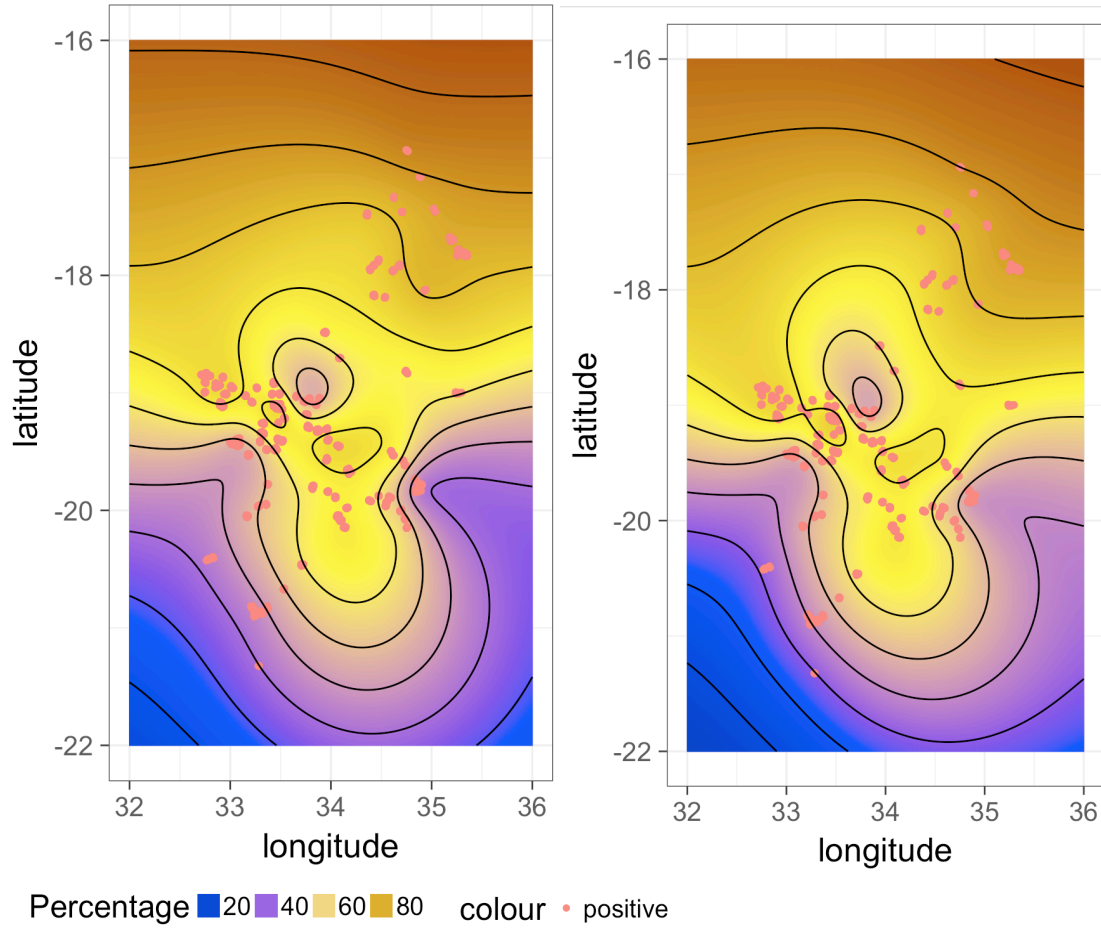
## APPENDIX E

Smoothed geographic maps of response of the question “Do you agree that it is possible to catch MI from treating or helping someone with MI” (left: unadjusted map,  $p < 0.01$ ; right: adjusted map,  $p < 0.01$ )



## APPENDIX F

Smoothed geographic maps of response of the question “Do you agree that mental health problems are caused by witchcraft or a curse placed on a person by someone else” (left: unadjusted map,  $p < 0.01$ ; right: adjusted map,  $p < 0.01$ )



**Ethics:** This study was approved by the Institutional Review Board of the National Institute of Health in Mozambique.

**Conflict of interest:** The authors report no conflict of interest.

**Acknowledgement:** Orvalho Augusto; Adam Akullian; Kristjana Ásbjörnsdóttir; Sara Gimbel; Kenneth Sherr; João Luis Manuel; Leecreasha Hicks; Arlete Mahumane; James Pfeiffer; Stephen Gloyd; Fatima Cuembelo; Miguel Nhumba; Joaquim Lequechane; Alfredo Covele; Manuel Napua; Lucia Vieira; Nelia Manaca; Falume Chale; Alberto Muanido; Cathy Michel

**Funding:** This study was supported by the Doris Duke Charitable Foundation. BHW was supported by grant number K01MH110599 from the U.S. National Institute of Mental Health. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.