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# Mental Health and Socio-Economic Outcomes in Burundi

**Florence Baingana, Andrew Dabalen, Essimi Menye, Menahem Prywes and Michael Rosholm**

**November 2004**

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HEALTH, NUTRITION, AND POPULATION
THE WORLD BANK

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# Health, Nutrition and Population (HNP) Discussion Paper

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# HEALTH, NUTRITION AND POPULATION (HNP) DISCUSSION PAPER

## Mental Health and Socio-Economic Outcomes in Burundi

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**Abstract:** Earlier studies have demonstrated the linkage between conflict and poor mental health, as well as the linkage between poor mental health and dysfunction. However, there have not been, to our knowledge, any population-wide studies of the linkages between mental health and socio-economic outcomes in poor, conflict-affected countries. This paper presents analysis of data from a survey of 5,599 respondents aged 10 years and older conducted country-wide in Burundi in 1998-99. We estimate statistically significant relationships between indicators of poor mental health and several social and economic outcomes. Most importantly, a worsening of mental health is associated with a decline in employment and with a decline in school enrolment of the subject's children. We find no relationship between mental health and poverty, once adjustments are made for demographic and regional influences.

We argue that poor mental health diminishes people's participation in work and investment in their children's education through dysfunction resulting from psychiatric trauma and depression. Economic theory holds that investment in human capital, such as in education, will depend in part on expectations about the return on the investment. Combining the psychological and economic theory with our statistical findings suggests that poor mental health is one of the causes of low enrollment of children in primary education. Our results suggest that mental health programs could be one means for promoting participation in labor markets and increased investments in education.

**Key Words:** mental health, poor mental health, distress, pessimism, consumption, education, employment, socio-economic outcomes

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# FOREWORD

In 1993, the Burden of Disease Studies and the World Development Report: *Investing in Health*, identified the contribution of mental illness to the overall burden of disease in society. At that time, neuropsychiatric disorders made up 11% of the global burden of disease estimate. Today, they are estimated to make up 13%, even without including alcohol and drug abuse, suicide and other intentional injuries and unintentional injuries. The World Bank, through support from the MacArthur Foundation, established the Mental Health Specialist Position in 1999. The position at the Bank was initiated to develop a better understanding of the relationship between mental illness and social capital and to determine the most cost-effective interventions to alleviate the burden of mental illnesses in developing countries. When the MacArthur Foundation was no longer able to support the position, the National Institute of Mental Health (NIMH) and the Center for Mental Health Services (CMHS) of the US Government continued to support it for another two years.

This paper on "Mental Health and Socio-Economic Outcomes in Burundi" is an example of the type of work that has come from this effort at the Bank. The study has some limitations, but it highlights the importance of attempting to understand how mental health and socio-economic variables are related in a conflict-affected country. A variety of studies before this one have reported that conflicts and extreme traumatic events can lead to mental disorders. These mental disorders are associated with continued impairment in functional status; long after the traumatic event is over. The study reported here attempts to establish a link between individual mental health and employment and other economic variables, as well as the educational outcomes for the individual's children.

This discussion paper is an important effort in increasing our understanding of how mental illnesses and socio-economic variables are related in developing countries. A better understanding of these relationships should lead to the development of universal interventions to decrease the burden of mental illness in these countries.


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# ACKNOWLEDGEMENTS

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# EXECUTIVE SUMMARY

To understand the links between mental health and socio-economic outcomes, our study analyzes data for Burundi, in 1998-1999, when the country began to emerge from a violent civil conflict. The data are uniquely interesting because, aside from mental health, there are observations on morbidity, school attendance of children, employment, and on household expenditures. Furthermore, the data are interesting because the sample is so large, with observations on about 5,600 people.

In addition, the data on Burundi may help us understand a larger class of civil conflicts in Africa and in other countries, such as former Yugoslavia. Burundi and these countries share a history of large-scale killing along ethnic lines, violence against women, forced displacement and migration, and worsened poverty.

Several earlier studies assess the mental health of populations in post conflict environments and our study contributes to this literature. To our knowledge however, no other study investigates the relationship between mental health and outcomes across the social sectors and in the economy in a systematic and empirical way.

We estimate a 36% prevalence rate for poor mental health based on an indicator, Distress, constructed from responses to questions about mental distress and anxiety and a 25% prevalence rate based on an indicator, Pessimism, constructed from responses to questions about confidence in the future. Regarding the socio-economic outcomes, our three most important results are that:

i.   A 10% worsening in the indicator of Pessimism of a head of household is associated with a 0.35% decrease in the primary school enrolment of their children;

ii.  A 10% worsening in the indicator of Pessimism is associated with a 0.17% decrease in employment, a 10% worsening in the indicator of Distress is associated with a further 0.22% decrease in employment; and

iii. There is no apparent relationship, in national data, between the indicators of mental health and poverty; regional and demographic variables statistically explain most of the variance in poverty.

Our results are consistent with predictions of several psychological and economic theories. We argue that poor mental health may diminish work effort and investment through dysfunction resulting from psychiatric trauma, depression, and hopelessness.

Moreover, hopelessness is a symptom of depression. Economic theory holds that investment in human capital, such as in education, will depend in part on expectations about the return on the investment. In effect, the economic concept of expectations runs parallel to the psychological concept of hope. Therefore it should be no surprise that the Pessimism indicator for heads of households, which reflects hopelessness, is associated with lower school attendance of their children. Moreover, it is seems unlikely that poor

school attendance of children would, in itself, worsen the mental health of the parent. Therefore causation may run from  poor mental health of heads of household to school attendance of their children.

Turning to policy, the findings suggest actions to promote the participation of children in education in conflict-affected regions.  Moreover, it is possible that mental health programs targeted to adults in these regions could contribute to better school enrollment of their children.

# BACKGROUND

## THE BURUNDI SITUATION

Gross National Income *per capita* is an estimated $100, so that Burundi is tied with Ethiopia for the poorest country in the world. The population is about 7.3 million and nearly half are 14 years or younger. About 90% of the population lives on subsistence agriculture, although there are some exports of coffee. Life expectancy is low at 43.2 years, partly because of the conflict, the AIDS pandemic --the estimated adult sero-prevalence rate is 8%-- and tropical diseases.

Journalists often present the conflict as a struggle between the majority, Hutu, and minority, Tutsi, ethnic groups. However the Hutu and Tutsi have intermarried for generations and are joined by a common language and culture. The conflict is not exclusively ethnic, but is influenced by social class, sub-regional alliances, political affiliation, the heritage of colonial era policies, and even religious extremism. For example, the origins of the conflict reach back to migration of different ethnic groups to the area and to conflict between mainly crop farmers ('Hutus') and cattle herders ('Tutsis') over land use.

The conflict was inflamed in 1993 by the assassination of the country's first democratically elected and the first Hutu president. This was followed by massacres of perhaps as many as 250,000 to 300,000 Burundians and by the flight of several hundred thousands to displaced persons and refugee camps. In 1996, the mainly Tutsi officers staged a coup d'état, and the country was subjected to an international boycott. Burundi has progressed toward peace since 1997, and now has a Hutu President and a bi-ethnic government representing most political parties and most of the guerilla groups.

## THE LITERATURE ON CONFLICT AND MENTAL HEALTH

The psychiatric literature reports that violent conflicts increase the prevalence of mental disorders (Scholte et al. 2004, Hoge et al. 2004, Cardozo et al. 2004). Furthermore, several studies report that populations affected by conflict suffer from mental disorders and also from associated dysfunction, which can last up to five years after the conflict (i.e. Mollica et al. 1999, Ztatzick et al. 1997).

There are relatively few population-based studies of adults in conflict-affected areas and in low-income countries. In one of a handful of examples, Muller, et al., compares 55 internally displaced persons in Uganda who experienced a traumatic event with 58 who did not (quoted from de Jong 2003). The study found a 53% point prevalence of Post-Traumatic Stress Disorder (PTSD) among the adults who experienced trauma, 63% for Generalized Anxiety Disorder, and 71% for Major Depressive Disorder. This compares to a rate of just 5% for anxiety and no PTSD or Major Depressive Disorder among adults who did not experience trauma. In another example, De Jong et al. (2001) study 3,047 refugees in four countries and find a 17% rate of psychopathology among the non traumatized, compared to 44% for those who experienced

violence. This study finds a lifetime prevalence rate of 29% for PTSD, 12% for Depression, 25% for Anxiety Disorder, and 5% for Somatoform disorder.

Traumas induced by low intensity conflict often take the form of generalized but pervasive fear and anxiety, which is usually severe and long lasting. Other symptoms include pain, loss, grief, guilt, hatred, sadness and dissolution of everyday forms of social contact, language and experience (Desjarlais, Eisenberg, Good and Kleinman 1995).

## THE LITERATURE ON MENTAL HEALTH AND SOCIO-ECONOMIC OUTCOMES

According to the World Health Organization (WHO), the sources of dysfunction and disability can be found in the interaction between disease and the external environment. In the context of this study, the disease condition is poor mental health and the major environmental influences are severe poverty and the civil conflict.

The WHO's International Classification of Functioning and Disability (ICF) classifies disability into three broad categories: impairment of body functions and body structures, limitations on activity, and limitations on participation in activities of daily living (WHO 1999). The ICF recognizes that many mental disorders can limit the performance of daily activities, even when there is no evident physical impairment. Patel et al. (1999) find, in data sets for India, Zimbabwe, Chile, and in two data sets for Brazil, that anxiety and depression are associated with disability, even after adjustment for the severity of physical diseases. In the context of this study, the limitations imposed by poor mental health, are, principally, on participation in work and on school enrolment.

Numerous studies link mental disorders and psychosocial suffering to dysfunction, such as limitations on activities. This dysfunction persists over time and decreases productivity (Mollica, et al. 1999), worsens nutritional, health and educational outcomes for children of mothers with these problems and decreases the impact of donor development efforts (Heise et al. 1994).

Several studies find that maternal mental health is closely linked to the education, health and nutritional outcomes of their children. For example, mothers with depression report difficulty in caring for their children (Grupp-Phalen et al. 2003), tend to use emergency units more than the well-baby clinics, miss more pediatric appointments (Flynn et al. 2004, Bartlett et al. 2001), and report their children as having more behavior related problems (Civic and Holt 2000). Moreover, mothers with a probable mental disorder are significantly more likely to have children with depression or behavior problems (Zima et al. 1996, Hartley and Phelan 2003, Olfson et al. 2003) nutritional disorders (Guttmann and Dick 2004, de Miranda et al. 1996, Anoop et al. 2004, Baker-Henningham et al. 2003) as well as health problems (McLennan et al. 2001, Casey et al. 2004).

Hopelessness is a symptom of depression. Economic theory holds that investment in human capital, such as in education, will depend in part on expectations about the return on the investment. In effect, the economic concept of expectations runs parallel to the psychological

concept of hope. Expectations play a major role in economics, and in particular in decision making about investments. If a person feels hopeless, then he will not expect investments to yield a significant return and will not invest in his child's education. Such a person may make less of an effort to search for work. These outcomes can occur even if the expectation of low returns to education or job search are irrational, that is, consistently lower than actual outcomes.

Similarly, the psychological concept of dysfunction resonates with the economic concept of depreciation. If we think of human capital as embodied ability, then psychological dysfunction implies depreciation of such capability. From this perspective, psychological dysfunction depreciates a person's capacity to work, search for employment or make future investment decisions on behalf of his or her children.


# DATA

From October 1998 to March 1999, the Burundi statistical institute (the ISTEEBU) conducted a Household Welfare Survey (Priority Survey) in Burundi. Our study draws on these data.

**Regional and statistical basis for the survey.** For survey purposes, the country was divided into 15 provinces plus the capital city of Bujumbura. These were further sub-divided into 116 rural districts, 2446 hills (communities), and about 8300 sub-hills (villages). The rural areas were divided into 4 agro-ecological strata. After more than 6 years of ethnic conflict, the sampling frame could not be based on the demographic data produced from the 1990 population census. To improve the accuracy of the sample frame, a new list of sub-hills, along with the exact number of households in them, was established from information obtained through an administrative survey, conducted in March 1998, in each district and in Bujumbura. Clusters were defined as the sub-hills in the countryside and census enumeration areas in Bujumbura.

**Figure 1. Sampling Methodology**



116 Rural Districts and 9 Urban Districts (Bujumbura City) in Burundi

586 Clusters Selected Using Probability Proportional to Size Method
134 Urban Clusters (in Bujumbura City)
452 Rural Clusters

525 Clusters Surveyed
134 Urban Clusters Surveyed
391 Rural Clusters Surveyed
**61 Could Not Be Visited For Security Reasons**
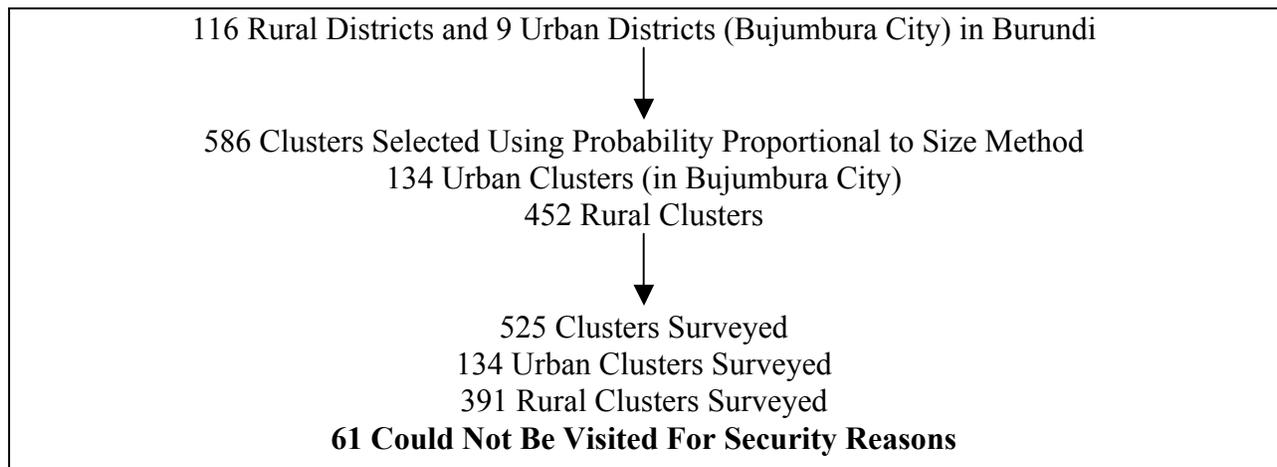
## SAMPLING METHODOLOGY

A two-stage cluster sampling methodology was used in the survey. First, clusters were selected with probability proportional to size (that is, number of households). Altogether, 586 clusters were selected. Of these, 452 were in rural areas and 134 in the city of Bujumbura (Figure 1).

In the second stage, 10 households were selected within each rural cluster and 20 households in each cluster within the city of Bujumbura. All households in a cluster were listed with the support of a traditional or an administrative authority before the selection of 10 or 20 households using a random number table.

In total, 7,200 households were to be selected and surveyed. A questionnaire, similar to the standard World Bank living standard measurement survey was used. The Burundi questionnaire had 11 modules that collected information on education, health, employment status, fertility, housing conditions and consumption. Unlike the standard surveys, the Burundi survey also included a module on the impact of the civil war on daily life, which was the core module used to gather information on mental health status. Two of the modules, one on child nutrition status and the other on mental health were not administered to all the sampled households. To avoid unduly long interview sessions and minimize the workload on the enumerators, the decision was made to administer the mental health section to 50% of the clusters, randomly drawn from clusters in the sample and the child nutrition section to the other 50%.

Each survey team consisted of 7 people, a supervisor with survey experience, 5 enumerators with high school degrees and a driver. Enumerators and supervisors received 10 days of training. In particular, the training related to the mental health section included a one-day field trial and was conducted by 4 psychiatrists from the University of Burundi.

Since the mental health section was the last part of the questionnaire to be administered, the enumerators were advised to request the permission of the main respondent (the household head or the spouse) to privately interview 3 other household members who were 10 years or older and available during the visit. In rural areas, the questionnaire of the entire survey was completed on average within 2 hours time, and eligible household members absent during the visit were not included in the mental heath section. The total number of observations with information on mental health is 5,599. The results that follow use all these observations, even when there are repeated observations within the same household. The reason is that our study is of mental health of the population and not only of household heads.

## MENTAL HEALTH QUESTIONNAIRE

The mental heath questionnaire is derived from the General Health Questionnaire, 12 question version (Box 1). A French version of the mental heath section of the questionnaire (GHQ-12) received from the WHO office in Geneva was translated into Kirundi (the national language in Burundi) and was revised and pilot-tested in Bujumbura. The translation of the mental health section benefited from the assistance of psychologists and psychiatrists from the University of Burundi. The review by the local mental health professionals led to revisions in the

questionnaire. While the revisions may have altered the direct comparability of our results to the general GHQ12 elsewhere, the core spirit of the GHQ12 with regard to obtaining information on mental distress and general feeling of hopelessness is maintained.

**Box 1. Screening for Poor Mental Health in General Populations.**

The General Health Questionnaire (GHQ) has been widely used across the world as a screening instrument for mental disorders in general outpatient departments, at the primary care level, and in the general population. The purpose of the instrument is to obtain a general picture of the mental well-being of a person or a population. The 12 item version is brief, simple, easy to complete and it's application as a screening tool is well documented, both for the developed and developing countries (Montazeri et al., 2003, Furukawa et al., 2002, Goldberg et al., 1997 el-Rufaie et al., 1996, Schmitz et al.,1999, Garyfallos et al.,1991).

The GHQ-12 is a consistent and reliable instrument when used in the general population (Montazeri et al, 2003). However, it is not a tool used for making a specific diagnosis. As a screening instrument, it has been found to be robust as a case detector. The GHQ-12 is sensitive to socio-economic status (McCabe et al 1996), useful for measurement of the psychological well-being of adolescents (Tait et al., 2003) and age and educational level have no significant effect on the validity (Goldberg et al., 1997).

**INTEGER RECORDING OF RESPONSES TO THE MENTAL HEALTH QUESTIONS**

This study uses the responses to questions 1, 3, 4, 5, 7, 8, 9, and 10 of the mental health module of the questionnaire (attached in Annex 1). Question 11 has little to do with mental health; and question 12 is difficult to interpret in a mental health context. We note that for some of the questions, there are three possible responses, while for others, there are two.

To estimate correlation between these variables, we recoded them as follows: for questions with 3 distinct categories of response, 0=not at all, 1=once in a while, and 2=often. For questions where the responses are 'yes' or 'no', 0=yes, and 1=no.

In this way, a larger number always indicates a poorer level of mental health. Tables II.B and II.C, and II.D in Annex II report the distribution of the responses to each of these eight questions. As regards question 4, on the feeling of usefulness, no natural ordering of the responses is obvious, which makes it difficult to use for this analyses.

# CONSTRUCTION OF THE INDICATORS OF MENTAL HEALTH

In this section, we formally define two indictors of poor mental health, d*istress* and *pessimism*. To start, we compute the Pearson correlations between the first seven questions (Table 1).

**Table 1. Pearson correlation coefficients**

(On a scale of 0 to 1)

| Questions | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| 1. Sleepless | 1 | | | | | | |
| 2. Anxious | 0.36 | 1 | | | | | |
| 3. Sad and discouraged | 0.47 | 0.39 | 1 | | | | |
| 4. Angry for no reason | 0.28 | 0.38 | 0.42 | 1 | | | |
| 5. Able to overcome difficulties | 0.23 | 0.17 | 0.34 | 0.20 | 1 | | |
| 6. Continue current activities | 0.20 | 0.15 | 0.28 | 0.21 | 0.29 | 1 | |
| 7. Think of future | 0.05 | 0.02 | 0.10 | 0.07 | 0.18 | 0.30 | 1 |

The numbers in Table 1 suggest that the responses to the first four questions are strongly correlated with each other, and this is also the case for the latter three, while the correlation across the two groups of questions is more modest, with a few exceptions. Using any of the two possible dichotomizations of the first four questions does not change the correlation patterns, but it does reduce some of the correlation coefficients.

A principal components analysis reveals that there are indeed different underlying factors at play (Box 2). Using a principal components analysis with varimax rotation, we find that the responses to the first four questions are aspects of the same underlying phenomenon, which we refer to here as *Distress*, while the last three questions are realizations of another underlying phenomenon, which we will refer to as *Pessimism*. The results for the principal components analysis appear below (Table 2).

**Box 2. Principal Components Factors with Varimax Rotation**

The purpose of principal components analysis is to reduce the number of variables and detect relations between variables. We use it to identify combinations of the variables that are so closely correlated that they can be said to be different manifestations of the same latent phenomenon (the underlying factor). When one factor is found, there remains some variability in the data; that is, not all the covariance between the variables will be captured by one factor. Because this factor is defined to capture the variance not accounted for by the first factor, all factors will be independent. However, all factors will depend on all the variables. The purpose of Varimax rotation is to rotate these factors – maintaining orthogonality – so that each factor depends mainly on a subset of the variables, that is, the purpose of factor rotation is to fit the factors better to the variables.

**Table 2. Rotated Factor Loading Coefficients, Varimaz Rotation**

| Questions | Factor 1 Distress | Factor 2 Pessimism | Uniqueness |
|---|---|---|---|
| 1. Sleepless | **0.67** | 0.10 | 0.54 |
| 2. Anxious | **0.73** | -0.04 | 0.47 |
| 3. Sad and discouraged | **0.74** | 0.18 | 0.41 |
| 4. Angry for no reason | **0.66** | 0.06 | 0.56 |
| 5. Able to overcome difficulties | 0.32 | **0.57** | 0.57 |
| 6. Continue current activities | 0.19 | **0.73** | 0.43 |
| 7. Think of future | -0.11 | **0.77** | 0.39 |

Note: Figures in bold are statistically significantly different from zero at a 5% level.

Cronbach's Alpha (Cronbach; 1951) reveals basically the same thing. Alpha equals 0.71 for the first four questions, but it is only 0.50 for the last three questions, suggesting that they are not as closely related as the first four (see Box 3). Nevertheless, the principal components analysis identifies only two factors. For this reason, we have generated two variables, Distress and Pessimism.

**Box 3. Cronbach's Alpha.**

The formula for calculating Cronbach alpha is:

$$\alpha = \frac{N \cdot r}{1 + (N-1) \cdot r}$$

where $r$ is the average inter-item correlation coefficient, and $N$ the number of variables used. If the data has a multi-dimensional structure, that is, if the answers to the questions suggest that there are several dimensions to the 'mental health' aspect, alpha will be low, and the suggestion in the literature is to conduct a factor or principal components analysis and compute alpha for the subsets of variables belonging to each identified factor. If the average inter-item correlation is large, it implies that the items are measuring the same phenomenon – distress in our case. Nunnaly (1978) reports 0.7 as a lower acceptable limit for a measure to be internally consistent.

These variables are defined as follows:
- *Distress* is the sum of the responses to the questions 'sleepless', 'anxious', 'sad and discouraged', and 'angry for no reason'.
- *Pessimism* is the sum of the responses to the three questions 'able to overcome difficulties', continue current activities', and 'think of future'.

The variable *Distress* takes values of the integers 0 to 8, with 8 signifying the largest level of distress. The distribution of this variable is as follows (Table 3).

## Table 3. Tabulation of *Distress*

(Value of Distress and Frequency are absolute numbers, probabilities are in percentage points)

| Value of Distress | Frequency | Percent Probability | Cumulative probability |
|---|---|---|---|
| 0 | 1912 | 34.15 | 34.15 |
| 1 | 1032 | 18.43 | 52.58 |
| 2 | 912 | 16.29 | 68.87 |
| 3 | 659 | 11.77 | 80.64 |
| 4 | 488 | 8.72 | 89.36 |
| 5 | 276 | 4.93 | 94.28 |
| 6 | 165 | 2.95 | 97.23 |
| 7 | 92 | 1.64 | 98.87 |
| 8 | 63 | 1.13 | 100.00 |

Almost a third of the sample scored 3 or above, while close to 20% scored 4 or above. 34% never experienced any of these problems, while only slightly above 1% experienced all four problems frequently. About 75% never had any of these problems, while the remaining 25% had at least one of them; only 6% had two or more of these problems.

The distribution of *Pessimism* is shown in Table 4.

## Table 4. Tabulation of *Pessimism*

(Value of Distress and Frequency are absolute numbers, probabilities are in percentage points)

| Value of Lack of Conf. | Frequency | Percent probability | Cumulative probability |
|---|---|---|---|
| 0 | 4222 | 75.41 | 75.41 |
| 1 | 1024 | 18.29 | 93.70 |
| 2 | 229 | 4.09 | 97.79 |
| 3 | 124 | 2.21 | 100.00 |

The Spearman correlation coefficients between the two indicators as well as between each of them and Question 12 (Has the current crisis affected your life?), are:

*Distress, Pessimism* = 0.30
*Distress*, Affected (Q 12) = 0.30
*Pessimism*, Affected (Q 12) = 0.12.

# DESCRIPTIVE STATISTICS

This section describes the averages of the indexes of *Distress* and *Pessimism* for different population sub-groups. (The means of all the variables appear in Annex Table II.C).

The Goldberg method is to use the means as cut-off points for calculation of prevalence rates (Goldberg and Williams, 1988). The overall (weighted) sample averages of the two variables are 2.1 for *Distress* and 0.33 for *Pessimism* (Table 5). On this basis, the prevalence rate for distress is 36% and the rate for Pessimism is 25%. Both *Distress* and *Pessimism* increase with age. For *Distress*, the increase stops at age 30, while for *Pessimism* the increase continues. A joint test of equality of these averages strongly rejects the hypothesis that they are equal; hence, these differences are statistically significant.

We find that on average, men experience higher (worse) levels of *Distress* and *Pessimism* than women. But when we narrow the focus to heads of households, average levels of *Distress* and *Pessimism* for women are worse (significantly higher average score compared even to the average for all women). Individuals who are divorced, separated or widowed exhibit higher levels of *Distress* and *Pessimism* than either married or single persons (Table 5).

Turning to household status, Heads of Households experience higher average *Distress* and *Pessimism* than the other household members. Interestingly, the gender difference is reversed among household heads, in the sense that female heads of Household experience higher average *Distress* and *Pessimism* than male heads of households. Turning to marital status, single people experience better average mental health than the sample average, while those who are divorced, separated, or widowed, on average experience poorer mental health than the sample average.

Residents of Bujumbura experience relatively good mental health, scoring very low for *Distress* and *Pessimism*. Levels of *Distress* are low (good mental health), on the Plains. Residents of the Mountains and Transitions and Western Plateau report the highest levels of *Distress*, while Bujumbura residents reported the lowest level (Table 6).

**Table 5. Averages of the variables *Distress* and *Pessimism* for different sub-populations**

(The table reports averages of variables across sub-groups of the sample in absolute terms; it also reports the estimated probabilities 'P' (tests of significance), on a scale from 0 to 1, of the hypothesis that the means are equal.)

| | *Distress* | P(equality of averages) | *Pessimism* | P(equality of averages) |
|---|---|---|---|---|
| *Entire sample* | 2.10 | | 0.33 | |
| *Age groups* | | | | |
| Aged 10-19 | 1.58 | | 0.23 | |
| Aged 20-29 | 1.97 | | 0.31 | |
| Aged 30-39 | 2.43 | 0.0000 | 0.32 | 0.0001 |
| Aged 40-49 | 2.27 | | 0.36 | |
| Aged 50+ | 2.46 | | 0.54 | |
| *Gender* | | | | |
| Female | 1.95 | 0.0232 | 0.28 | 0.0043 |
| Male | 2.23 | | 0.37 | |
| *Status in the household*: | | | | |
| Head of household | 2.42 | | 0.39 | |
| Spouse | 2.15 | | 0.35 | |
| Son | 1.58 | 0.0000 | 0.23 | 0.0001 |
| Daughter | 1.63 | | 0.25 | |
| Other | 1.95 | | 0.21 | |
| *Gender of head of household* | | 0.0000 | | 0.0001 |
| Female Head | 3.29 | | 0.65 | |
| Male Head | 2.11 | | 0.31 | |
| *Marital status*: | | | | |
| Married | 2.16 | | 0.32 | |
| Single | 1.65 | 0.0000 | 0.23 | 0.0000 |
| Divorced/Separated/ Widowed | 3.10 | | 0.66 | |

Note: The variable *Distress* takes the value of the integers 0-8, while *Pessimism* takes values 0,1,2,3. The test of the joint equality of the sub-population averages is a Wald test. The number reported is the probability that the means are equal across the sub-populations listed to the left of the test statistic. Sample weights are used in both calculations of means and in the Wald tests.

## Table 6. Average *Distress* and *Pessimism* by Geographical Region

(The table reports averages of variables across sub-groups of the sample in absolute terms; it also reports the estimated probabilities 'P' (tests of significance), on a scale from 0 to 1, of the hypothesis that the means are equal.)

| *Regions* | *Distress* | P(equality of averages) | *Pessimism* | P(equality of averages) |
|---|---|---|---|---|
| Bujumbura | 1.29 | | 0.25 | |
| Plains | 1.64 | | 0.33 | |
| Mountains & Transition | 2.53 | 0.0000 | 0.30 | 0.0000 |
| Western plateau | 2.26 | | 0.40 | |
| Eastern plateau | 1.89 | | 0.33 | |

Note: The variable *Distress takes* the integer values 0 to 8, while *Pessimism* takes the values 0,1,2,3. The test of the joint equality of the sub-population averages is a Wald test. The number reported is the probability that the means are equal across the sub-populations listed to the left of the test statistic. Sample weights are used in both calculations of means and in the Wald tests.

We also examine the relationship between migration and mental health (Table 7). Of the 5,599 people in the sample, only 465 moved during the 12 months before the survey. There are no significant differences between migrants and non-migrants with respect to the averages for both *Distress* and *Pessimism*.

## Table 7. Average *Distress* and *Pessimism* for migrants and non-migrants

(The table reports averages of variables across sub-groups of the sample in absolute terms; it also reports the estimated probabilities 'P' (tests of significance), on a scale from 0 to 1, of the hypothesis that the means are equal.)

| | *Distress* | P(equality of averages) | *Pessimism* | P(equality of averages) |
|---|---|---|---|---|
| Lived here 12 months ago | 2.09 | | 0.34 | |
| Did not live here 12 months ago | 2.22 | 0.7195 | 0.26 | 0.2239 |
| If yes, came from | | | | |
|   Same hill or district | 2.43 | | 0.37 | |
|   Other hill, same community | 2.94 | | 0.11 | |
|   Other community, same province | 1.79 | 0.0158 | 0.27 | 0.0797 |
|   Other province | 1.29 | | 0.23 | |
|   Abroad | 1.04 | | 0.34 | |
|   Household did not exist | 2.26 | | 0.10 | |

Note: The variable *Distress* takes the integer values 0 to 8, while *Pessimism* takes the values 0,1,2,3. The test of the joint equality of the sub-population averages is a Wald test. The number reported is the probability that the means are equal across the sub-populations listed to the left of the test statistic. Sample weights are used in both calculations of means and in the Wald tests.

Among those who migrate, there are some significant differences in the average *Distress* levels with respect to the distance of migration. Levels of *Distress* levels are highest in households that moved the shortest distance. But for *Pessimism*, there is no obvious pattern.

Table 8 reports statistics relating to the employment status and to occupation. Note that the statistics cover people aged 16 or older, that is, the statistics reflect information from 4,877 of the 5,599 individuals that were asked about their mental health.

### Table 8. Averages of *Distress* and *Pessimism* for Employed, Unemployed, and for Occupational Groups

(The table reports averages of variables across sub-groups of the sample in absolute terms; it also reports the estimated probabilities 'P' (tests of significance), on a scale from 0 to 1, of the hypothesis that the means are equal.)

| Labor market status | Distress | P(equality of averages) | Pessimism | P(equality of averages) |
|---|---|---|---|---|
| **Current employment & unemp.** | | | | |
| Currently working | 2.23 | 0.5307 | 0.34 | 0.2010 |
| Not currently working | 2.11 | | 0.44 | |
| **Long-term emp. & unemp.** | | | | |
| Working past 12 months | 2.23 | 0.5129 | 0.35 | 0.8057 |
| Not working past 12 months | 2.10 | | 0.36 | |
| **Occupation:** | | | | |
| Farmer | 2.25 | | 0.33 | |
| Public | 2.41 | | 0.37 | |
| Para-statal | 1.43 | | 0.53 | |
| Private sector farming | 3.42 | | 0.43 | |
| Private sector non-farming | 1.52 | 0.0000 | 0.20 | 0.0000 |
| Arts & crafts | 2.53 | | 1.39 | |
| Trader or vendor | 2.58 | | 0.45 | |
| Home help | 1.89 | | 0.17 | |
| Apprentice | 4.97 | | 1.97 | |
| Other occupation | 1.12 | | 0.18 | |

Note: The variable *Distress* takes the integer values 0 to 8, while *Pessimism* takes the values 0,1,2,3. The test of the joint equality of the sub-population averages is a Wald test. The number reported is the probability that the means are equal across the sub-populations listed to the left of the test statistic. Sample weights are used in both calculations of means and in the Wald tests.

There is no detectable difference in the average mental health of employed and unemployed people, irrespective of the definition of employment used. However for employed people, there are significant differences in both mental health variables across occupations. In general, farmers have relatively poor average levels of well being, as do apprentices and the 'Arts & Crafts' and 'Trader or Vendor' occupations.

Next, we examine the relationship between levels of education and the indicators of poor mental health (Table 9).  There is a strong, if not uniform, tendency for *Distress* to decline with the level of education. For *Pessimism*, the tendency is similar, but less pronounced. Some of these differences, it should be noted, are caused by small numbers of individuals in some of the cells.

**Table 9. Averages *Distress* and *Pessimism* for Groups with Different Levels of Education**

(The table reports averages of variables across sub-groups of the sample in absolute terms; it also reports the estimated probabilities 'P' (tests of significance), on a scale from 0 to 1, of the hypothesis that the means are equal.)

| | *Distress* | P(equality of averages) | *Pessimism* | P(equality of averages) |
|---|---|---|---|---|
| *Education:* | | | | |
| No Schooling | 2.31 | | 0.40 | |
| 14th grade primary school | 2.44 | | 0.41 | |
| 13th grade primary school | 2.35 | | 0.21 | |
| 12th grade primary school | 2.29 | | 0.21 | |
| 11th grade primary school | 2.67 | | 0.32 | |
| 10th grade primary school | 1.95 | | 0.33 | |
| 9th grade primary school | 2.35 | | 0.27 | |
| 8th grade secondary school | 1.19 | 0.0000 | 0.28 | 0.0000 |
| 7th grade secondary school | 2.36 | | 0.04 | |
| 6th grade secondary school | 1.85 | | 0.07 | |
| 5th grade secondary school | 1.01 | | 0.09 | |
| 4th grade secondary school | 0.98 | | 0.20 | |
| 3th grade secondary school | 1.12 | | 0.23 | |
| 2th grade secondary school | 1.68 | | 0.29 | |
| 1th grade secondary school | 0.74 | | 0.16 | |
| Higher education | 0.80 | | 0.12 | |
| *Literacy:* | | | 0.0139 | |
| Can read and write | 2.05 | 0.0139 | 0.27 | 0.0000 |
| Can not read and write | 2.39 | | 0.42 | |

Note: 4877 observations.  The variable *Distress* takes the integer values 0 to 8, while *Pessimism* takes the values 0,1,2,3. The test of the joint equality of the sub-population averages is a Wald test. The number reported is the probability that the means are equal across the sub-populations listed above the test statistic. Sample weights are used in both calculations of means and in the Wald tests.

We also examine the association between the mental health of parents in the household and the education of the children in the households (Table 10).  Here, we include *all* children aged 5-15 in households where the household head answered the questionnaire on mental health.  These amount to 3,868 children.  There is a fairly large difference in the average levels of *Distress* and *Pessimism* among those who are literate; those who can read and write have significantly better mental health than those who cannot.  Mental health appears worse among those household heads whose children do not attend school and whose household heads cannot read and write.  However, this difference is statistically significant only for the variable *Pessimism*.

**Table 10. Averages of *Distress* and *Pessimism* for household heads as a function of schooling variables of their children**

(The table reports averages of variables across sub-groups of the sample in absolute terms; it also reports the estimated probabilities 'P' (tests of significance), on a scale from 0 to 1, of the hypothesis that the means are equal.)

|  | *Distress* | P(equality of averages) | *Pessimism* | P(equality of averages |
|---|---|---|---|---|
| **School attendance:** |  |  |  |  |
| Attending school | 2.29 | 0.3360 | 0.34 | 0.0241 |
| Not attending School | 2.42 |  | 0.43 |  |
| **Girls' school attendance:** |  |  |  |  |
| Attending school, girls | 2.29 | 0.3630 | 0.33 | 0.0178 |
| Not attending school, girls | 2.44 |  | 0.47 |  |
| **Boys' school attendance** |  |  |  |  |
| Attending school, boys | 2.28 | 0.5981 | 0.35 | 0.5431 |
| Not attending school, boys | 2.39 |  | 0.38 |  |
| **Ability to read & write:** |  |  |  |  |
| Can read and write | 2.26 | 0.4502 | 0.35 | 0.2988 |
| Cannot read and write | 2.38 |  | 0.40 |  |
| **Girls' ability to read and write:** |  |  |  |  |
| Can read and write, girls | 2.34 | 0.8184 | 0.37 | 0.3630 |
| Cannot read and write | 2.39 |  | 0.43 |  |
| **Boys' ability to read and write:** |  |  |  |  |
| Can read and write, boys | 2.16 | 0.3380 | 0.34 | 0.5150 |
| Cannot read and write | 2.37 |  | 0.37 |  |

Note: 3868 observations. The variable *Distress* takes the integer values 0 to 8, while *Pessimism* takes the values 0,1,2,3. The test of the joint equality of the sub-population averages is a Wald test. The number reported is the probability that the means are equal across the sub-populations listed above the test statistic. Sample weights are used in both calculations of means and in the Wald tests.

Next, we examine the relationship between the indicators of poor mental health and health & sickness (Table 11). Mental health is significantly worse among people who were sick during the 15 days preceding the survey than for those who were healthy. For people who report sickness, however, there is no difference in the mental health of those consulting a practitioner and those who do not. Finally, for those who consult a practitioner, there is some difference in mental health for different choices of practitioner. In general, those choosing nurses and traditional healers or practitioners have poorer mental health, compared to those choosing to consult a doctor.

**Table 11. Averages of *Distress* and *Pessimism* for Health & Sick People**

(The table reports averages of variables across sub-groups of the sample in absolute terms; it also reports the estimated probabilities 'P' (tests of significance), on a scale from 0 to 1, of the hypothesis that the means are equal.)

| | *Distress* | P(equality of averages) | *Pessimism* | P(equality of averages) |
|---|---|---|---|---|
| **Health & sickness** | | | | |
| Healthy past 15 days | 2.03 | 0.0000 | 0.32 | 0.0201 |
| Sick past 15 days | 2.80 | | 0.44 | |
| **If Yes, consult practitioner?** | | | | |
| Yes | 2.77 | 0.6820 | 0.41 | 0.4376 |
| No | 2.85 | | 0.48 | |
| **If Yes,** | | | | |
| Traditional Healer | 2.84 | | 0.81 | |
| Traditional Practitioner | 4 | | 1.12 | |
| Matron | 2 | 0.0000 | . | 0.0000 |
| Nurse | 2.76 | | 0.42 | |
| Doctor | 1.97 | | 0.28 | |
| Chemist | 1.90 | | 0.54 | |
| Other | 4.00 | | 0.12 | |

Note: 4877 observations. The variable *Distress* takes the integer values 0 to 8, while *Pessimism* takes the values 0,1,2,3. The test of the joint equality of the sub-population averages is a Wald test. The number reported is the probability that the means are equal across the sub-populations listed above the test statistic. Sample weights are used in both calculations of means and in the Wald tests.

Finally, we investigate the relationship between *Distress* and *Pessimism* and poverty. We do this by using a measure of the total monthly household expenditures on all goods divided by the square root of the household size. This is a standard technique for correcting for economies of scale in households.[1] The relationship between *Distress* and deciles of the expenditures distribution for the household appears in Figure 2, while the relationship between *Pessimism* and the deciles of expenditure appears in Figure 3. Please note that this figure uses the raw, rather than the weighted data.

We observe that the level of *Distress* is high up to and including the seventh decile of the distribution of expenditures, and then it is significantly lower for the three upper deciles. Moreover, it is evident *Distress* is highest among those in the lowest decile, but the relation between expenditures and *Distress* is, surprisingly, not monotonic. In fact, from the first to the seventh decile, there appears to be a plateau between *Distress* and expenditures, with a sudden decline for the upper three deciles.

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[1] Alternatively, we might have used the OECD definition of adult equivalents, but the results are similar to those obtained below.

In Figure 2, *Pessimism* and deciles of expenditure, the relationship appears to be much stronger and hold over the entire expenditure distribution, such that lower expenditures appear to be uniformly associated with higher levels of *Pessimism*.

The relationships reported in this section may be merely apparent and caused by, for example, regional differences. As an example, it may be that the relationship between mental health and expenditures appears because incomes are highest in Bujumbura, which also has the highest levels of mental health.  When we control for this, the relationship may disappear. To adjust for such patterns and interdependencies, we conduct multivariate analyses, which we turn to in the next section.

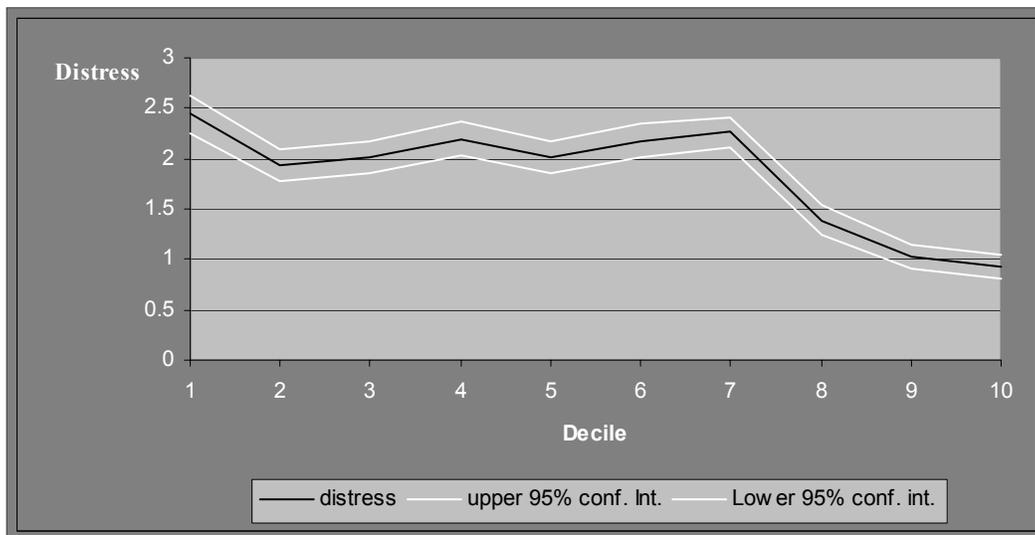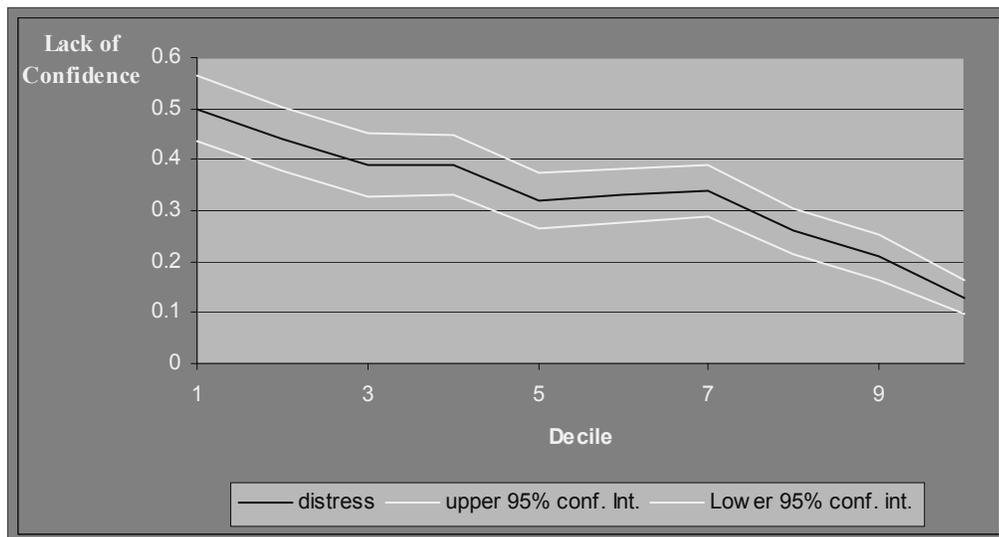**Figure 2.  Distress and deciles of expenditures per adult equivalent in the household**



**Figure 3. Pessimism and deciles of expenditures per adult equivalent in the household**



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# MULTIVARIATE ANALYSES OF MENTAL HEALTH AND SOCIO-ECONOMIC OUTCOMES

In this section, we investigate the relationship between the indicators of poor mental health, *Distress* and *Pessimism,* and several social and economic outcomes such as education, employment, and consumption. In all cases we control for influences from other variables. Specifically, we conduct multivariate statistical analyses, in which each social and economic outcome, in turn, is the dependent variable, and include the variables *Distress* and *Pessimism* as explanatory variables, alongside the demographic, regional, and other relevant characteristics of households.

We use the indicators of poor mental health that were constructed in section 3. That is, we use the variable *Distress*, which takes values of the integers 0 to 8, with 8 indicating the highest level of distress, and we use the variable *Pessimism*, which takes the values of the integers 0 to 3, with 3 indicating severe *Pessimism*. Higher values of the indicators always mean poorer mental health.

**Household expenditures.** First we investigate the extent to which the indicators of mental health are associated with broad measures of economic outcomes, such as poverty and employment. Table 12 presents the estimated relationship between the log of household expenditure, the indicators of poor mental health, and other variables. Household expenditures are an overall measure of economic health, so this is in effect a model of the link between poor mental health and poverty.

The estimated coefficients of the indicators of poor mental health are not statistically significantly different from zero. These regression results suggest that poverty is more closely associated with region of residence and with education than with the indicators of poor mental health. This changes the relationship observed in Figures 1 & 2; without adjustment for these influences, the indicators of mental health worsened with a decrease in the level of expenditures per person.

**Table 12. A Linear Regression Model of Log Expenditures in Household per Adult Equivalent**

| Right hand side variables | Coefficient | Standard error |
|---|---|---|
| *Distress* | -0.0028 | 0.0097 |
| *Pessimism* | -0.0163 | 0.0279 |
| Bujumbura | **1.1326** | **0.0653** |
| Plains | **-0.2255** | **0.0439** |
| West | **-0.1592** | **0.0501** |
| East | **-0.1113** | **0.0502** |
| Age | 0.0054 | 0.0092 |
| Age squared | 0.0000 | 0.0001 |
| Female | -0.3237 | 0.2417 |
| Spouse | *0.3968* | *0.2439* |
| Daughter | *0.3986* | *0.2195* |
| Son | -0.1366 | 0.1284 |
| Other | 0.1213 | 0.1990 |
| Female head | 0.2133 | 0.2719 |
| Single | -0.1070 | 0.1093 |
| Divorced, separated, widowed | **-0.2731** | **0.0883** |
| In school | **0.5951** | **0.0832** |
| Literacy | **0.1329** | **0.0400** |
| Schooling (attended school as a child) | **0.0449** | **0.0065** |
| Constant | **9.0054** | **0.1889** |

Note: 4877 observations, selecting those aged above 15. Reference categories are 'Mountains & transitions', 'Household head', 'Married', 'Not in school', 'Can not read and write'. Numbers in bold are significant at the 5% level, while those in italics are significant at the 10% level.

**Employment**. Table 13 reports the estimated relationship between 'employment during the past week' (which takes the value 1 if the individual was employed and 0 otherwise), the indicators of mental health, and the other variables. The employment variable is modeled by use of a Logit model, and the coefficients reported are the log odds ratios (the ratio of the probability of being employed to not being employed). Hence, a negative sign of the estimated coefficients imply that an increase in *Distress* and *Pessimism* variables are associated with a lower probability of employment, and these coefficients are statistically significantly different from zero.

**Table 13. A Logit Model of Employment during the past week**

| Right-hand side variables | Coefficient | Standard error |
|---|---|---|
| *Distress* | **-0.1432** | **0.0568** |
| *Pessimism* | **-0.5973** | **0.1853** |
| Bujumbura | **-3.3984** | **0.3999** |
| Plains | 0.7132 | 0.5659 |
| West | *1.0349* | *0.6018* |
| East | -0.4231 | 0.5066 |
| Age | **0.3091** | **0.0598** |
| Age squared | **-0.0041** | **0.0007** |
| Female | -0.3998 | 0.6124 |
| Spouse | -0.6722 | 0.7974 |
| Daughter | -0.1876 | 1.0149 |
| Son | 0.1608 | 0.7253 |
| Other | -0.8683 | 0.6944 |
| Female head | 1.1486 | 0.9427 |
| Single | -0.2644 | 0.5786 |
| Divorced, separated, widowed | -0.1862 | 0.7294 |
| In school | **-11.7705** | **1.1213** |
| Literacy | 0.0111 | 0.3351 |
| Constant | 0.0310 | 1.2543 |

Note: 4877 observations, selecting those aged above 15. Reference categories are 'Mountains & transitions', 'Household head', 'Married', 'Not in school', 'Can not read and write'. Numbers in bold are significant at the 5% level, while those in italics are significant at the 10% level.

The table suggests that people living in Bujumbura are less likely to be employed, while those living in the Western region are more likely to be so. This supports the hypothesis that poor mental health leads to higher levels of unemployment, rather than vice-versa. The probability of employment increases with age until the age of 39, and then decreases with age. Those who are in school are less likely to work. We also estimated this equation using morbidity as an additional explanatory variable, but this did not significantly change the results.

**Education.** Table 14 presents the estimated relationship between school attendance of children aged 5 to 15 and the indicators of poor mental health of the head of their household. (If the child attends school, the variable is 1, if not, 0.) The level of *Distress* of the head of household is not associated with school attendance, but *Pessimism* is negatively associated with school attendance and the estimated coefficient is statistically significant.

**Table 14. A Logit Model of The School Attendance of Children Aged 5-15 as a Function of the Characteristics of Heads of Households**

|  | *Coefficient* | *Standard error* |
|---|---|---|
| *Distress* | -0.0570 | 0.0481 |
| *Pessimism* | **-0.2163** | **0.0951** |
| Bujumbura | **1.5598** | **0.2430** |
| Plains | **-1.1427** | **0.1927** |
| West | **-0.6267** | **0.1714** |
| East | **-1.1757** | **0.1847** |
| Female head | **0.4339** | **0.1812** |
| Schooling | **0.1103** | **0.0259** |
| Age of child | **2.2174** | **0.1722** |
| Age of child squared | **-0.0998** | **0.0086** |
| Girl | **-0.5452** | **0.1526** |
| Constant | **-10.7729** | **0.8275** |

Note: 3868 observations, selecting those aged 5-15. Reference categories are 'Mountains & transitions', 'Male head of household', 'Boy'. Numbers in bold are significant at the 5% level, while those in italics are significant at the 10% level.

Moreover, children in Bujumbura are more likely to attend school than others, while school attendance is lowest in the Eastern region and on the Plains. Children from female-headed households are more likely to attend school than those from male-headed households. Children from households where the head has more schooling are more likely to attend school. Furthermore, school attendance increases with the age of the child until age 11, and then decreases. Finally, girls are less likely to attend school than boys.

**Literacy**. In Table 15, we investigate the relationship between the literacy of children aged 5 to 15, and the mental health of the head of their household. Children in households in Bujumbura are more likely, and those on the Plains least likely, to be able to read and write. Children from households where the head has more schooling are more likely to be able to read and write. As would be expected, literacy increases with the age of the child. We do not find any significant correlation between literacy status of children and poor mental health of the household head. This suggests that the mental health of a household head has a greater influence on whether children enter school, than on what children learn once they are in school.

**Table 15. A Logit Model of The Literacy of Children Aged 5-15 as a Function of the Characteristics of Heads of Households**

| Right-hand side variables | Coefficient | Standard error |
|---|---|---|
| *Distress* | 0.0377 | 0.0565 |
| *Pessimism* | -0.2178 | 0.1588 |
| Bujumbura | **1.5992** | **0.3019** |
| Plains | **-0.6678** | **0.2619** |
| West | 0.0608 | 0.2222 |
| East | -0.2154 | 0.2444 |
| Female head | -0.1792 | 0.2183 |
| Schooling | **0.0763** | **0.0318** |
| Age | **1.2708** | **0.3579** |
| Age squared | -0.0243 | 0.0156 |
| Girl | 0.1806 | 0.1990 |
| Girl*Distress | 0.4333 | 0.3101 |
| Constant | -12.7094 | 2.0004 |

Note: 3868 observations, selecting those aged 5-15. Reference categories are 'Mountains & transitions', 'Male head of household', 'Boy'. Numbers in bold are significant at the 5% level, while those in italics are significant at the 10% level.

**Morbidity**. Table 16 presents the estimated relationship between morbidity, the indicators of poor mental health, and other variables. Morbidity measures whether a person was sick during the past two weeks: the variable is 1 if the person was sick and 0 otherwise. A higher level of *Distress* is associated with higher morbidity, while *Pessimism* does not appear to be associated with morbidity. People living in the Western region and on the Plains fall sick more frequently than others, and morbidity deceases with age until age 32, and then increases with age. Single persons are more likely to fall sick than others.

**Table 16. A Logit Model of Morbidity**

|  | *Coefficient* | *Standard error* |
|---|---|---|
| *Distress* | **0.1909** | **0.0369** |
| *Pessimism* | 0.0199 | 0.1101 |
| Bujumbura | -0.2155 | 0.2000 |
| Plains | **0.8092** | **0.2025** |
| West | **0.6595** | **0.1890** |
| East | 0.1790 | 0.2075 |
| Age | **-0.0731** | **0.0365** |
| Age squared | **0.0011** | **0.0005** |
| Female | 0.7771 | 0.7171 |
| Spouse | -0.3674 | 0.7347 |
| Daughter | 0.0462 | 0.7633 |
| Son | 0.5760 | 0.5555 |
| Other | 0.2907 | 0.6430 |
| Female head | -0.4644 | 0.8153 |
| Single | **-0.8911** | **0.4526** |
| Divorced, separated, widowed | 0.0103 | 0.3479 |
| In school | -0.6509 | 0.4747 |
| Literacy | 0.0559 | 0.1274 |
| Constant | -1.0312 | 0.7484 |

Note: 4877 observations, selecting those aged above 15. Reference categories are 'Mountains & transitions', 'Household head', 'Married', 'Not in school', 'Can not read and write'. Numbers in bold are significant at the 5% level, while those in italics are significant at the 10% level.

## DISCUSSION

**Summary of the results.** The estimated coefficients in the logit model demonstrate the strength of the links between the indicators of mental ill being and some of the social and economic variables. But the coefficients can be difficult to interpret. Therefore, we use the estimated coefficients to compute elasticities at the sample means (Table 17). The elasticities express the percentage change in the dependent variable associated with a 1 percentage point increase in *Distress* or *Pessimism*.

## Table 17. Elasticity of the Indicators of Poor Mental Health

(Higher levels of the indicators mean poorer levels of mental health)

| Dependent variable: Head of Household's | *Distress* Percentage change | Standard error | *Pessimism* Percentage Change | Standard error. |
|---|---|---|---|---|
| Poverty | -0.0005 | 0.0019 | -0.0006 | 0.0010 |
| Children's school attendance | -0.0525 | 0.0443 | **-0.0348** | **0.0153** |
| Employment last week | **-0.0220** | **0.0096** | **-0.0171** | **0.0061** |
| Morbidity | **0.2980** | **0.0581** | 0.0055 | 0.0307 |
| Literacy | 0.0734 | 0.1100 | -0.0741 | 0.0541 |

Numbers in bold are statistically significantly different from zero at the 5% level.

There is no meaningful relationship between poverty and the indicators of mental health (the estimated elasticities are not statistically different from zero). A 1 percentage point increase (worsening) in the head of households indicator of *Pessimism* is associated with a 0.035 percentage point decline in primary school attendance of the head's children. Moreover, a 1 percentage point increase in *Distress* is associated with a 0.022 percentage point decline in employment and a 1 percentage point increase in *Pessimism* is associated with a 0.017 further decline in employment. Finally, a 1 percentage point increase in *Distress* is associated with a nearly 0.3 percentage point increase in morbidity.

**Statistical issues in interpreting the results.** In several tables above, we present a relationship between the indicators of mental health and labor market, education and poverty (consumption poverty) outcomes. The tables show varying degrees of strength of association between the indicators of poor mental health and these outcomes of interest. While our discussion tends to focus on how mental health explains observed employment, education and poverty outcomes, the results have weaknesses.

A key weakness is the problem of endogeneity. For instance, it is reasonable to argue that it is unemployment status that drives individuals to anxiety and discouragement about the future. The alternative hypothesis that those who suffer poor mental health tend to be more unemployed because they put in less effort in search of work. In our analysis, the education model is less prone to the endogeneity charge than the employment and consumption models, because in the education equation, the dependent variable is the education of the children while the mental health indicators are those of the household head. The same cannot be said of the employment and consumption models.

There is no easy way to resolve the issue of endogenity. Because the data were cross-sectional, it is harder to establish the direction of causality. Two standard remedies, the instrumental variables approach and, alternatively, a long panel, are not feasible in this case. The first is not feasible because it is difficult to find appropriate instruments of mental health that would be independent of employment and consumption, and the second because subsequent surveys did

not revisit the same households, nor did they employ the same survey instruments. We argue that the crisis triggered much of the reported poor mental health and that the outcomes are consequences of poor mental health. Even so, we make no claim of causality in the employment and consumption models, only statistical correlations. In subsequent work, we plan to use repeated cross-section methods to establish stronger linkages between mental health and employment and poverty status.

**Results and the psychiatric literature.** Our questionnaire, derived from the GHQ-12, appears to be an internally valid instrument for testing psychological well-being in a general population. To show this, we compute the Spearman correlation coefficient between *Distress* and *Pessimism,* which is 0.30 –which indicates internal consistency. To further test internal validity, we compute correlations between each of the indicators and Question 12 ("Has the current crisis affected your life?") and find highly statistically significant results.

Moreover, our results are consistent with those from similar studies. Another study that uses the GHQ-12, (Werneke et al. 2000) identified two factors, expressing 'depression' and 'social dysfunction.' This is consistent with our findings, which identified the factors *Distress* and *Pessimism*. The Goldberg method recommends the use of the mean as the cut-off in stimulating point prevalence rates. Using this method, we compute an estimated prevalence rate of 36% for *Distress*, which is broadly consistent with other studies of conflict-affected populations.

The study indicates a link between geographical regions that were more affected by the conflict with a greater rate of poor mental health as well as morbidity. Studies that apply a trauma inventory link higher levels of trauma with higher levels of symptoms of poor mental health (Cardozo et al. 2004, Scholte et al. 2004, Mollica et al. 1999, 2001) as well as a link to higher levels of dysfunction (Cardozo et al. 2004, Mollica et al. 1999, 2001, Zatzick et al. 1997). Even after adjusting for physical disease, common mental disorders have been found to be associated with disability (Patel, et al. 1999).

Like the literature, our study finds a relationship between household expenditures and poor mental health, but once adjustments are made for the influence of demographic and regional variables, this relationship becomes statistically insignificant. A study of the relationship between assets (such as housing) and poor mental health might have found different results. Potential further analysis could carry out sensitivity of the index used. The dataset includes information that could be used to construct an Asset Index. Very different conclusions can be reached, depending on how socio-economic status is measured (Lindelow, 2004).

This study finds a strong tendency for *Distress* to decline with increasing levels of education, and finds, to a lesser extent, the same trend for *Pessimism*. In a meta-analysis of socioeconomic inequalities in depression (Lorant et al. (2003), individuals from lower socio-economic status had an overall odds ratio for being depressed of 1.81, as compared with people with higher status. The same meta-analysis found that within incidence studies, the lowest status group turned out to have 1.24 times greater odds of experiencing a new depressive episode than the highest group. It was also found that once depressed, the lower status individuals were much more likely to persist in depression (odds ratio = 2.06). The dose-response coefficients indicate that for each year of education, the log odds ratio of being decreased by 3%.

Although initial statistical analysis found an association between higher levels of *Distress* and *Pessimism* with the lower deciles of consumption, this association did not hold following multivariate analyses. Studies carried out in the West find this linkage (Berndt et al. 2000, Ettner et al. 1997, Ettner 1996). Studies on poverty and health have found the same association. It would interesting to look at the other datasets of Burundi data, 2001-02 and 2004, to see what the association is, if any.

## CONCLUSIONS

In this paper, we present the statistical characteristics of people who experience poor mental health and conduct a multivariate statistical analysis of the links between indicators of mental health and several socio-economic outcomes.  We find that people with poor mental  health are likely to be older, female, and heads of their household to a larger extent than those with better mental health.  Specifically, female heads of household appear to experience worse mental health than male household heads.  Moreover, the indicators of mental health are closely related to region of residence, being worse among the populations in the 'Mountains and Transitions' region.  People with poor mental health are more likely to be sick than others and their children are less likely to attend school.  Finally, the unadjusted relationship between economic welfare – as measured by household expenditures – and distress is mostly as expected, with the three richest deciles being significantly less distressed than the rest of the population, and the poorest decile being also the most distressed.

The multivariate statistical analyses tries to correct for a number of other factors in measuring the association between mental health and socio-economic outcomes. A number of insights were generated by these analyses.

First, there is a strong and negative association between the probability of being employed and poor mental health.  Moreover, those with poorer mental health are more likely to have been sick during the previous two weeks. There does not appear to be an association between mental health and expenditures per adult equivalent in the household –in the adjusted (multivariate) analysis.  Children in households with heads who experience poorer mental health are less likely to attend school than others.

A number of policy lessons may be drawn from this study. First, it would appear that *Distress* has a very strong regional component, as the regional variables always have strong explanatory power in explaining the socio-economic outcomes.  Perhaps obviously, policies that improve security in these regions may well improve mental health.  Most importantly, both economic and psychological theory suggest that *Pessimism* may cause lower investment in education.  This suggests a need for measures to promote the participation of children in education in conflict-affected regions.  Moreover, it is possible that mental health programs targeted to adults in these regions could contribute to better school enrollment of their children.

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# ANNEX I. THE QUESTIONNAIRE ON MENTAL HEALTH.

SECTION . 12  IMPACT OF THE CRISIS ON DAILY LIFE

|  | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Number | Do you have sleepless nights or nightmares ? | If yes, give two main reasons | Do you feel anxious without any reason? (anxiety, stress) | Do you feel that your activities are useful to you and your community? | Do you feel you can overcome your difficulties ? | If not, give two main reasons |
|  | 1. Often 2. Once in a while 3. Not at all>>3 |  | 1. Often 2. Once in a while 3. Not at all | 1. To myself 2. To me and my associates 3. To my associates 4. No | 1. Yes>>7 2. No |  |
| 1 |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |

SECTION . 12  IMPACT OF THE CRISIS ON DAILY LIFE

| | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|
| Number | Do you feel sad and discouraged ? | Do you feel strong enough to continue your current activities ? | Do you get angry without any apparent reason? | Do you think about future plans? | If yes, where will you settle? (refer to codes below) | Has the current crisis affected your life? | If yes, give two examples. |
| | 1. Often 2. Once in a while 3. Not at all | 1. Yes 2. No | 1. Often 2. Once in a while 3. Not at all | 1. Yes 2. No>>11 | | 1. Yes, strongly>>12 2. Yes, slightly 3. No>>Next person | |
| 1 | | | | | | | a------- b-------- |
| 2 | | | | | | | a--------- b-------- |
| 3 | | | | | | | a-------- b-------- |
| 4 | | | | | | | a--------- b--------- |
| 5 | | | | | | | a--------- b--------- |
| 6 | | | | | | | a--------- b--------- |
| 7 | | | | | | | a--------- b--------- |
| 8 | | | | | | | a--------- b--------- |

# ANNEX II: STATISTICAL TABLES

**Table II.a. Distribution of responses to questions 1, 3, 7, and 9**
(Percentage point share in total responses to question)

| Questions | 0 | 1 | 2 |
|---|---|---|---|
| 1. Sleepless | 52.8 | 31.3 | 15.8 |
| 3. Anxious | 71.7 | 21.4 | 6.9 |
| 7. Sad and discouraged | 56.5 | 30.1 | 13.3 |
| 9. Angry for no reason | 76.5 | 17.9 | 5.6 |

**Table II.B. Distribution of responses to questions 5, 8, and 10**
(Percentage point share in responses to questions)

| Questions | 0 | 1 |
|---|---|---|
| 5. Able to overcome difficulties | 84.9 | 15.1 |
| 8. Continue current activities | 92.0 | 8.0 |
| 9. Think of future | 90.1 | 9.9 |

**Table II.C. Distribution of responses to question 4**
(Percentage point share in responses to question)

| Question | To myself | To me and my associates | To my associates | No |
|---|---|---|---|---|
| Feel useful | 15.1 | 81.1 | 0.6 | 3.2 |

## Table II.D: Summary Statistics

(Means are proportions of the sample population)

| Variable name | Mean | Estimated Standard Error | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | Lower bound | Upper bound |
| female | 0.540 | 0.013 | 0.514 | 0.566 |
| male | 0.460 | 0.013 | 0.434 | 0.486 |
| head | 0.418 | 0.013 | 0.392 | 0.444 |
| spouse | 0.259 | 0.012 | 0.236 | 0.282 |
| daug | 0.145 | 0.009 | 0.127 | 0.163 |
| son | 0.130 | 0.009 | 0.113 | 0.147 |
| other | 0.049 | 0.005 | 0.039 | 0.059 |
| femhead | 0.108 | 0.010 | 0.088 | 0.127 |
| malehead | 0.310 | 0.012 | 0.287 | 0.334 |
| child | 0.166 | 0.010 | 0.148 | 0.185 |
| single | 0.296 | 0.012 | 0.272 | 0.319 |
| married | 0.571 | 0.013 | 0.545 | 0.597 |
| divsepwid | 0.117 | 0.010 | 0.097 | 0.137 |
| inschool | 0.096 | 0.007 | 0.083 | 0.110 |
| schooling | 5.082 | 0.086 | 4.914 | 5.250 |
| literacy | 0.431 | 0.013 | 0.405 | 0.457 |
| sick15 | 0.216 | 0.010 | 0.195 | 0.236 |
| employed | 0.868 | 0.008 | 0.853 | 0.884 |
| nonempl | 0.132 | 0.008 | 0.116 | 0.147 |
| farmer | 0.760 | 0.012 | 0.736 | 0.783 |
| public | 0.018 | 0.004 | 0.010 | 0.026 |
| parastat | 0.011 | 0.005 | 0.002 | 0.020 |
| farmpr~e | 0.003 | 0.001 | 0.001 | 0.004 |
| nfarmp~e | 0.015 | 0.003 | 0.009 | 0.020 |
| crafts | 0.010 | 0.002 | 0.006 | 0.015 |
| homehelp | 0.040 | 0.008 | 0.025 | 0.056 |
| appr | 0.000 | 0.000 | 0.000 | 0.001 |
| otherocc | 0.001 | 0.000 | 0.000 | 0.002 |
| occumiss | 0.131 | 0.008 | 0.115 | 0.147 |
| work12m | 0.863 | 0.008 | 0.847 | 0.879 |
| nonwork | 0.137 | 0.008 | 0.121 | 0.153 |
| age1020 | 0.269 | 0.012 | 0.247 | 0.292 |
| age2030 | 0.161 | 0.008 | 0.146 | 0.176 |
| age3040 | 0.251 | 0.011 | 0.230 | 0.272 |
| age4050 | 0.193 | 0.012 | 0.169 | 0.217 |
| age50 | 0.126 | 0.011 | 0.105 | 0.147 |

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