

Health Shocks and Well-being

Klaus F. Zimmermann¹

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Abstract *Well-being is the ultimate objective of any labour movement. For long, efforts have concentrated on the provision of jobs and decent work conditions. Recently, however, labour economics has been focusing on health, in general, and mental health, in particular. It is time for labour economists to study this challenging issue. Typically, work is not the cause of poor mental health but, often, its cure. Decent work or earnings may help to avoid or moderate mental health issues. While in advanced societies the social effect of decent work may moderate illness, in developing economies sufficient earnings may pave the way out of natural causes of illness. This paper makes the case that natural arsenic poisoning of water affects the well-being of families negatively and causes substantial loss. Recent research for Bangladesh suggests that showing the symptoms of arsenic poisoning reduces well-being substantially. The impacts on mental health can be avoided or reduced through education and the relaxation of financial constraints on families.*

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¹ Harvard University, Cambridge, USA; UNU-MERIT, Maastricht, The Netherlands. Email: klaus.f.zimmermann@gmail.com

Education is the principal tool of socio-economic development and unless all societies are provided with right type of education, adequate in quality and quantity, it will not be possible to tackle satisfactorily the problem of ignorance of health and poverty which afflicts the majority of human beings in the world.

V.V. Giri, quoted by Gopal Bhargava in *Child Labour*, 2003, p. 96.

1. INTRODUCTION

For too long, research efforts in labour economics have concentrated largely on the provision of jobs and decent work conditions. Often, however, poor health conditions lie at the root of inequality and poverty. While it is broadly accepted that general health is important for welfare and work performance, the relevance of mental health is still widely ignored. Therefore, this paper makes a case for the relevance of mental health to labour economics, draws attention to the under-documented fact that mental health problems may arise due to exogenous health shocks, like arsenic poisoning of drinking water, and investigates the effect of drinking arsenic-contaminated water on mental health.

If the arsenic level in water is unsafe, drinking it for a prolonged period can lead to arsenicosis, symptoms of which include black spots on the skin and subsequent illnesses, such as various cancers. This may have consequences not only for the well-being of those affected and their families, but also for their labour supply, productivity and poverty. Education and appropriate information provision may help the affected adjust better, as individuals and in communities.

The empirical background draws on data from a household survey in Bangladesh, a country with wide (natural) arsenic contamination of groundwater, to construct several measures for arsenic contamination. These measures include the actual arsenic level in the respondent's tubewell and past institutional arsenic test results, as well as the collected arsenicosis symptoms of household members and their physical and mental health. It is found that suffering from an arsenicosis symptom is strongly and negatively related to mental health, even more so than from other illnesses.

Section 2 discusses the relevance of mental health issues for labour economics. Section 3 explains how mental health or subjective health well-being can be measured. Section 4 presents the issue of arsenic contamination of drinking water. Section 5 documents the efforts to trace the causal effects of drinking arsenic-contaminated water on the likelihood of experiencing mental health problems. Finally, Section 6 concludes and discusses the policy implications.

2. WHY IS MENTAL HEALTH IMPORTANT FOR LABOUR ECONOMISTS?

People's well-being is the ultimate objective of any labour movement; it always deserves attention. This is of concern not just for philanthropists—mental health and well-being is also a crucial economic factor. Recently, Richard Layard (2013) called mental health 'the new frontier for labour economics', as it affects success in education and in the labour market. A study by the OECD (2012) suggests that mental health is a key factor of well-functioning labour markets and social policies in the OECD. The study proposes policies that simultaneously address mental health and work issues, and provides useful documentation of our knowledge from Western societies and, in particular, Europe. Zimmermann (2015) summarises the major points below and suggests that new empirical research is necessary for an improved understanding of the underlying issues.

To define the challenge (see OECD 2012), about 40 per cent of all cases of sickness among people under the age of 65 in developed countries today are rooted in psychological problems. Mental illness is responsible for more than one-third of total sick days, and is the most common cause of health-related early retirement. Moreover, mental health problems aggravate physical impairments, thus increasing healthcare expenditure for chronic illnesses by more than 30 per cent. Consequently, according to conservative estimates, the economic costs of mental health problems total 3–4 per cent of the annual gross domestic product (GDP) in the European Union (EU). Layard (2013) estimates the broader social costs of mental health problems at 10 per cent of GDP per annum. However, 'contrary to widespread beliefs, the prevalence of mental disorder is not increasing' (OECD 2012, p. 200).

Work can be absolutely crucial for successful treatment; therefore, it is essential that individuals with impaired mental health participate in the labour market. Unfortunately, this important insight rarely finds its way into practical therapeutic approaches. The reality of mental health is not as black-and-white—in terms of being either healthy or ill—as is often understood; there are many shades of grey in between. Many suffer from a temporary deterioration of mental health at some point in their lives, and such cases are more widespread than one would think.

The continuing challenge for independent labour market research is to produce scientific studies that systematically document effective and ineffective interventions. This is particularly important for developing countries, where mental health problems are significant (see, for instance, Harding *et al.* (1980) and, in particular, Patel (2001)) but largely unrecognised and seriously under-researched.

Patel (2001) also finds mental health problems a central component arising from, and reinforcing, inequality. There are disabilities associated with depression and other mental illnesses but not rooted in physical

illnesses. Hence, in developing countries, poor mental health can intensify poverty and inequality. Patel and Kleinman (2003) evaluate a large number of empirical studies to mostly confirm the suggested association between poverty measures and the incidence of mental disorders, most evident with lower levels of education. Das *et al.* (2007) also evaluate the relationship between poverty and mental health using data from nationally representative household surveys in Bosnia and Herzegovina, Indonesia and Mexico, and from special surveys in India and Tonga, but do not find an association between consumption poverty and mental health. In any case, mental health is a substantive issue in developing countries. Margaret Chan, Director General of the World Health Organization (WHO), argues:

'Almost three-quarters of the global burden of neuropsychiatric disorders occur in low- and middle-income countries Positive mental health is linked to a range of development outcomes, including better health status, higher educational achievement, enhanced productivity and earnings, improved interpersonal relationships, better parenting, closer social connections and improved quality of life. Positive mental health is also fundamental to coping with adversity. On the other hand, poor mental health impedes an individual's capacity to realize their potential, work productively, and make a contribution to their community.' (Chan 2010)

However, expenditure on mental health is much smaller in low-income countries than in high-income countries, and proper mental health legislation much weaker (WHO 2011).

3. HOW CAN MENTAL HEALTH BE MEASURED?

The standard mental health measure currently used in the literature is the General Health Questionnaire score (GHQ-12; for an introduction, see Goldberg and Williams (1988)). It consists of 12 questions related to respondents' well-being in the preceding few weeks, such as their ability to concentrate and the occurrence of worry, stress, depression and self-confidence, and aims to identify short-term psychiatric disorders. The setting is (see Goldberg and Williams (1988)):

Have you had any of the following feelings over the last few weeks?

1. Been able to concentrate on whatever you are doing
2. Lost much sleep over worry
3. Felt that you are playing a useful part in things
4. Felt capable of making decisions about things

5. Felt constantly under strain
6. Felt you could not overcome your difficulties
7. Been able to enjoy your normal day to day activities
8. Been able to face up to your problems
9. Been feeling unhappy and depressed
10. Been losing confidence in yourself
11. Been thinking of yourself as a worthless person
12. Been feeling reasonably happy, all things considered

The answer possibilities typically range between 1 and 4, where a higher value refers to ‘truer’. Six of the questions are negatively phrased and the other six are positively phrased. Numerous studies demonstrate the validity of GHQ–12 to measure psychological well-being (Hardy *et al.* 1999; Quek *et al.* 2001; Tait *et al.* 2003; Navarro *et al.* 2007; Sánchez-López and Dresch 2008).

To add up each respondent’s answers to an index score ranging from 0 to 36 to obtain an overall evaluation of the situation, one needs to reverse six of the 12 answers. A possibility is to reverse the individual answers to the negatively phrased sentences. A higher total index score indicates better mental health. The total index score for each individual in a population sample can then be explained by a set of variables to explain the overall well-being of the respondents in a regression analysis, which has been the approach in several studies (Clark 2003; Gardner and Oswald 2007; Akay *et al.* 2014; Chowdhury *et al.* 2015).

4. ARSENICOSIS AND WELL-BEING

Consuming arsenic-contaminated water or food over a prolonged period leads to arsenicosis. The illness has symptoms such as black spots on the skin and subsequent illnesses such as internal cancers (bladder, kidney, lung), neurological effects, hypertension, cardiovascular disease, increases in miscarriage and premature delivery, decreased birth weights, as well as mortality (Smith *et al.* 2000; Kapaj *et al.* 2006; Argos *et al.* 2010). Moreover, arsenic exposure is known to be affiliated negatively with many economic activities—for instance, with household labour supply (Carson *et al.* 2011), children’s test scores (Asadullah and Chaudhury 2011) and work productivity (Pitt *et al.* 2012).

Arsenic is a chemical element that appears naturally in many minerals and is used in the production of pesticides, treated wood products, insecticides and herbicides. Poisoning by arsenic, present naturally in groundwater, affects or has the potential to affect millions worldwide, and especially in Bangladesh, India, China,

the US, Pakistan and Nepal (Mandal and Suzuki 2002; Ravenscroft 2007; Hossain 2006). The country that seems mostly affected is Bangladesh: Flanagan *et al.* (2012) estimate that 45 million people drink water that has a higher arsenic level than the maximum recommended by the WHO and are at risk of arsenicosis, and Smith *et al.* (2000) even call the arsenic contamination of groundwater in Bangladesh ‘the largest poisoning of a population in history’. Sad as it is, the problem occurred only after the United Nations Children’s Fund (UNICEF) initiated the construction of tubewells in the 1970s to replace surface water contaminated with diarrhoea-causing bacteria by seemingly safe drinking water from the ground. Contamination may vary within short distances, as a strongly contaminated tubewell may be close to a low-contaminated one (van Geen *et al.* 2002); therefore, there is substantial uncertainty about water quality.

How can arsenic affect individuals and damage their mental health? The link is the consumption of contaminated food or drinking water. Arsenic is a ‘clean’ poison— which cannot be seen, smelled or tasted. The effect can arise through physiological, social, and psychological mechanisms (Chowdhury *et al.* 2015). Physiologically, the arsenic may affect certain brain functions and directly cause depression (Martinez *et al.* 2008), or the arsenicosis can lower mental health in individuals and make them feel sick as a consequence (Dolan *et al.* 2008). Further, arsenicosis patients may suffer from discrimination and social exclusion and stigma, and hence may be affected socially. Although untrue, arsenicosis is sometimes believed to be contagious (for empirical evidence of the social channel, see George *et al.*, (2013); Hassan *et al.*, (2005); and Brinkel *et al.*, (2009)). Arsenicosis symptoms should, therefore, lead to a decrease in mental health. Finally, Schwartz and Melech (2000) suggest a psychological mechanism. Here, the problem arises due to concerns about the illness and their consequences for themselves or their family if they or their relatives exhibit arsenicosis symptoms or if they consume contaminated or unsafe food or water. Such feelings would weaken mental health.

5. ARSENIC NEGATIVELY AFFECTS WELL-BEING: EMPIRICAL FINDINGS

The focus of the last section of this paper is to analyse whether drinking arsenic-contaminated water affects the mental health of individuals in Bangladesh. Bangladesh is in focus for several reasons: it is a large developing country; it is considered to have the largest threat of arsenic poisoning; and it has a seemingly high prevalence of mental disorders (Hossain *et al.* 2014). Further, the health shock of arsenicosis was generated in the 1970s when UNICEF initiated the construction of tubewells to substitute the use of unsafe, arsenic-contaminated surface water, obviously with detrimental effects.

Many of the tubewells used were later tested and painted 'red' for unsafe and 'green' for safe, but since many tubewells were not tested (new tubewells, in particular) and those found 'green' could have turned unsafe over the years, there is substantial uncertainty nowadays over which tubewells are safe. Contrary to reports of strong adjustments towards information about arsenic in the groundwater (Madajewicz *et al.* 2007), a recent study by Chowdhury *et al.* (2015) finds that about 53 per cent of the used tubewells were never tested, and people continue drinking also from 'red' tubewells, with hardly any adjustments over time. Hence, the problem exists even now.

It is not surprising that the relationship between arsenic in drinking water and mental health is not well understood, as only a few studies deal with it. Martinez *et al.* (2008) show that perinatal arsenic exposure may have long-lasting biochemical and behavioural effects on adult mouse offspring, and can result in depression-like behaviour. Arsenic is a developmental neurotoxicant that may affect intellectual functions such as IQ and memory in both children and adults (Tolins *et al.* 2014; Tyler and Allan 2014). Few studies directly examine arsenic contamination and self-reported mental health or depression; while they all reveal a negative relationship, they are based on small samples only and on limited information about arsenic poisoning. (Brinkel *et al.*, (2009) provide a survey evaluation; and Zierold *et al.* (2004) have evidence for the US, Fujino *et al.* (2004) and Dang *et al.* (2008) for China and Keya (2004) and Syed *et al.* (2012) for Bangladesh). Consistent with these findings, however, are the results by Asadullah and Chaudhury (2011), who report a negative effect of arsenic exposure on children's life satisfaction.

The recent study by Chowdhury *et al.* (2015) provides substantial new evidence. Rich information was collected on current and past drinking water sources, education, health issues including arsenicosis symptoms, income and other important characteristics of individuals, households and villages in a representative survey of affected areas in Bangladesh in 2014, during which members of 4,500 households were interviewed—30 households each in 150 villages. The survey tested all the tubewells and recorded if they were labelled before for arsenic contamination, and how.

Using the GHQ-12 measure and regression analysis, Chowdhury *et al.* (2015) confirm strong causal effects from arsenic poisoning on well-being or mental health. The exhibiting of arsenicosis symptoms has a stronger negative impact than other illnesses on individual well-being. Relatives of arsenicosis-affected individuals suffer worse mental health; the suffering is stronger if the relatives suffer from illness. All this suggests that a social/stigma or psychological/worry channel is at work and affects mental health. Regression results also show

that drinking from an untested tubewell or having to walk longer to reach it is also affiliated negatively with well-being.

6. CONCLUSIONS

The ultimate objective of any labour movement is to improve the well-being of its members. Education is an important instrument to fight poverty and inequality and to generate better health conditions. For too long, efforts have concentrated on the provision of jobs and decent work conditions only; labour economics needs to focus more than before on health, in general, and mental health, in particular. Mental health problems are a serious challenge—in particular, for developing countries. New research finds that mental health problems may arise through health shocks generated by the exogenous provision of arsenic drinking water in many countries, including India, China and the USA, but particularly in Bangladesh. In spite of many information campaigns, there is still widespread ignorance of the severe health consequences of drinking arsenic-contaminated water. Deeper research insights and better communication strategies are needed to foster development in the countries under threat. Mental health issues can be improved through education and the relaxation of financial constraints on families.

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