

Determinants of Choice of Water Sources in Aizawl City

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1. Introduction

The characteristics of the water sources have a number of influences on choice of a water source. One characteristic of the water sources in the study area is that an individual piped connections facility is unreliable. Piped water connection into a house, a large sum of money is necessary to pay at a time. Secondly, there are different types of other water sources available to people. These different water sources are exposed to different kinds and degrees of contamination. This significantly influences both the extent to which this source of water is used and the way it is used. It can therefore be said that the vulnerability of unprotected sources influence water related practices. Thirdly, limitation in number of sources and supply of water from these sources influence water - collecting practices. Different water sources deliver less water during the dry season causing congestion at the sources during this time. The limited number of hand pumps and public taps create congestion at the sources. These characteristics clearly contribute to making water collection a time demanding activity, thus affecting the choice of water sources. These are a few of the factors that potentially influence peoples' choice of water source; but it is important to bear in mind that such choice is not stable or inflexible.

2. Study Area

Aizawl, the capital of Mizoram state, is situated in on the hillcrests, steep slopes and small valleys. It is located on a north - south elongated ridge, which acts as the main hill from which many small ridges and valleys are extending towards the east and west directions. The topography is highly undulating and rugged. The unique physical attributes of this rugged land are marked by extreme fragility and frequent landslides, limited land space, steep slopes and lack of accessibility. The city reveals a rapid and uncontrolled growth pattern with multi - storey settlements that has mushroomed unplanned on highly risk prone slopes. The altitude varies from 120 m to 1400 m above mean sea level. It falls between 23° 40' N to 23° 50' N latitudes and 92° 40' E to 92° 49' E longitudes. It covers an area of about 128.98 sq km, and as per Aizawl Municipal Corporation Report 2020, the population is 3, 59, 829 persons. There are a number of streams in and around Aizawl City, but none of them is dependable for providing adequate water. The only dependable source is river *Tlawng* located more than 1, 000 m below the city.

3. Discussion

The major factors determining people choice of water sources in the study area may be summarised broadly as distance, cost and perceived quality of the chosen water source.

Distance

Those who can afford to pay the amount for house connection and monthly bills choose house connection as their principal source of water, if their households are within reach of the network. For them, this is one of the shortest distances to get water and to overcome the task of water fetching. If the water supply from house connection is insufficient, they look for alternative source, which is convenient for them. Apart from house connection users, the users of rainwater harvesting as the principal source of water supply are also determined by shortest distance. Simple proximity is a major concern for many in order to minimise time spent/lost in collection of domestic water.

The drudgery of water collection is not only a question of the conditions at the source, but also of distance to it. The study indicates that people living close to a water source tend to use this source especially so if there are no competing sources nearby. People try to reduce the effort in many ways. Collection of rainwater commonly during rainy period indicates that people seize the opportunity to reduce the toil and cost of water collection whenever possible.

Without doubt, reduction of drudgery is important determinant in choice of a water source. It seems clear that largely people buy water from water tankers when it is considered the best opportunity. This choice is most likely to occur when use of this service represents considerably less hardship than collection of water from outside distant sources. However, people seem more willing to overcome constraints in order to collect water from outside their dwellings. Cost can explain much of this tendency. It is, therefore, important to recognise how economical scarcity is a factor that structures their behaviour (thereby water collection practices).

Collection of water from hand pumps and unprotected spring (*tuikhur*) is clearly subject to distance decay. Distance decay is here understood as attenuation of a pattern with distance (Johnston *et al.*, 2000). It is represented by decreasing number of users with increasing distance to a water source. For the protected spring (*tuikhur*), the pattern is somewhat different. Even though there is certain decay from the spring (*tuikhur*) too, the tendency is much weaker. This indicates

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that many are willing to overcome distance in order to collect water from the protected spring (*tuikhur*). Choice of water may therefore be a compromise where a source is chosen despite knowledge about contamination.

Cost

Cost is a major factor in determining not only which source people choose for water but also the quantity of water used from it. However, if aggregate expenditure of an unserved population by piped supply is studied, it frequently shows that the poor pay more for a poorer service (Lewin *et al.*, 1996; Lloyd *et al.*, 1991). However, cost is not a simple issue and involves to a substantial degree the relative value placed on different goods that can be purchased with available funds. Utility services often require the payment of large sums at one time; this clearly limits the potential for poor families to have house connection, as they may not be able to access these sums easily. It also involves a commitment to long-term patterns of payment that is contrary to income patterns. This is supported by the findings of a limited study in Jakarta dealing with survey methodologies in urban areas (Mc Granahan, 1997)

Cost is a factor significantly influencing choice of a water source. It may partly explain why many people are willing to overcome both distance and congestion in order to collect water from outside their premises. Similarly, cost can probably partly explain why use of the miserable unprotected spring (*tuikhur*) has not been abandoned yet. Due to the tight economical situation of many families, economy is to a large degree built on a day-to-day basis. This seems to involve that choice of a water source is also varying according to the constraints and opportunities determined by the economical situation.

Therefore, people within reach of the piped utility may collect water from house connections if they can afford to pay connection fees and monthly bills, or be forced to fetch from a distant source. Collection of free water from either spring (*tuikhur*) or hand pumps can thus be a way of saving money for many, at the cost of human labour. To a certain degree there seems to be a directly negative attitude against using money for water, which may lead to use of water known to be unsafe for human consumption. A respondent illustrates this by explaining his reason for using an unprotected spring (*tuikhur*), "*tuikhur* is near and we don't want to spend money to collect water from other sources".

Since water from spring (*tuikhur*) is free of charge, many are willing to struggle against various constraints to fetch water from this source. Given the poor families' economical situation, water collection from spring (*tuikhur*) and hand pumps is the best way to reach the goal of managing economically the daily requirements of domestic water in the study area. Calculating the cost of water for those who do not get piped water is difficult. As quoted by Tumwine (2002) "Estimating the cost of water is a more complex situation for households without piped connections. Sometimes it involves direct cash price paid to the water tankers, as well as the time and energy expended in travelling to a source and queuing for water and carrying it home". This is a description of costs connected to collection of water from tankers, hand pumps and spring (*tuikhur*).

However, constraints connected to distance and queuing may be more significant here. It is, therefore, important not to think of water from spring (*tuikhur*) and hand pumps as a very free product. According to Adelekan (2001) strenuous and time demanding water-collection practices can have negative consequences, for example on the school performance of children who have to fetch water in the morning before going to school. She also points out that the wasted effort in fetching and queuing for water could have been better spent in more activities that are productive.

Heavy work is also likely to require an increased intake of calories. Carrying heavy loads of water over distance is a strenuous activity, probably requiring an increased intake of calories (provided the household can afford it). Tumwine (2002) asserts that due to an increase in water consumption in households' without piped connection results in an increased amount of trips to the source and there has been a substantial increase in total daily energy expenditure. Total energy expenditure is understood here as calories per trip multiplied by number of trips. According to Falkenmark (1982), cost seems to be significantly influencing choice of water source. Cost is to her understood as cash payments, distance walked, or time spent waiting in queue.

Perceived Quality

People may not fully recognise quality as regards to accepted parameters of health, it is clear that most societies have some way in which they assess quality of water. Most of the households that utilise water sources other than piped supplies are poor families, many of whom are used to utilising small water systems and who believe that these are adequate to their needs. One of the important concerns is that the degree to which people differentiates among waters from different sources. The present study has found no pattern of distinction in use between protected spring (*tuikhur*), piped water, rainwater and tankers. Few respondents seem to use all kinds of water for all purposes. People to a large extent use water from unprotected spring (*tuikhur*) and hand pumps differently, mainly reserving this water for washing purposes, cleaning dishes, and, bathing. Negative remarks about water quality were aimed primarily at unprotected spring (*tuikhur*) and secondarily at hand pumps. An important reason for hand pumps dislike is related to the taste and smell of water. In unprotected spring (*tuikhur*) algae blooms occur frequently hence, the visual appearance of water is less appealing.

On an enquiry as to why the water from the hand pumps is not suitable for drinking, smell of iron was quoted as the most important reason. The other reason reported was foul smell and muddy colour. It is found that because of the iron content a thin layer, probably of iron oxides, is noticed once the water is stored for a while. According to the users, this makes the use of such water unsuitable for drinking. People are used to water from protected spring (*tuikhur*), piped water, rainwater for drinking as it has distinctly different taste and smell. This seems to influence choice of water source significantly. Neither does the microbiological content seem to be the most important factor in assessment of water quality.

It is important to note at this point that the experience on which people base their understanding and behaviour is gained through inheritance from the society (Lindskog and Lundqvist, 1989). The less fear of spring (*tuikhur*) contamination can be related to the natural attitude within which people's actions in the everyday world are being carried out. Given that people to a large degree are traditionally accustomed to water of the spring (*tuikhur*) for drinking purpose, this may influence their view on contamination in them. In comparison, the use of hand pumps is a newer phenomenon, which involves that people are less accustomed to contamination in it. This reinforces the point that public perceptions of water quality are not necessarily concomitant with scientific knowledge.

Consideration of quality is probably the single most important reason why most of the people do not choose unprotected spring (*tuikhur*) and hand pumps during the normal period however, during the dry period they cannot ignore them due to decline of water in all the other sources. While there is a common understanding that unprotected spring (*tuikhur*) water is not fit for drinking drunk, those who collect it use this water for other than drinking purpose. Thus, the level of contamination may still present a considerable health risk. Considering the poor quality of unprotected spring (*tuikhur*) water, it is surprising that a substantial number of households use it for dishwashing. The practice of cleaning tins/buckets with contaminated water may also become problematic, if these utensils are later used for drinking water.

4. Conclusion

Households' economy is one of the most significant determinant factors on choice of water sources. People's knowledge about the relationship between water and health is also important, but only one of the aspects determine the water use pattern. According to them individuals may have the insight of the need for improvement in a water supply system, but be unable to change their situation due to lack of time or economic resources. A consequence of this is that knowledge about the dangers of using water of poor quality may not be enough to change behaviour. Thus lack of action must not be regarded as the same as lack of knowledge. Choice of water sources is a broad and complex phenomenon. It is not even a stable one but may change on a daily or seasonal basis. Several factors influence choice of water sources. Even though people to a large extent seem to follow routines, there are constraints and opportunities that can break such patterns. Lack of money can therefore force people to use normally water from spring (*tuikhur*), public taps, and hand pumps. Most of the low income families are determined by more than one factors as far as their choice of water source is concerned.

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