

CURRENT SITUATION TO THE ACCESS OF WATER SUPPLY IN GER AREA

Case study: Bayankhoshuu, SKH district of Ulaanbaatar

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Abstract

The study examined the access of the households in ger districts to water sources and according to the definition of "**human water rights**" to "sufficient, safe and acceptable, physically accessible and affordable water", at household level. Totally 333 households from Bayankhoshuu sub center were involved in the survey.

Descriptive statistical method was used in main results. The main results of the survey were as follows: (1) only 1.2 percent of the households fully satisfied the criteria of human water rights (2) 88.5-95.6 percent of the total households cannot use the necessary human consumption of 20 liters of water (3) Quality of private protected dug well kiosks does not meet the requirements of MNS 900:2005. And 58.9 percent of the total households use some kind of water disinfection (4) 63.9 of the total households take water within 200 meters, 91 percent spend less than 30 minutes in taking water, which meets the requirements. (5) All the households spend 0.5 percent of their average monthly income or 2729 tugrugs to water, which meets the requirements. But the households with minimum monthly income (< 370.000) spend 1453 tugrugs to water, while the households with maximum income (1.063.000<) spend 4200 tugrugs.

Key words: *sufficient, safe and acceptable, physically accessible and affordable*

INTRODUCTION

Providing the population with reliable drinking-water is one of the main indicators to express the sustainable development of the country as well it has become the global problem. The objective (16) to reduce the percentage of the population, which has no improved drinking-water sources and has not connected to the improved sanitation facilities, was included in the framework of the World Summit on Sustainable development, held in 2002, and Goal 7 to provide Environmental sustainability of MDGs, approved by the UNO in 2000. According to the objective, by the year 2015 Mongolia has aimed to increase the access of the population to improved water supply to 80 percent and access to the improved sanitation facilities to 62 percent, compared to the basic mean of 1990s.

The institution, obliged to control the implementation of this objective at the world level, is the JMP of the UNICEF/ WHO. It was determined in the JMP report-2013 and in the 5th (2013) national report of MDGs implementation that the fulfillment to access the improved source of water supply was implemented completely; in particular, the urban population was provided 100 percent.

In reality, a person, living in the ger district, which occupies about 60 percent of the total population of Ulaanbaatar city, uses on average 7.3-8.2 liters²⁰ of water for drinking and household needs, which is 2-3 times less the amount, recommended by the JMP²¹, and it does not conform with the determination of sufficient improved source of drinking-water.

As we can see, it is insufficient to substitute the problems of the access of water supply in ger districts only by improved water supply sources. Hence, under the human water rights it is necessary to involve all the criteria, which determine the access of water supply and compare with the other social and economic factors at the household level, make analysis and conclusions. Determining the current access of water supply and sanitation facilities of the households in ger districts under the international criteria has much importance in developing a plan of concrete measures to be taken at the expected level.

METHODOLOGY

Sampling was developed with the purpose to determine the survey results for the

²⁰ USUG work report 2013

²¹ http://www.un.org/waterforlifedecade/human_right_to_water.shtml

Bayankhoshuu sub center households. Sampling range is the households within 1 km radius circle around Bayankhoshuu sub center.

The list of the households within this circle was the main information to determine the sampling range.

Total sampling amount was calculated by the following formula.

$$n = \frac{Z^2 r(1 - r)N}{Ne^2 + Z^2 r(1 - r)}$$

n – sampling amount

Z– content of statistical table related to expected importance level t

r- content of key indicator calculation (in percentage)

e – assumed error limit

N – amount of the target population

By using the formula above it is calculated that expected importance level is 95%, assumed error limit is 5, key indicator calculation content is 50%, then, and sampling amount or number of the units to be studied was 341. Non response rate 341-333. Respondent households were selected by random sampling, using the household list.

Quantity data was collected by making interview under the questionnaire. The questionnaire consists of forms with the following 4 parts (I) Household social-economic information II) Water supply III) Sanitation facilities IV) Health and others).

Quality survey follows the principle to confirm quantity survey results and explain the reasons. Quality data was collected by Focus group discussion – the participation method, which is commonly used in social survey practices. Interview was conducted according to prepared guideline. The guideline included discussion topics and participation methodology for every topic. Totally 31 people were interviewed.

Water chemical composition analysis was made by taking samples from the USUG water kiosk no.177, located on the territory of khoroo 9 in Songinokhairkhan district, and "Raash nuur"

private well of a citizen Battsagaan in April 2012 and May 2013. The samples were taken according to the requirements: after the well water was rinsed 2-3 times in a clean, dry and clear plastic container the container was filled with the water.

Indicators of the study

Access of improved drinking-water sources is the percentage of the people, who are using one of the improved sources, determined by the JMP, in required amount and from reasonable distance. It is considered that warrantee water access is provided when the round trip to and from the water source is 30 minutes, the distance is no more than 1000 meters and 20 liters of water is imposed per person daily²².

The access of water supply and sanitation facilities is stated "Every person must be provided with sufficient, acceptable, physically accessible and affordable clean water to be used for personal and household needs" in general definition (No.15) of water right, supported by the Economic, social and cultural declaration of UN in 2002. The UNCESCR determines sufficient and improved water by the following definition:

- Sufficient – An adequate quantity must be available in accordance with international guidelines. This ordinarily means 40-50 liters and an absolute minimum of 20 liters per day/person.
- Safe and Acceptable – Water must be safe for each use. Water for drinking must meet a very high standard. Water should be of an acceptable color, odor and taste.
- Physically accessible – Water must be within a safe physical reach, in the house or nearby.
- Affordable – Water should be affordable and must not affect a person's ability to buy other essential goods²³.

The table below shows the indicators, which express the access of water supply, accepted internationally and in Mongolia (Table 1).

²² Access to water and sanitation services in Mongolia, 2004

²³ Access to water and sanitation services in Mongolia, 2004

Table 1. Indicators showing the access of water supply

	Indicator on Timing required (Round trip)	Indicator on maximum distance for water source (in meters)	Indicator on daily use of water per person (in liters)	Indicator on water cost (percent of household income)	Indicator on water quality
WHO/UNICEF JMP, UNDP	30 min	1000	20 liter	exceed 3 percent	WHO Drinking water quality
NSO of Mongolia	30 min	200	25 liter <	-	MNS 0900:2005

Source: http://www.un.org/waterforlifedecade/human_right_to_water.shtml, Decision by the chairman of NSO of Mongolia Jan.03, 2013/number 1/4

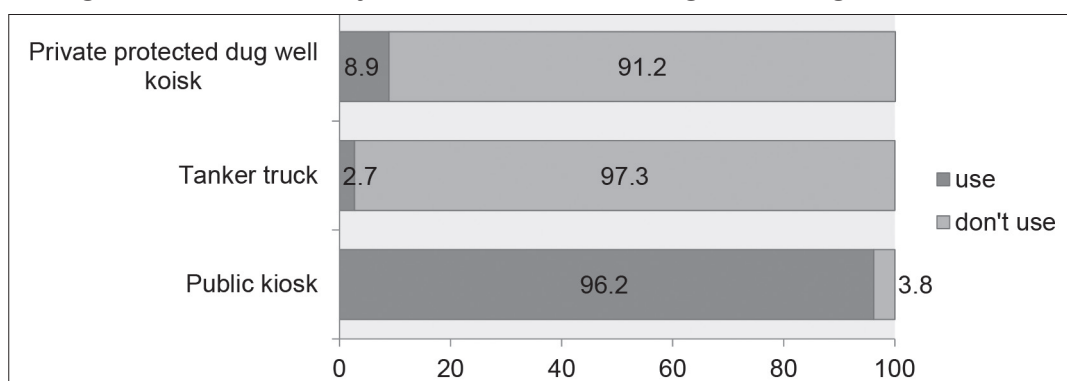
EMPIRICAL RESULTS

Drinking water sources and sufficient

Water source is generally classified into improved and unimproved. The main purpose of the MDGs is to provide the population with improved drinking water sources. 12

water kiosks²⁴, connected to the USUG line, and one private Abyssinian well²⁵ provide the population with water in the pilot area. Also, a few households call portable water truck of USUG²⁶ to take water and store the water in a water tank (big container with lid, sealed and protected from dust and outside waste, specially for storing much water), placed in own khashaa.

Figure 1. Use of water by the households according to drinking water sources



As we can see from the figure above, the main water source for the respondent households is public kiosks, connected to the centralized system. The most used one from the 3 types of the water sources above or 96.2 percent take water from the public kiosks, connected to the centralized system, and 8.9 take from private protected dug well kiosks. And the third source is the portable water truck, from which 2.7 percent are provided with water.

Sufficiency: According to the international instructions and recommendations the water must meet the simple human requirements. It means 50-100 liter/day per person and the minimum limit must be no less than 20 liter.

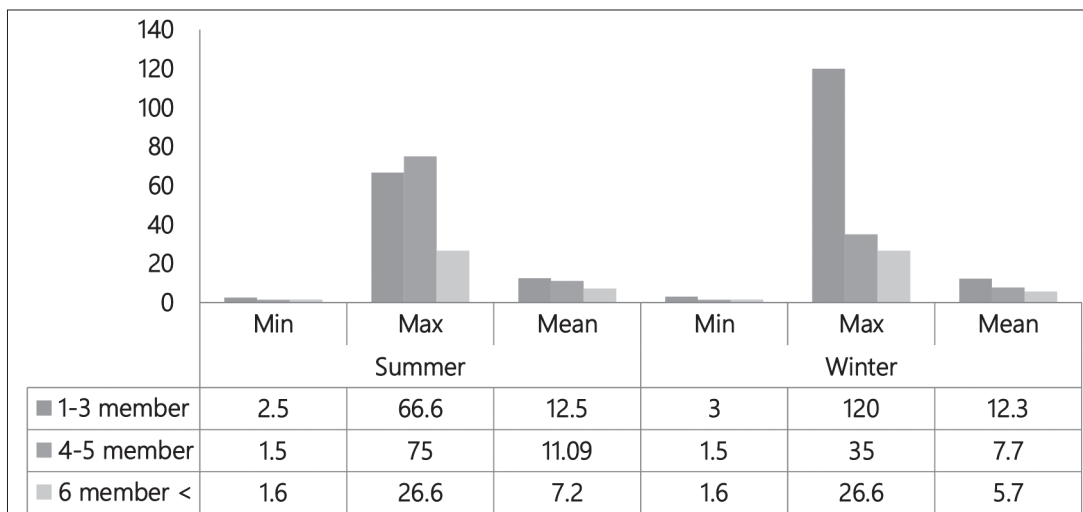
According to the study the daily water amount of the respondent households a member per day in summer time is on average 10.7 liters and in winter time is 8.9. Compared to the KAP 2009 of ACF Mongolia this indicator is less by 3.6 liters than (14.3l) water amount per day in summer time and more by 4.5 liters than (4.4l) water amount per day in winter time.

²⁴ Water kiosks of USUG, connected to a special line from the centralized water reservoir, within the UBNAAST-2 project, financed from the World bank. They are included to the reliable and improved drinking water sources.

²⁵ Individuals use by pump priming from the water source, dug in own khashaa as well sell to other households. This kind of well is also included to the improved water supply source.

²⁶ Customers can call the portable water truck of USUG when necessary and store the water in a water tank (big container with lid, sealed and protected from dust and outside waste, specially for storing much water), placed in own khashaa. This type of drinking water source is considered the unimproved source.

Figure 2. Daily water consumption per person of the households, by seasons



A member of a household uses on average 12.5-7.2 water per day in summer time but in winter time this amount is reduced to 12.3-5.7 liters/person/day.

As the members of a household increase the amount of daily water per person decreases, which shows that the households take water not by consumption amount but use the water according to their consumption. The average daily water amount per person is less by approximately 14-32 times than the average consumption of a person, living in apartment suite, which is 180 liter/person/day, and it is same as stated in the USUG report²⁷ that

person in ger district uses on average 7.3-8.2 liters of water per day. The average daily water amount per person is less by approximately 14-32 times than the average consumption of a person, living in apartment suite, which is 180 liter/person/day, and it is same as stated in the USUG report²⁸ that person in ger district uses on average 7.3-8.2 liters of water per day.

The table below shows the three group intervals of daily water consumption per person as below 10 liters, 11-19 liters and above 20 liters; analysis results, comparing the percentage of the households in the interval with some socio-economic indicators (Table 2, 3 and 4).

Table 2. Daily water consumption per person of the households, by types of dwelling

Dwelling types	Summer				Winter			
	< 10 liter	11-19 liter	20 liter<	Total	< 10 liter	11-19 liter	20 liter<	Total
Ger	70.4	17.2	12.4	100.0	78.0	16.6	5.4	100.0
Detached house	67.0	21.7	11.3	100.0	79.0	17.0	4.2	100.0
House	0.0	0.0	100.0	100.0	0.0	0.0	100.0	100.0
Total	67.5	21.0	11.5	100.0	78.6	17.0	4.5	100.0

If the daily water sufficiency per person of the households, living in gers (70.4%) and in detached houses (67%), is less than 10 liters, it shows that the consumption does not reach the half of the 20 liters, recommended by JMP.

But the daily water sufficiency per person of the households, living in comfortable apartment suits, is 100 percent and they use more than 20 liters of water.

Table 3. Daily water consumption per person of the households, by family members

Household members	Summer				Winter			
	< 10 liter	11-19 liter	20 liter<	Total	< 10 liter	11-19 liter	20 liter<	Total
1-3 members	53.7	28.6	17.7	100.0	66.4	24.2	9.4	100.0
4-5 members	69.3	19.7	11.0	100.0	80.2	18.3	0.9	100.0
6 members <	85.5	11.6	3.0	100.0	94.9	2.9	2.2	100.0
Total	67.5	21.0	11.5	100.0	78.6	17.0	4.5	100.0

In total, 53.7 percent of the households with 1-3 members and 85.5 percent of the households with more than 6 members use daily water less than 10 liters per day. But only 3 percent of the households with more than

6 members use more than 20 liters of water per person. It is proved that the increase of members of a household has a negative impact to the daily water sufficiency per person.

Table 4. Household employed members, by seasons

Household employed member	Summer				Winter			
	< 10 liter	11-19 liter	20 liter<	Total	< 10 liter	11-19 liter	20 liter<	Total
No employed persons	60.0	25.2	14.8	100.0	76.4	18.2	5.5	100.0
1 employed	65.5	22.5	12.0	100.0	75.6	19.7	4.7	100.0
2 employed	65.3	23.4	11.3	100.0	78.4	16.5	5.1	100.0
3 and more employed	93.1	1.6	5.3	100.0	93.1	6.9	0.0	100.0
Total	67.5	21.0	11.5	100.0	78.6	17.0	4.5	100.0

Totally, 93.1 percent of the households, where 3 and more members are employed, and the daily water sufficiency per person are less than 10 liters. It is observed that as the number of the employed members increases in a household, the daily water consumption reduces. It proves the responses on quality survey, that the kiosk timetable²⁹ is unsuitable for the employed people, so they cannot use water in sufficient amount.

Case: Kiosk timetable is unsuitable for the employed people. Kiosks are closed when they arrive home from works in the evenings. The kiosks open at 10.00 in the morning, so they cannot take water before going to work (N., Citizen of khoroo 9, female, aged 37)

One thing we should pay attention here is that the percentage of using more than 10 liters of water per day increases in winter season and the percentage of using more than 20 liters decreases, but in summer season this indicator is opposite, which shows that the hard climatic conditions influence to the water consumption. It is concluded that according to the JMP determination 88.5-95.6 percent of total households (depending on the season) cannot use the necessary consumption of 20 liters of water, which does not satisfy the criteria for water sufficiency.

²⁹ Public kiosks work from 10.00 in the morning until 20.00 in the evening with lunchtime. They don't work on Mondays and work until 16.00 in the afternoon on Thursdays and Saturdays.

1. Water safe and acceptable

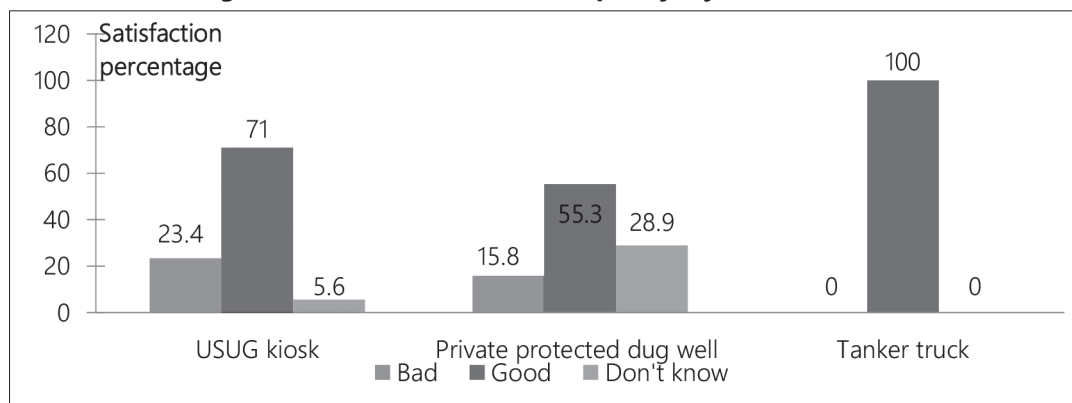
Water must be safe at each type of consumption. According to the WHO drinking water must satisfy very high standards and has accepted color, taste and smell.

The national standard (MNS 900:2005) on drinking water hygiene, quality and safety assessment, currently followed in Mongolia, was approved in 2005 and it is included in the Drinking water section of the part "Protecting the environment, health and safety" of ISO international classification. The standard purpose is regulating the hygienic requirements of water to be used for drinking and household consumption of the population, to provide the norms and to regulate the control and assessment activities³⁰.

In total, 22.7 percent of the households considered the water quality bad, 71.4 percent good and 5.9 don't know. Satisfaction on water quality was classified by water sources as showed below (Figure 3).

³⁰ Rural water supply and sanitation hygiene.

Figure 3. Satisfaction on water quality, by water sources



The public kiosks, connected to water system, are considered safe and improved water sources, however, 23.4 percent of the survey respondents are unsatisfied with the water quality. But 15.8 percent of the respondents

evaluated the quality of private wells as bad.

Households' evaluation on water quality was compared to the distance to water source as showed below (Table 5).

Table 5. Evaluation on water quality

Distance to water source	Evaluation on water quality			Total
	Bad	Good	Don't know	
< 50 м	20.6	72.2	7.2	100.0
50-200 м	15.8	82.3	1.9	100.0
201-500 м	33.8	60.9	5.2	100.0
501-1000 м	18.0	59.3	22.7	100.0
1000 м <	100.0	0.0	0.0	100.0
Total	22.7	71.4	5.9	100.0

As we can see from the table above the bad evaluation increases as the distance to water source departs and the households, which take water from more than 1000 m evaluated their water quality bad in 100 percent. It is because the most households use water from the kiosks, connected to the line, however, they are unsatisfied with the fact that they pack in dusty and dirty environment and transport to their homes.

Based on the evaluation of the water quality by the households, the researcher took samples from a kiosk (no.177), connected to USUG line, and from the private protected dug well kiosk, which were tested for suitability to drinking water /MNS 900:2005/ standard by the laboratories of geographical Institute at the Science Academy /2012/ and geo-ecology Institute /2013/. The test results:

Public kiosk: Chemical composition: soft water of very fresh water of 3rd type of calcium group of hydro-carbonate class. In the years of

sample taking the water from the public kiosk meets the standard MNS 900:2005 of drinking water.

Private kiosk: Chemical composition: very hard water of quite fresh water of 3rd type of calcium group of chlorine hydro-carbonate class. The analysis showed the amount of nitrate, calcium, magnesium (increased 2,6 times), iron ion and general hardness much than stated in drinking water standard MNS 900:2005, oxidation exceeds the rational content, therefore, it is unsuitable for human drinking.

As we can see, 96.2 percent of the population in the pilot area are provided with the water, which meets the safety requirements. But one disadvantage is that although high quality water is provided from the water kiosk, it is unclear if it is contaminated during transportation and storage, therefore, it is impossible to say that the households use completely high quality water. It is because the

households in ger districts transport, store and use water in plastic containers, which used to contain chemicals. Therefore, it is necessary to analyze it next time.

2. Physically accessible

One criteria for satisfying water source is that the households must be located closer to the water source and spend less time in taking water. 63.9 percent of the households take water within 200 meters, 35.9 percent within 200-1000 meters and 0.2 percent take water

from more than 1000 meters far. 91 percent of the total households spend less than 30 minutes in taking water and carry water on average 3-4 times a week.

The connection of distance to water source with water consumption is shown below (Table 6).

The percentage of the people, using 20 liters a day, is reducing as the distance to water source is dispatched, which proves the fact that the distance to water source influences to the water sufficiency.

Table 6. Ration on distance to water source and daily water consumption (by percentage)

Amount of daily water	Distance to drinking water source					Total
	<50 m	50-200 m	200-500 m	500-1000 m	1000 m <	
Summer						
< 10 liter	28.5	33.6	31.4	6.4	0.1	100.0
11-19 liter	31.6	30.6	31.6	5.8	0.4	100.0
20 liter <	28.8	48.6	12.1	10.5	0.0	100.0
Winter						
< 10 liter	30.1	33.2	29.9	6.8	0.1	100.0
11-19 liter	20.7	42.4	28.6	7.7	0.5	100.0
20 liter <	46.0	33.0	19.0	2.0	0.0	100.0
Total	29.2	34.7	29.2	6.7	0.2	100.0

3. Water price and affordable

As for the prices on water in kiosks on the pilot area the kiosk, connected to USUG line, sells 1 liter of water by 1 tugrug and the private protected dug well kiosk sells 1 liter of water by 2 tugrugs. The households, which take water

from portable water trucks, buy 4 tons of water by 50.000 tugrugs. The monthly average income of the households was divided into five groups and the money, spent to water per month by the household of the group is compared to the household income (Table 7).

Table 7. Money spent for water per month, by household income

Households income /a month/	Money spent /mean/	Percentage to income /mean/
I. < 370.000	1453	0.8
II. 370.001-543.000	2163	0.5
III. 543.001-763.000	3043	0.5
IV. 763.001-1.063.000	2867	0.3
V. 1.063.000 <	4200	0.3
Total /mean/	2729	0.5

As we can see from the table above the percentage to income of the money, spent by the households to water per month, is 0.5 percent or according to the international criteria does not exceed 3 percent. The households of the group with minimum income spend on average 0.8 percent of their monthly income /1453₮/ to water and the households of the group with maximum income spend on

average 0.3 percent /4200₮/. It determines that household income influences to the water consumption.

As the result, household responses on water prices is positive and does not burden the household living, however, cost of 1 liter of water in ger district is 3.1 times more expensive than the cost of 1 liter of water in apartment suits (38 mungu). The household with less

income spends less for water, which shows that increase in water price may reduce the current water sufficiency.

4. Water supply and health

Insufficiency of improved water supply and sanitation facilities pollute the environment and have negative impact to human health.

According to this study, 5.7 percent of the total respondent households had diarrhea,

0.6 percent had contagious hepatitis and 30.9 percent cough and respiratory diseases.

Household water access is the guarantee of human living. Water insufficiency causes many kinds of infectious diseases. Therefore, household water consumption is shown by the responses on any infectious diseases if the household members for the last 12 months (Table 8).

Table 8. Percentage of the households, which had infectious diseases for the last 12 months, by water amount per person

Water amount per person		<i>Dierrhea</i>	<i>Hepatitis</i>	<i>Other infectious disease</i>
Summer	< 10 liter	73.2	84.6	69.4
	11-19 liter	26.8	15.4	30.6
	20 liter <	0.0	0.0	0.0
	Total	100.0	100.0	100.0
Winter	< 10 liter	73.2	84.6	94.4
	11-19 liter	26.8	15.4	5.6
	20 liter <	0.0	5.6	0.0
	Total	100.0	100.0	100.0

As we can see, the most of the households, which had any member, who had infectious disease for the last 12 months, have daily water consumption per person less than 10 liters and there are no households, which use more than 20 liters of water. It shows that water consumption and the infectious diseases are interrelated.

5. Necessity to improve water supply

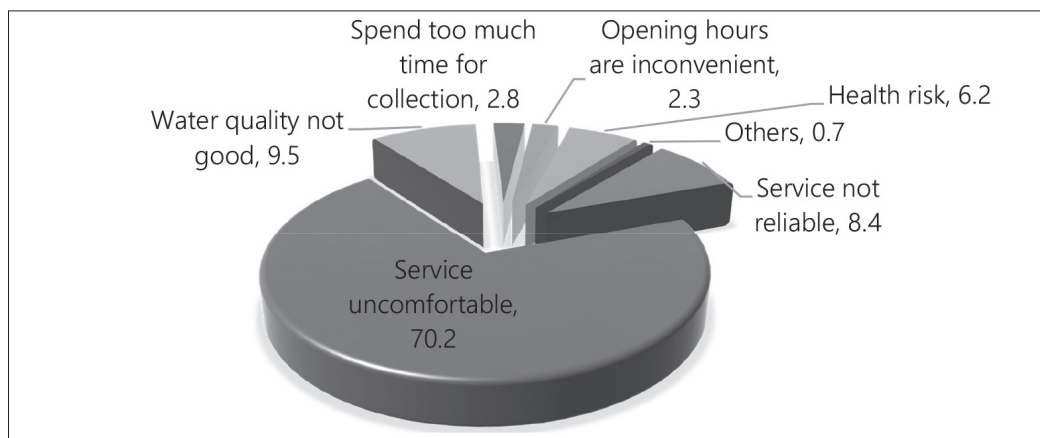
Drinking water source in the pilot area is fully provided from the kiosks, connected to the line, or improved source. In total, 64 percent of the total households take water within 200

meters, 91 percent spend less than 30 minutes and take water at affordable price, and however, only 11.5 percent use the necessary human consumption of 20 liters and up in summer season and 4.5 percent in winter season, which is unsatisfied indicator.

As the results, household responses satisfaction of the households on water supply 60 percent is somewhat satisfied, 22 percent is highly satisfied, 18 percent is not satisfied of total household considered.

Figure 4. shows the impacts for the reasons of not satisfied and somewhat satisfied households.

Figure 4. Reasons of the households to be unsatisfied in water supply

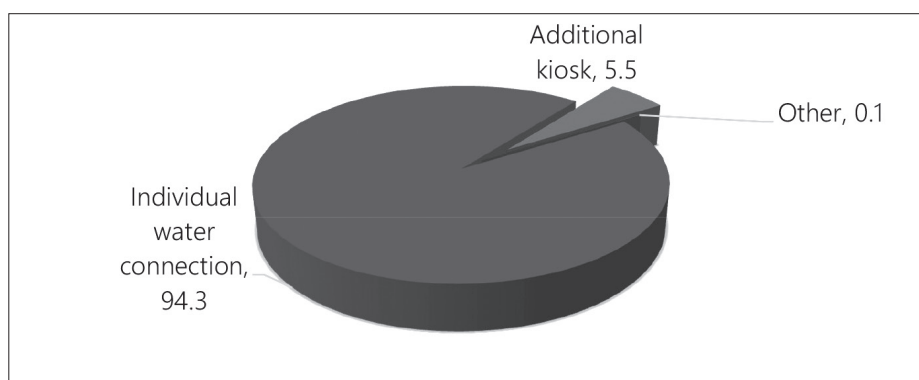


The main reason for the households to be unsatisfied with water supply is uncomfortable service, which occupies 70 percent of the respondents. The next important reason is water quality is not good, which occupies 10 percent of the respondents.

We clarified the households, which

considered the water supply unsatisfied and somewhat satisfied (78%), if they have any proposals on changing the service on water supply and 93.9 percent considered it right to change the current water supply. The proposals on how to change the water sources were clarified (Figure 5).

Figure 5. Proposals on changing water supply



As we can see, the most households would like to be provided with the water, connected to line, at home and it proves the main reason for being unsatisfied to the previous water supply is that they need to carry the water themselves. In the framework of USIP-1-2 project of Ulaanbaatar city the most kiosks of Ulaanbaatar city were connected to the clean water system as well new kiosks were built, which eliminated the long queues as was before 2000s, however, the daily water consumption of the households in ger districts still not reach 20 liters. A few households with potential capital and dwelling installed huge tanks and take water in sufficient amount, but it cannot be fully rational method due high costs.

CONCLUSION

According to the study results the population in the pilot area is using their drinking water from the improved source, which meets the determinations of Mongolia and JMP. But only 1.2 percent of the total households provide the main 4 (5³¹) indicators, which determine the full access to improved drinking water source.

³¹ Access to taking water includes both distance to the water source and the time to spend for it. If these 2 indicators are separated, then totally there are 5 indicators, including the other 3 indicators.

In total, 88.5-95.6 percent of the total households cannot use the 20 liters of water, which is the necessary daily consumption per person. In winter the average amount of daily water consumption per person is reduced than in summer. Also, increase of number of household members and number of employed people in the household reduce the water consumption per person.

More than 90 percent of the households take water within 200 meters and spend maximum 30 minutes for it, however, the percentage of the households, which uses 20 liters of water a day, is reduced as the distance to water source furthers.

The cost, spent by the households with minimum income is less than the households with maximum income, i.e., percentage of the cost for water to the household income is much by 0.5 percent, compared to the households with high income, which proves the fact that the household income influences to the water access.

The main reason of the households for not satisfied with the water supply is the difficulty of carrying the water themselves as well kiosk timetable, climatic conditions, obstacle roads, which have impact in carrying sufficient amount of water.

Recommendation

The first work to improve the access of household water is to change the kiosk timetables. The kiosk timetables must be lengthened, early opening and late closing shall provide the possibilities for the employed people to take sufficient water. Also, USUG water kiosks have holidays at the same time, which causes difficulties for the households to use the water of bad quality from the private protected dug well kiosk or stay with no water. Therefore, the holidays of the kiosks must be different in order to provide the households with the possibilities to take quality.

The best and most expected by the citizens method to improve the current water source of the households in ger districts is to be connected to the clean and waste water system. Connect the households to clean water line.

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