



Arsenic Contamination and Social Groups in the Nawalparasi District, Nepal

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Arsenic Contamination and Social Groups in the Nawalparasi District, Nepal

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Abstract

Chronic arsenic poisoning by arsenic-contaminated groundwater occurs in many areas of Asia. Since arsenic is naturally occurring, it should have nothing to do with the attributes of humans. Previous research, however, has shown that the poor disproportionately suffer more from arsenic contamination. This paper examines the relationship between arsenic poisoning and "jats," social groups consisting of the Nepali caste system. Results indicate that there very few arsenicosis patients among the upper caste groups, while the occurrence of arsenicosis among the Tharu, a native ethnic group in Terai, is more than 10 times higher than that of the upper caste.

Keywords: Groundwater arsenic contamination, Health problems, Nepal, Caste system

1. INTRODUCTION

In the last few decades, groundwater arsenic contamination has been recognized along major rivers in Asia. Among them, along the confluence of the Ganges River, arsenic contamination was first recognized in 1983 in the West Bengal, India, followed by Bangladesh in 1993. Arsenic contamination also spreads in the Terai Region, Nepal located in the middle confluence of the Ganges. Because groundwater is the almost only source of drinking water, with an extended time of drinking such contaminated water, many people have developed symptoms of arsenicosis.

Groundwater arsenic contamination in this area is caused by the dissolution of arsenic transported from the Himalayas and deposited in alluvial layers. In other words, the contamination itself is a natural process, and has nothing to do with human activities. Therefore, because who drinks contaminated water should be determined by pure chance, subsequently, the occurrence of arsenicosis should have no relationship with the attributes of people, who they are.

Actually, however, human health damage does not occur randomly. There have been various studies on the

relationship between household economy and the occurrence of arsenicosis in Bangladesh (Chowdhury et al., 2001; Chowdhury et al., 2006 ; Argos, 2007; Tani 2005; Tsutsui 2006). These studies all indicate that the poor suffer more than the wealthy.

As these studies show, the poverty seems to have non-random relationship with illness including arsenicosis. A. Sen argues (Sen 2000) that the poverty is not merely the lack of economic resources and income, but that it should be recognized as the state of restricted freedom. Such state of deprived freedom is conceived as consisting of the lack of health service, education, political freedom, social participation as well as economic poorness. Therefore, the occurrence of arsenicosis may as well be affected by the state of this extended poverty. There are thus far only a few studies analyzing factors involved in the extended notion of poverty (Tani & Tsutsui 2010).

The Nepali society based on the caste system consists of social groups called "jats." These groups include caste groups segmented by the norms of Hinduism, and diverse non-Hindu ethnic groups. Although it is not simple to explain how these caste groups have come to the existence,

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the grouping principle is based on the notion of purity-contamination. The top consists of Brahmin, who are said to still enjoy social advantages, and many people who belong to the Brahmin group occupy positions at top layers of the society. On the other hand, the bottom layer of this hierarchy, dalits, is therefore considered as contaminated and “untouchable” and they have been the subject of various forms of discrimination. The social placement of other non-Hindu groups varies. The Tharu, an ethnic group native to the Terai Region, do not have a symbolic stigma as dalit, but they have been subject to disadvantages. Therefore, these social groups in Nepal are attributed to differential shades of deprived freedom, and it is possible that such diverse characteristics of social groups affect the occurrence of arsenicosis. With this perspective, this paper analyzes the relationship between arsenicosis and social groups using a large set of data derived from 58 arsenic contaminated communities in Nawalparasi, Nepal

2. METHODS

2.1 Study Area

The study area is arsenic contaminated areas located in the Nawalparasi District in the center of the Terai Region, in southern Nepal (Figure 1). Arsenic contamination in Nepal does not occur in the mountains and hilly areas, and exists only in the southern plain. All 20 districts in Terai are all affected by arsenic contamination. Among the 20, Nawalparasi is the most seriously contaminated district. For that reason, a grass-root technological assistance project by Japan International Cooperation Agency (JICA) has been conducted for the local capacity building of arsenic mitigation since December 2010. The data for this analysis is derived from a baseline survey conducted by the above project in 58 communities where there is at least one tube well with arsenic concentration of 300 ppb or higher.

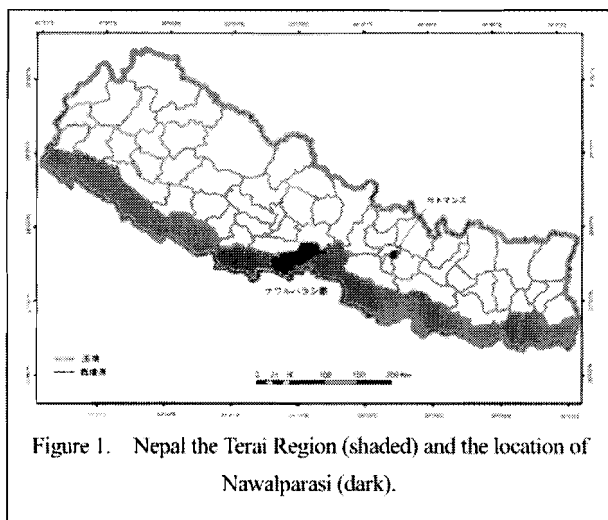


Figure 1. Nepal the Terai Region (shaded) and the location of Nawalparasi (dark).

2.2 Survey Methods

The survey was conducted by project staff members by using a questionnaire from March 2011 through November 2011. Each staff member visited every household in his/her communities, and recorded the questionnaire. A respondent must be an adult, either male or female. Recorded items are shown in Table 1. They include the knowledge of arsenic contamination and arsenic poisoning of the respondent, and the caste group the household belongs to, water use habits, living history, properties, agricultural land tenure, income, household composition; for each household member, age, sex, occupation, arsenicosis symptoms, smoking and drinking habits.

Table 1. Items recorded in household survey

1.Information on household ID: household head, location, jat
2.Source of drinking water
3.Income sources: agricultural land, occupation
4.Knowledge on arsenic, and arsenic risks
5.Living history
6.Participation in local organization
7.The state and type of toilet
8.Owned tube wells
9.Properties: TV, radio, mobile phone
10.Household composition
For each member: name, age, sex, relationship to household head, education completed, migrated labor, occupation, birth place, arsenicosis, smoking, drinking

2.3 Unit of Analysis: Jat

The caste system in Nepal consists of many groups called “jats.” The number and kind of jats vary from place to place. While the caste system of Nepal is originated from Hinduism, non-Hindu people are also incorporated into the caste system. Therefore, groups consisting of the system are classified into two large types. One is derived from Hinduism and the other includes ethnic groups. The unit of analysis for this study is not small specific caste groups and specific ethnic groups, but 6 large categories as shown in Table 2. These categories include the upper caste groups, the middle caste groups, the dalits (lower caste groups), ethnic groups, the Tharu, and the Muslims. The upper caste groups contain both Brahmin and Chettri, and the dalits are the lower caste groups and are considered as untouchable. The middle caste groups include all but the upper groups and the dalits. Other ethnic groups include non-Hindu ethnic groups called “janajati” except for the Tharu. Since the Tharu is indigenous to the Terai, and there are a large number of Tharu residents, the Tharu is a separate category.

Table 2. Caste and Ethnic Groups, Jats, as the Units of Analysis of This Study

Jat	Description
Upper Caste	Brahmin & Chettri
Middle Caste	Non-dalit castes other than the above
Dalit (Lower Caste)	The bottom of the Hindu caste
Janajati (Other ethnic groups)	Non-Hindu ethnic groups
The Tharu	Indigenous ethnic group in Terai.
Muslim	Muslim

Possible arsenicosis patients were screened only based on skin lesions, such as melanosis and keratosis by survey staff. Not all identified possible patients have been examined by medical doctors for confirmation, although such examinations are currently proceeding.

3. RESULTS

The survey recorded 32,925 individuals in 5,798 households. Table 3 summarizes the number of households, population size, the number of suspected arsenicosis patients, the rate of patients in every 1000 people, and average annual income. With the six categories of jats, the largest category is the middle caste group consisting of 31.5% in terms of households. The Tharu also counts almost as many household as the former, consisting of 30.8%. Following these two categories, the Dalits and the upper caste group are approximately the same size occupying 14.4% and 13.5%, respectively. Households belonging to non-Hindu ethnic groups (janajati) are relatively fewer, 6.7%. But, as stated above, because the Tharu is also “janajati,” the other ethnic groups category is actually the biggest. The Muslim who lives almost exclusively in non-rural areas is the smallest group of all.

Table 3. Households, population, patients, & income by jat

	No. of HHs	Pop.	No. of Patients	Patients per 1000	Annual Income
Upper Caste	781	3980	5	1.3	154926
Middle Caste	1829	10715	120	11.2	80544
Dalits	836	4709	48	10.2	99214
Janajati	390	2062	15	7.3	158934
Tharu	1788	10355	194	18.7	84979
Muslim	167	1081	7	6.5	103126
Total	5798	32925	389	11.8	100492

This survey recorded a total of 389 suspected patients. The half of the 389 patients are Tharus. The overall average of the number of patients in 1000 people is 11.8. All categories but the Tharu is less than this number. The patient rate per 1000 people of the upper caste group is especially low being 1.3 patients. The patient rates for the Muslims and other ethnic groups are relatively low, 6.5 patients and 7.3 patients, respectively. Those of the middle caste group and the Dalits are about the same as the overall average. Among all, the Tharu’s patient rate is particularly high being 18.7 patients (Figure 3).

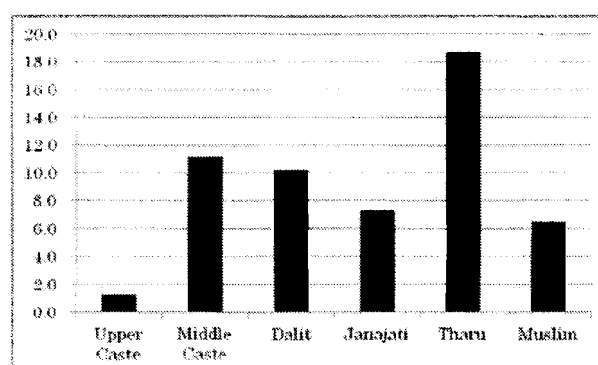


Figure 3. Patient rates by jat

4. CONCLUSION

This study analyzes the relationship between jats and arsenicosis. There are very few suspected patients among the upper caste group, and their rate in 1000 people is 1.3 patients, about only the one-ninth of the overall average. On the other hands, the Tharu, indigenous to this area, is much more severely affected by arsenicosis. Their rate is 18.7 patients in 1000 people, the highest of all groups. This is almost twice as high as that of the second highest group; or, 14 times higher than that of the upper caste group. Because the difference in the rate of patient occurrence is substantial, and the size of samples used in this analysis is large, this result indicates that there is a non-random relationship between the influence of arsenic contamination and social groups. Because factors that cause this difference have not been specified, however, further study will be necessary.

Although the discussion of physiological characteristics of the Tharu is far beyond the scope of this kind of paper, the Tharu has a well-known genetic characteristic producing sickle-cell hemoglobin as a response to the prevalence of malaria. There is no indication, of course, of this genetic characteristic having a non-random relationship with arsenicosis. It may need to be investigated if all other possible factors do not explain their high occurrence of arsenicosis.

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