

Mental Health and Poverty in Developing Countries: Revisiting the Relationship

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August 2006

Abstract

The relationship between poverty and mental health has received considerable attention in the recent literature. However the associations presented in existing studies typically rely on limited samples of individuals and on proxy indicators for poverty such as education, the lack of tap water, or being unemployed. We revisit the relationship between poverty and mental health using data from nationally representative household surveys in Bosnia and Herzegovina, Indonesia and Mexico, along with special surveys from India and Tonga.

As in previous studies, we find that individuals who are older, female, widowed, and in poor health are more likely to report worse mental health outcomes. Individuals living with others with poor mental health are significantly more likely to report worse mental health themselves. The size of the coefficients and their significance are comparable across the five countries. In contrast to previous studies, the relationship between higher education and better mental health is weak or non-existent. Furthermore, there is no consistent association between consumption poverty and mental health—in two countries mental health measures are marginally worse for the poor; in two countries there is no association; and, in one country mental health measures are better for the poor compared to the non-poor. Moreover, the sizes of the coefficients for both education and consumption poverty are small compared to other factors considered here.

While the lack of an association between consumption poverty and mental health implies that poor mental health is not a “disease of affluence”, neither is it a disease of poverty. *Changes* in life-circumstances brought on, for instance, by illness may have a greater impact on mental health than *levels* of poverty. Effective public health policy for mental health should focus on protecting individuals and households from adverse events and on targeted interventions following such adverse changes.

Introduction

The relationship between poverty and mental health holds great interest for both health and economic policy makers. Empirical findings from developed countries suggest that for most mental health disorders the association between low socioeconomic status and psychiatric morbidity is strong and significant (Kessler, 2005; WHO International Consortium in Psychiatric Epidemiology, 2000).

This relationship has been found to hold, in some cases even more strongly, in low-income countries. In eleven developing-country community-based studies, significant associations between poverty indicators and common mental disorders were found in all but one study (Patel & Kleinman, 2003). Univariate odds ratios (henceforth OR) predicting prevalence of a common mental disorder include low education (OR = 3.3), earning less than one-quarter of the minimum wage (OR = 3.9), and not working (OR = 3.6) in Brazil; having no electricity (OR = 1.47) or tap water (OR = 2.2) in Indonesia; arguing with spouse for economic reasons (OR = 10) in Pakistan; and being unemployed (OR = 2.9) or living in an overcrowded situation (OR = 2.1) in Zimbabwe. Another multi-country review of studies in Zimbabwe, two sites in Brazil, and in Chile showed strong associations between income terciles and the prevalence of common mental disorders, with odds ratios for those in the highest terciles ranging from 0.46-0.50 relative to those in the lowest terciles (Patel et al., 1999). Higher monthly income and formal education were also associated with reduced odds of mood disorders in rural Ethiopia (Awas et al., 1999).

This paper revisits the association between mental health and socio-economic outcomes in a number of low and middle-income countries through the analysis of recently available household survey data from Bosnia and Herzegovina, Indonesia, India, Mexico and Tonga. These data differ from those used in previous studies in important ways. First, the samples are drawn from a sampling frame of households rather than (for instance), a sampling frame of patients in health clinics (Patel et al. 1998). The latter may result in biased estimates of population-wide morbidity and the association with socio-economic characteristics if the use of health clinics is different among the general population compared to those

with mental disorders. Second, mental health measures are collected for all adults in the household; these allow us to examine the concordance of mental health outcomes among different members of the household with important implications for treatment. Third, detailed expenditure modules in each of these multi-purpose surveys can be used to construct household consumption measures. Household per-capita consumption is the preferred monetary-based welfare measure for poverty analysis among economists and hence is particularly germane for discussions of mental health and poverty in the developing world (Ravallion, 1994; Deaton and Zaidi, 2002).

Data and Methods

Data

Multi-purpose surveys combining a mental health component with extensive socio-economic measures and information on all household members were fielded in Bosnia and Herzegovina (hereafter Bosnia), Indonesia, India, Mexico and Tonga. These household surveys are representative of the national population in Bosnia, Indonesia and Mexico with data on over 5,400 households in Bosnia and over 10,000 households in Indonesia and Mexico. The Indian and Tongan surveys were special purpose surveys. The data in India are from a longitudinal study of 300 households (1600 individuals) in the capital, Delhi; the sample of households is no different in observable attributes from a representative sample of households in the city (Das and Sánchez 2003). The Tongan respondents were in 230 households chosen randomly from among those who applied for an emigration lottery (Stillman et al. 2006).

Each of the surveys fielded a screening survey of psychological distress similar to the SRQ20, the related GHQ (Goldberg, 1972) or the SCL-90R. These screening surveys were translated and back-translated to ensure accuracy and extensively tested in the field to ensure comprehension among study subjects. In four countries (Bosnia, Indonesia, Mexico and Tonga), the surveys were fielded on the first visit to the

household. In India, the 90 question SLC-90R was fielded one year after the longitudinal survey was initiated to ensure some degree of comfort between the respondents and field-workers.¹

The mental health modules in the utilized surveys ask respondents the frequency in the last month of a similar range of internal states (e.g. “feeling sad or blue”, “feeling anxious or nervous”) or related behaviors (e.g. “difficulty falling asleep”, “distracted from everyday activities”).² The frequency of such states or behaviors is recorded on a four-point scale that ranges from “never” or “almost never” to “very often”. To score the individual’s survey response, a low ordinal value (1 point) is assigned to categorical responses of infrequency and high ordinal values (up to 4 points) to the categories indicating greatest frequency. The average response across all questions (with each question given equal weight) constitutes the respondent’s mental health score, often known as the Global Severity Index or GSI, which is higher for those reporting worse mental health.³

Table 1 presents the mean of the raw scores across the surveys, as well as various characteristics of each survey. The main mental health scores across all surveys fall in the narrow range of approximately 1.35 – 1.50 indicating the average response to any particular mental health measure to be somewhere between “almost never” and “rarely or infrequently”. The standard deviation around this mean is also relatively similar in the general range of .35 - .50. Tonga is the exception where the average question response is higher at 1.75 and with slightly less dispersion at a standard deviation below .35.⁴

Given similar distributions of the mental health score across the five countries the score is standardized around the mean of each country and expressed in units of standard-deviations to enhance comparability and facilitate the interpretation of the results. The standardized GSI, formally defined as $GSI_{individual} - \text{mean}(GSI)_{country} / \text{standard deviation}(GSI)_{country}$, is the outcome variable for the analysis in this paper. The relative magnitudes of different factors are then directly compared across countries.

Statistical methods

The analysis explores the co-variation of the standardized GSI with a range of potentially related factors at the level of the individual and household. In order to parsimoniously explore predictors of poor mental health, similar groups of characteristics measured consistently across each data set are identified. These characteristics vary either at the individual level, such as age, gender, marital status, or education, or the household level, such as household size or total household expenditures⁵. For the larger surveys, community level characteristics are accounted for either through a community-level fixed effect or by including the average individual mental health score for the entire community as an additional explanatory variable. The predictive power of each of these characteristics is estimated in separate national level ordinary least square regressions⁶ (OLS) using STATA/SE Version 9.0. In each of these regressions the respondents are restricted to those aged 15-80 and standard-errors are clustered to correct for possible response dependency at the household level.

Selected results are graphically summarized in accompanying figures. Associations between the mental health score and continuous control variables are depicted by gradients estimated with a partial linear model. In this approach all covariates except the one depicted are modeled in a parametric fashion while the depicted variable is allowed to vary in a non-parametric fashion.⁷ Associations between mental health and discrete covariates are conveyed graphically by their 95% confidence intervals.

Results

Figures 1 and 2 summarize the findings from the five countries; Figure 1 presents mental health associations with continuous variables and Figure 2 with discrete variables. The parametric version of these relationships using ordinary least squares are presented in Table 2.

Demographic influences

Several of the empirical regularities with regards to demographic influences identified in previous research are reproduced in the data here (Andrews et al., 2001; Awas et al., 1999; Kessler et al., 2005; Patel et al., 1999; Weissman et al., 1996; WHO International Consortium in Psychiatric Epidemiology, 2000). Age, gender, and marital status are all significant predictors of individual mental health in the direction of influence found earlier.

Mental health measures are positively and significantly associated with age in every country but Tonga (Panel A, Figure 1). However the magnitude of the age gradient varies substantially across countries—in four of the five countries mental health worsens with age, while in Tonga the association between mental health and age is an inverted-U shape whereby mental health scores improve at advanced ages. Bosnia exhibits the steepest age gradient by far.

One of the most pronounced demographic regularities is that the odds of experiencing any disorder and specifically of experiencing affective (mood), anxiety, and somatoform disorders are significantly higher among females.⁸ Panel A of Figure 2 replicates this regularity. In four of the five national settings, mental health measures are worse among women, although the magnitude of the female “penalty” varies widely from a low of 0.16 standard-deviations in Indonesia to a high of 0.49 standard-deviations in Mexico. Tonga is again the exception, where women report significantly lower level of distress to the order of 0.2 standard deviations.

A third consistent finding in the literature is that respondents who are separated, divorced or widowed report worse mental health compared to those who are married (Andrade et al., 2002; Andrews et al., 2001; Kessler et al., 2005; Weissman et al., 1996; WHO International Consortium in Psychiatric Epidemiology, 2000). Again, in a majority of countries examined here widows are indeed worse off,

although the relative deprivation of widows varies over the national setting and in the India data widows report lower levels of distress than non-married individuals (Panel B, Figure 2).

Physical health and mental health

Similarities between these data and previously reported results are also evident in the positive association between mental and physical health (Kessler et al., 2005; Kessler et al., 1994; Bijl et al., 2003). Poorer physical health, as measured by a binary variable based on self-assessed general health status (poor health = 0), is strongly associated with worse mental health outcomes in all countries with sufficient data. As observed in Panel C of Figure 2, the coefficients are large and precisely estimated. The lowest magnitude is for India at 0.42 standard deviations; while in Bosnia, an individual reporting poor health also reports a mental health score 1.1 standard deviations higher than someone in good physical health.

Socioeconomic status and mental health

In sharp contrast to these results, which replicate those reported earlier in the literature, associations between socio-economic measures and mental health deviate considerably from expected patterns. Panel B of Figure 1 and Panel D of Figure 2 depict how mental health scores vary with years of formal schooling (Figure 1) and quartiles of household per-capita consumption (Figure 2).

For either socio-economic measure there is no clear pattern across the five countries. In three of the five countries—India, Mexico, and Bosnia—education is significantly and negatively associated with worse mental health. There is no association across years of education in Indonesia and in Tonga the estimated relationship is U-shaped, with mental health first improving as education increases and then worsening. Of equal interest are the relatively small magnitudes of the schooling coefficients compared to the demographic and physical health measures reported above--the association between education and mental health, where it is significant at all, is small.

Any general relationship between mental health and household per-capita expenditures is even more tenuous. Across the five countries only two – Tonga and Bosnia – exhibit a negative gradient between household per-capita consumption and individual mental health. The largest gradient is observed in Tonga, where individuals in the top quartile report on average a mental health score that is 0.15 standard deviations below the other three quartiles. However to claim that the poor report worse mental health in Tonga one would have to adopt an expansive definition of poverty that includes the bottom three-quartiles of the distribution. Bosnia also exhibits a negative gradient, albeit much smaller in magnitude. In Indonesia and India there is no association between per-capita expenditures and mental health outcomes and in Mexico, there is a significant *positive* gradient suggesting that mental health outcomes are *better* for the poor.

Comparing socioeconomic variables to other correlates

Furthermore, for all five countries, the magnitudes of the estimated socioeconomic coefficients are much smaller than the coefficients for any other factor presented here. For example, in Bosnia one more year of education is associated with a 0.01 standard deviation improvement in mental health, while moving from the bottom to the top quartile of the per capita expenditure distribution improves mental health by 0.03 standard deviations (Table 2). These pale in comparison to the associated worsening in mental health from being female (0.30 standard deviations), being widowed (0.29 standard deviations), having poor physical health (1.12 standard deviations), and having a one standard deviation worse mental health of other members in the household (0.51 standard deviations). Similar magnitudes are seen in other countries, suggesting that the relative importance of consumption poverty in the determination of mental health is slight.

In addition, the household based nature of these data enable a unique exploration of the co-location of poor mental health within the household and community. Panel C of Figure 1 depicts the non-parametric regression lines of individual mental health on the average mental health score of other members in the

household (excluding the individual herself).⁹ There is a strong positive association between an individual's psychological well-being and others in his or her constituent household. This association exists at all levels of mental health and is one of the most powerful predictors of the mental health score on the rough order of gender or physical health and certainly more influential than any socio-economic measure. The community average mental health score also influences an individual's mental well-being even after adjusting for household average mental health (Panel D, Figure 1). The degree of association is roughly half as large as the association at the household level in the three countries that allow for community level measures.¹⁰

Discussion

Summary of main results

Household surveys in five low and middle-income countries covering Latin America, Eastern Europe, East Asia and the Pacific, and South Asia reveal significant associations between mental health scores and gender, the physical health of the respondent, his/her marital status, and the mental well-being of other members in the respondents' household and community. These relationships hold (with occasional deviations) across all the countries with roughly comparable magnitudes. In contrast, there is no consistent relationship between mental health scores and socio-economic measures such as the respondent's education or the per-capita expenditure of the household in which the respondent resides. These results provide the setting for a discussion centered around (a) the potential use of mental health modules in multi-purpose household surveys and (b) the implications for policy and research on mental health.

Measuring mental health in multi-purpose surveys

The consistency of the magnitudes and signs obtained across the five countries suggest that mental health screening questionnaires can be incorporated into large and nationally representative standard household surveys such as the Living Standards Measurement Survey (Scott et al. 2005). Furthermore, the

associations between mental health scores and individual/household characteristics are very similar in surveys where questionnaires were fielded on a first visit to households and where they were fielded after a period of acquaintanceship. Finally, shorter modules (such as the GHQ-12) reveal similar associations as the longer SCL-90R, which took one hour to field for non-literate respondents. Indeed, the depression and anxiety components of the SCL-90R are found to contain most of the relevant information for the 9 dimensions covered under the questionnaire (Das and Das 2006).

Implications for public health interventions

On a more substantive note, effective public health policy requires an understanding of the mechanisms that determine poor mental health and, in turn, the implications of poor mental health for the individual and his/her family. The descriptive analysis here provides suggestive evidence for what these mechanisms may be and therefore a potential role for public health interventions.

The lack of any relationship between conventional economic welfare measures and mental health outcomes across a diverse sample of developing countries suggests that poverty, *per se*, is not a strong determinant of poor mental health. A straightforward equity rationale for public investments in mental health is undermined by the higher relative prevalence among the poor of other health problems such as tuberculosis and malaria as well as continuing financing gaps for these illnesses. The lack of a relationship between consumption poverty and mental health is certainly not, however, supportive of arguments that suggest no scope for public interventions towards improving mental health. Instead, we argue that resources should be targeted towards improving the mental health of those who have experienced adverse events, and note also the distinction between severe and common mental disorders.

Two of the strongest factors associated with poor mental health are poor physical health and widowhood. Related papers on India, Indonesia and Tonga confirm that more generally *changes* in life-circumstances brought on by positive or negative events have long-lasting implications for mental health. In India,

women who report child-loss (either through miscarriages, abortions or death) are at significantly higher risk of mental health problems compared to those without; indeed, the female penalty observed in the data is entirely driven by the difference between men and women in households that experienced the loss of a child (Das and Das, 2006). In Indonesia, the mental health of the population worsened dramatically following the economic crisis of the nineties; however although consumption levels recovered by 1999, mental health did not (Friedman and Thomas, 2006). Finally, in Tonga, individuals who were selected by a lottery to emigrate (and randomly received a positive income shock) reported significantly better mental health outcomes after emigration (Stillman et al. 2006). These findings are also consistent with studies that report worsened mental health outcomes in populations that have suffered conflict or disasters (United Nations High Commissioner for Refugees (UNHCR), 2005; Lopes Cardozo et al., 2004; Mollica et al., 1999; Mollica et al., 2001).

The Indian and Indonesian studies suggest that the trauma from adverse events may persist long after the recovery of more traditional measures of welfare and there may very well be real individual and household costs to this persistence. Examples of such costs along the health dimension include: lower adherence to dietary recommendations and medication regimes among diabetics with depressive symptoms compared to diabetics without (Ciechanowski, Katon, & Russo, 2000); high co-morbidity rates for smoking and psychiatric disorders, with smoking twice as common among the mentally ill compared to the mentally healthy population (Lasser et al., 2000); and an association between maternal mental health and child welfare in two South African studies, with maternal depression significantly increasing the odds that a child will experience growth faltering (Harpham, Huttly, De Silva, & Abramsky, 2005; Patel, Rahman, Jacob, & Hughes, 2004). Strong evidence of such costs in other dimensions of welfare such as education also exist (Kessler et al., 1995).

If individuals who have suffered adverse events (or “shocks” as in the economic literature) are particularly likely to report worse mental health, traditional measures of poverty such as per-capita

household expenditure, are insufficient to fully understand the association between mental health and poverty. These poverty measures do not account for the risk and uncertainty that households face; alternative measures that incorporate risk and vulnerability could yield significantly different results.

Focusing on “shocks” and mental health outcomes suggests a dual role for policy. First, addressing the *causes* of poor mental health is a viable policy alternative for which there is already a strong global consensus in place. Few would argue that decreasing child mortality or improving physical health should not be a global priority; that such investments also have an effect on mental health strengthens an already existing case. Second, there may be a role for targeted treatments to the directly affected in the aftermath of an adverse event if such treatments lead to improved outcomes. The clustering of mental health outcomes within households provides evidence that such treatments targeted at the level of the *household* may have larger benefits than those targeted to individuals.

An important limitation of this study and of the household-survey based methodology is our inability to differentiate common from severe mental disorders. That there is a clear distinction has been remarked on in the literature, especially in the context of findings that the annual prevalence of common mental disorders exceeds 10 percent in many countries, and is as high as 16.9 percent in Lebanon, 17.8 percent in Colombia, 20.4 percent in Ukraine and 26.3 percent in the United States (WHO World Mental Health Survey Consortium, 2004). Severe mental health (such as schizophrenia), brought on by bio-genetic causes and possible interactions with environment, require a separate policy-response. In several low-income countries, the institutional capacity for treating such disorders is very poor with frequent human-rights violations of the severely mentally ill (WHO, 2001). Neither does it appear that the private sector is capable of providing the required response—doctors tested on the handling of a patient with depression in Delhi had to be above average competence to have a better than even chance of not *harming* the patient; even those in the highest quintile of competence provided a non-harmful treatment only 58 percent of the time (Das and Hammer, 2005). The long-term treatment required for such disorders and the high costs

imposed on households suggest that these are the types of disorders where the lack of insurance markets requires clear government intervention.

A second limitation of this study is that, in the absence of an experimental setup, the associations presented are consistent with multiple interpretations. For instance, the concordance of mental health outcomes within households could reflect unobserved household-level shocks, assortative matching (where those in poor mental health are more likely to marry each other) , genetic links between parents and children, or a “contagion” effect, whereby caring for a mentally ill person in the household in turn affects the mental well being of others. Longitudinal data and experimental mental health interventions are needed to try and separate these channels.

These results ask for a more nuanced understanding of the relationship between poverty and mental health. Two potential avenues for further research suggested by these findings are the long and short-term effects of negative and positive shocks to mental health and the link between mental health outcomes and broader measures of welfare that incorporate risk and vulnerability in their construction.

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Table 1. Overview of datasets employed

Country	Year of Survey	Number of Obs.	Level of representation	Mental health survey instrument	Mean	Std. dev.
Bosnia	2001	12956	National	CESD	1.495	0.502
India	2003	784	300 households in Delhi (*)	SCL-90R	1.535	0.416
Indonesia	2000	25470	National	GHQ derived	1.413	0.508
Mexico	2002	19798	National	GHQ derived	1.341	0.358
Tonga	2005	714	Special sample of migrant sending villages	MIH-5	1.745	0.337

* Indistinguishable from a representative sample of the city

Table 2: Correlates of Mental Health

	TONGA (1)	INDIA (2)	MEXICO (3)	MEXICO (4)	BOSNIA (5)	BOSNIA (6)	INDONESIA (7)	INDONESIA (8)
Age	0.00285 (0.0043)	0.00799* (0.0041)	0.00269*** (0.0010)	0.00263** (0.0010)	0.0127*** (0.00095)	0.0123*** (0.00096)	0.00266*** (0.00067)	0.00270*** (0.00070)
Female Dummy	-0.221*** (0.069)	0.356*** (0.078)	0.488*** (0.020)	0.486*** (0.020)	0.298*** (0.016)	0.300*** (0.016)	0.164*** (0.015)	0.161*** (0.015)
Married Dummy	0.449*** (0.11)	-0.104 (0.12)	0.0329 (0.030)	0.0250 (0.029)	0.123*** (0.030)	0.133*** (0.031)	-0.172*** (0.022)	-0.173*** (0.023)
Widowed Dummy	0.604** (0.25)	-0.421* (0.23)	0.169*** (0.052)	0.161*** (0.052)	0.272*** (0.051)	0.290*** (0.052)	0.0919** (0.042)	0.0914** (0.042)
Poor Physical Health		0.417*** (0.12)	0.940*** (0.060)	0.943*** (0.060)	1.076*** (0.13)	1.115*** (0.12)	0.663*** (0.028)	0.672*** (0.028)
Years of Education	0.0164 (0.019)		-0.0197*** (0.0031)	-0.0219*** (0.0033)	-0.00976*** (0.0016)	-0.0113*** (0.0018)	-0.00306 (0.0019)	-0.00322 (0.0021)
HH PCE - quartile 2	-0.0119 (0.072)	-0.00644 (0.094)	0.0520** (0.025)	0.0443* (0.026)	-0.0323* (0.019)	-0.0317* (0.017)	-0.00122 (0.018)	-0.00229 (0.019)
HH PCE - quartile 3	-0.0701 (0.072)	-0.0396 (0.089)	0.0695*** (0.026)	0.0617** (0.028)	-0.0501*** (0.019)	-0.0460*** (0.018)	0.00372 (0.019)	0.00560 (0.020)
HH PCE - quartile 4	-0.156** (0.076)	-0.0180 (0.097)	0.0467* (0.028)	0.0264 (0.030)	-0.0621*** (0.018)	-0.0332* (0.018)	0.0224 (0.021)	0.0232 (0.023)
Household Size	-0.00715 (0.010)	0.0140 (0.016)	0.00361 (0.0054)	0.00262 (0.0054)	-0.0118** (0.0060)	-0.00892* (0.0052)	-0.000318 (0.0024)	-0.000034 (0.0026)
Old Dependents	-0.504*** (0.17)	-0.389 (0.24)	-0.0685 (0.054)	-0.0451 (0.055)	-0.355*** (0.035)	-0.352*** (0.034)	0.0448 (0.045)	0.0742 (0.047)
Young Dependents	-0.586*** (0.15)	-0.0288 (0.16)	0.0706 (0.050)	0.0841* (0.050)	-0.0758 (0.047)	-0.0469 (0.046)	0.0857** (0.038)	0.115*** (0.040)
HH Mental Health	0.484*** (0.038)	0.321*** (0.053)	0.178*** (0.014)	0.161*** (0.014)	0.472*** (0.018)	0.511*** (0.015)	0.194*** (0.012)	0.174*** (0.012)
Community Mental Health			0.119*** (0.0093)		0.187*** (0.011)		0.124*** (0.0069)	
Primary to High School		-0.149* (0.084)						
High School or More		-0.197* (0.10)						
District fixed effects	no	no	no	yes	no	yes	no	yes
Constant	-0.155 (0.25)	-0.330* (0.17)	-0.386*** (0.055)	-0.355*** (0.058)	-0.634*** (0.049)	-0.656*** (0.049)	-0.183*** (0.035)	-0.211*** (0.038)
Observations	681	747	17926	17926	11766	11766	19584	19584
R-squared	0.32	0.18	0.19	0.21	0.61	0.60	0.15	0.16

Robust standard errors in parentheses clustered at the household level

*** p<0.01, ** p<0.05, * p<0.1

Figure 1. Mental health score by selected characteristics (continuous)

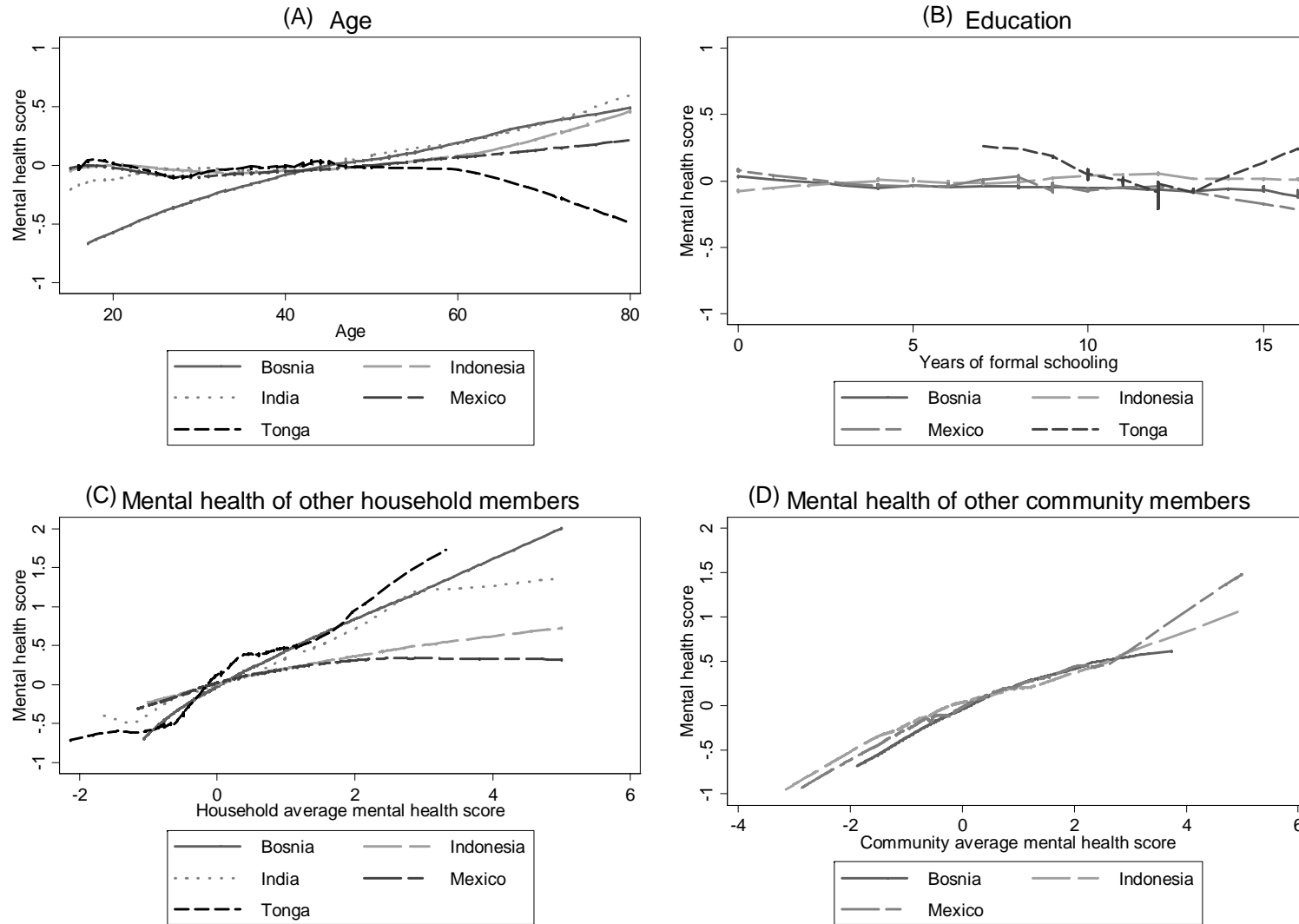
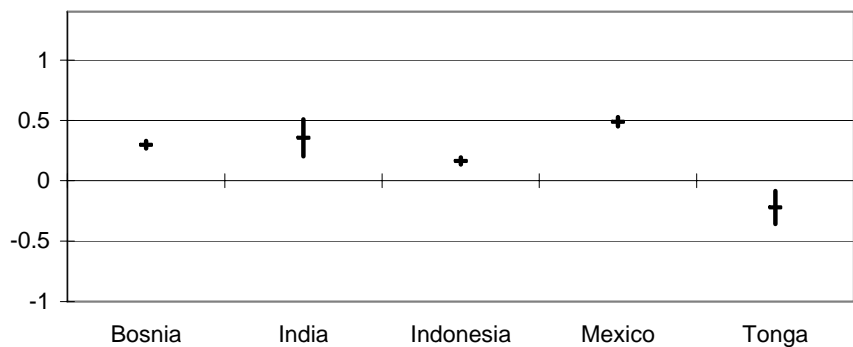
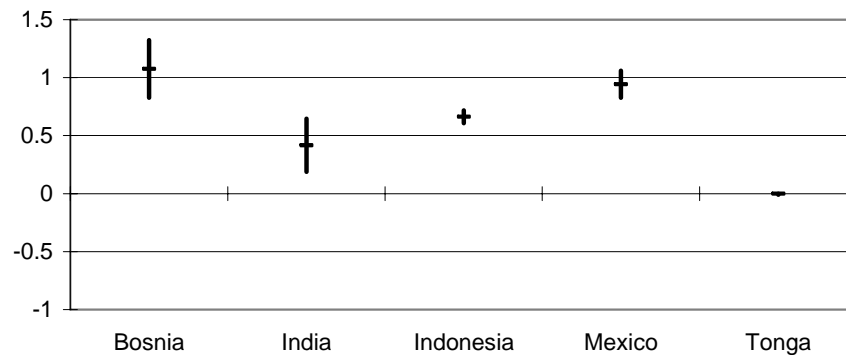


Figure 2. Mental health score by selected discrete characteristics

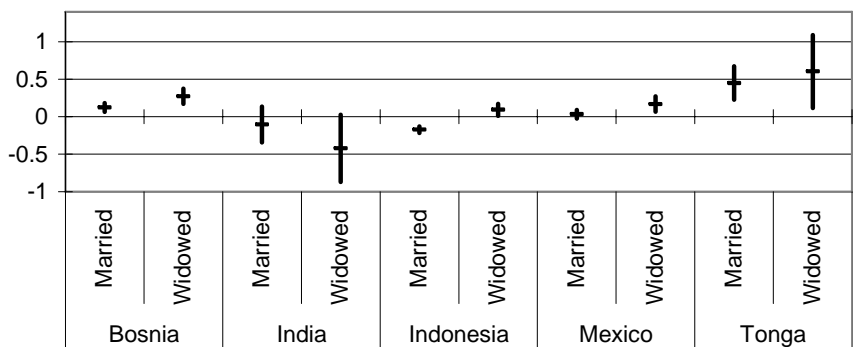
(A) Female



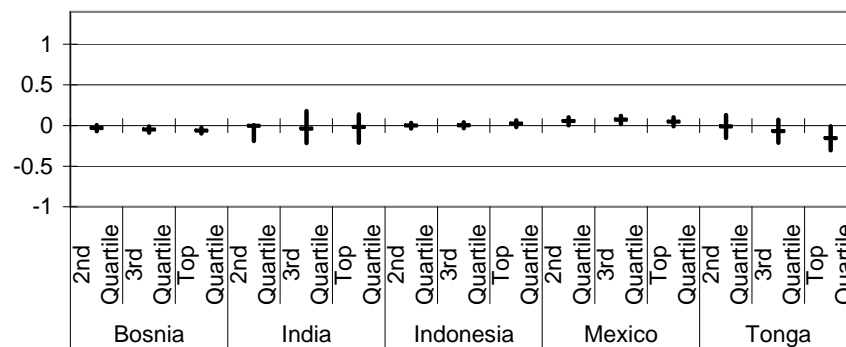
(B) Poor physical health



(C) Marital status (compared to non-married)



(D) Per capita household expenditures



Endnotes

¹ As opposed to relatively lengthy diagnostic interviews such as the Comprehensive International Diagnostic Interview (Kessler et al., 2005), the more common mental health instruments included in socio-economic surveys attempt to measure general psychological distress and are not intended to diagnose specific manifestations of mental illness per se. The SRQ20, which has been translated into more than twenty languages and used in wide range of studies as a individual-level screening tool and to estimate mental disorder prevalence at the community level, is one example of this brief survey instrument (Harpham et al., 2003).

² The recall period in the Indian survey using the SCL-90R was one week instead of one month.

³ Typically a “cut-off” score indicating the likely presence of psychological disorders is determined by mental health professionals through supplementary validation exercises. These exercises were not available for all studies included here.

⁴ The exact questionnaire content varies across countries. However for every country but Tonga there are three similar questions: whether the respondent has recently felt sad, felt anxious, or had trouble sleeping. Limiting overall mental health score to these three questions yields similar yet slightly elevated scores and greater dispersion around the mean score. The mean response for the 3-question subset and the overall mean score are highly correlated with coefficients ranging from .84 - .90 across the datasets. Due to these close correlations, and in order to include Tonga in the analysis, the analysis focuses on the comprehensive measure.

⁵ Most of the surveys use an extensive expenditure module to capture not just monetary expenditures, but also the value of goods produced for home production, gifts, and the value of owner-occupied housing. This provides a comprehensive indicator of consumption welfare. The Tongan survey uses per capita household income instead of consumption.

⁶ Qualitatively similar results are obtained using logistic regression to examine the odds that the individual will be in the worst 20 percent, 10 percent or 5 percent of the population in terms of mental health scores.

⁷ See Yatchew (1998) for a description of these semi-parametric methods and Lokshin (2005) for programming implementation.

⁸ In one important exception, males tend to have higher odds of substance use disorders (Andrews et al., 2001).

⁹ Hence individuals living alone, representing 3.2 percent of the pooled data, are not included in the analysis.

¹⁰ An important distinction in low-income countries is between urban and rural areas. Rapid urbanization and economic restructuring are defining forces in much of the developing world and may lead to unique stressors (Blue & Harpham, 1996). In these data urban residents report worse average mental health scores. However controlling for residence through district fixed effects leaves the interpretation of the regression coefficients unchanged. (The Indian data is exclusively an urban sample and the urban/rural distinction in Tonga has less meaning.)