

# **Access to Clean and Safe Water in Yangon: A Case of Municipal Water Provision in Insein Township**

*Another Development*

**January 2019**

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*“Access to Clean and Safe Water in Yangon:  
A Case of Municipal Water Provision in Insein Township”*  
ISBN 979-11-88772-55-1 95340

## Access to Clean and Safe Water in Yangon: A Case of Municipal Water Provision in Insein Township

Another Development

### Executive Summary<sup>1</sup>

The provision of safe and reliable water supply is important to all urban dwellers. Actually, urban water supply systems aim to be a safe and reliable water supply for all urban residents. But the municipal water supply with improved public hygiene is still inadequate even in the major cities of Yangon and Mandalay. This research aims to explore the challenges facing the current water supply in Yangon, particularly at the township level. It will also identify the factors that hinder the sustainable supply of water at the township level.

The municipal water supply in Yangon City covers only 38% of the urban population and the rest relies on other sources - the cleanliness and safety of these sources is questionable. Ground water usage is growing at a progressive rate. It is likely to be exhausted if it continues at the current rate. Water shortages often happen during the summer time.

Water quality was found to be a big concern for all respondents in Insein Township. It is common in most wards of the township. Water shortages are highly seasonal but the most frequent and long shortages are found particularly in some wards: East Gyo Gone, Taung Thu Gone and Hpawt Kan. There is an unfair distribution of water among wards due to topography. In hilly parts of the wards, water is received only at night time.

This study finds that there is a pressing need to improve water quality in order to meet the standards of drinking water safety. Urgent action is needed for the wards that suffer the most frequent shortages. Setting pumping system in hilly areas will be one of the ways to tackle unfair water distribution. There is a need to extend the water supply system that comes from surface water in order to reduce ground water depletion in the long-term.

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<sup>1</sup> The AD Team, first and foremost, would like to thank Caroline Wanjiru Gatimu, our research mentor, for her kind mentoring on this research. We also would like to express our gratitude to those who have given their time: the YCDC Township Officer and Township Administrator and each Ward Administrator of Insein Township. Their willingness to explain the situation is greatly appreciated. Also, our heartfelt thanks goes to the respondents in Insein Township for sharing their valuable time. Last but not least, the AD team would like to deeply express heartfelt thanks to the East Asia Institute (EAI) for their technical and financial support.

## I. Introduction

### Background of the Study

Water is one of the most crucial and non-substitutable environmental resources for human beings. Access to an adequate, quality, safe and affordable supply of water is a basic need for human life. However, many people across the world, especially in developing countries, do not have sufficient access to safe and adequate water supply services which affects their life in various ways. The availability of reliable water is becoming a problem throughout the world and is coupled with increasing population pressure. According to WHO and UNICEF, three in ten people worldwide, or 2.1 billion, lack access to safe and readily available water<sup>2</sup>.

Water scarcity, especially in urban areas of developing countries, is a source of pressure hindering economic and social development. Over the last 20 years, many urban areas have experienced dramatic growth due to many factors, including rapid population growth and technological change as the world economy transforms. Around three billion people - virtually half of world's population - now live in urban settlements. Over the next 30 years, it is expected that higher population growth rates will be in the urban areas of developing countries<sup>3</sup>. With an enhanced need for water for economic activities, there is also likely going to be increased pressure on the use of surface water and extraction of ground water<sup>4</sup>. This will contribute to the greater depletion of available water resources.

Myanmar is one of many developing countries that experience water scarcity across different urban and rural areas. For one, the urban population in Myanmar is estimated to be approximately 30% of the total population (Census, 2014). In most urban areas, however, investment in infrastructure has been low, especially in the water supply, sanitation drainage, wastewater, and solid waste management. In addition, current municipal pipe water services do not reach a large proportion of the urban population. Consumers have to adapt by improvising self-supply such as through the use of private water vendors, private systems involving tube wells, and reliance on public wells among others<sup>5</sup>.

With 5.2 million people, Yangon, which is also the commercial capital of Myanmar, is the largest city by population. It is four times larger than the population of Mandalay<sup>6</sup> - the second largest city. It is situated at the confluence of three rivers- the Yangon River, Pazundaung Creek and Bago River in the central part of Yangon Division. The average annual rainfall is around 2700 mm and refills four main reservoirs located about 40 miles to the north of the city. However, despite the abundance of water in the area, the water supply system managed by the Yangon City Development Committee (YCDC) is still inadequate as it covers only 38% of Yangon's population (JICA, 2014).

Access to clean and safe water remains a pressing issue since Yangon is undergoing rapid economic growth

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<sup>2</sup> WHO, UNICEF, "Progress on drinking water, sanitation and hygiene," Joint Monitoring Programme (2017).

<sup>3</sup> Barney Cohen, "Urbanization in developing countries: Current trends, future projections, and key challenges for sustainability," *Technology in society* 28, no. 1-2 (2006): 63-80.

<sup>4</sup> Khin Kay Khaing, "Groundwater Utilization and Availability in Yangon City," *Universities Research Journal* 4, no. 5 (2011).

<sup>5</sup> Asian Development Bank, Myanmar - Urban Development and Water Sector Assessment, Strategy, and Road Map, Report. Asian Development Bank. August 2013.

<sup>6</sup> Mandalay is the second largest city in Myanmar. See 2014 census population

which is likely to result in fast-paced urbanization. These two factors combined are expected to further stress the water supply system and its alternatives. The same could also exasperate differences in services among areas in the same townships. Yangon City comprises 33 townships. Insein, one of the townships, was selected for this study partly because of its relatively higher urban population compared to other townships. Also, there is likely to be high migration and populated area because Insein is near Mindama Special Economic Zone (SEZ), one of the drivers of economic development in Yangon. Lastly, the township has a relatively high number of primary, middle, and high schools creating a higher demand for water. It ranks fourth out of 33 townships in the latter.

For this reason, it was necessary to explore the current municipal water supply challenges in the city, employing a case study approach focusing on the township level. Additionally, we aimed to examine factors that hinder sustainable supply of clean and safe water and recommend actions that can be taken to improve supply to the residents of the city. Taking action now will prevent the development of chronic malfunctions and unfair distribution in the future.

### **Statement of the Research Problem**

Despite Myanmar having ample water resources such as rivers, lakes, forests, and reliable rainfall - albeit marked by seasonal and regional variability -, access to clean and safe water still remains a challenge for the majority of the population in both urban and rural areas. In Yangon City, only 38% of the population is reached by the existing municipal water supply and, as mentioned in the introduction, the majority of the population has found alternatives in other sources such as groundwater, tube wells, and private water vendors, which are untreated and unlikely to meet bacteriological guidelines for drinking water<sup>7</sup>.

In addition, the majority of urban areas lack proper drainage networks, resulting in severe flooding during the monsoon season. In Yangon, for example, except for a limited sewage system in the old business district, there is no systematic collection and treatment of domestic wastewater. Most households in formal residential areas have some form of septic tank which is usually not routinely serviced and treatment of the sludge is questionable. In informal settlements, improvised latrines are mainly used and storm water drains carry untreated sewage in open channels. This combined with under-investment in preventive health care has a reciprocal effect on the health of residents with water borne diseases such as diarrhea among children under 5, and water-related vector borne diseases such as malaria and dengue fever being commonly reported.

Therefore, access to clean and safe water is an urgent issue in Yangon. Little research has been done on the subject, especially at the township level. Our study's aim was to provide in-depth information on the case of Insein Township with the hope of coming up with actions and strategies that can be implemented to provide sustainable access and/or supply for residents in this area as well as Yangon City in general.

### **Justification of the Study**

This study aimed to generate in-depth information on access to clean and safe water for residents in Insein Township, as well as on factors that hinder sustainable supply of the same to residents. Additionally, the study proposes actions and strategies that can be implemented to promote access not only in Insein but also in other similar townships in the city of Yangon. Specifically, this study targets the following policy audience who we

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<sup>7</sup> Asian Development Bank, Myanmar - Urban Development and Water Sector Assessment, Strategy, and Road Map, 2013.

hope can take up our recommendations and act on them. They include but are not limited to: the Yangon Regional Government, YCDC and its Water and Sanitation Department, the Members of Parliament representing Insein Township from both Upper and Lower Houses (national) and Regional Parliament, the Insein General Administrative Department, and CSOs and NGOs working in the water sector.

### **Research Questions**

This study aims to answer the following questions.

- a) What are the current water supply challenges in Insein Township?
- b) What are the factors that hinder the sustainable supply of water in the township?
- c) What are some of the strategies and actions that can be implemented in both the short and long-term to improve access to clean and safe water in Insein Township and Yangon City in general?

### **Research Objectives**

This study aims:

- a) To explore the current water supply challenges facing Insein Township
- b) To investigate factors that hinder the sustainable supply of water at the township level
- c) To recommend strategies and actions that can be taken to improve access to clean and safe water in Insein Township and Yangon City in general.

### **Limitations of the Study**

This study has several limitations. One is the scope of the research. We selected one township out of the 33 that form the Yangon region. This was due to human resource and financial constraints. However, we hoped to present in-depth information about the township which the relevant management and administrative bodies as well as other interested stakeholders can use to make judgments about the case and possibly apply the information to other similar townships in the city. Lastly, people in Myanmar are not used to speaking out and expressing their real challenges and concerns to researchers, government representatives and actors viewed as outsiders by the local communities. This may have influenced the nature of the responses we received for this study but we endeavored to do a detailed analysis of the findings from our household data and triangulate this with data collected from key informants.

## **II. Literature Review**

### **The Concept of Sustainability and Sustainable Water Supply**

Previously, most governments focused more on economic growth, ignoring other social, environmental, and cultural factors that are crucial for sustainability. However, in recent times, the question of sustainability has dominated human development debates. The term ‘sustainable’ was first used around 1980. The most comprehensive definition came from a United Nations (UN) Report in 1987. In the report, sustainable development is defined as development that meets the needs of the present without compromising the ability of

future generations to meet their own needs<sup>8</sup>. This definition attempts to balance the social and economic wellbeing of the present with the impact of current patterns on the future.

There are many other definitions of sustainable development that have been advanced by international organizations and academics. The World Business Council describes sustainable development as the kind of development that involves the simultaneous pursuit of economic prosperity, environmental quality, and social equity<sup>9</sup>. Three pillars are highlighted here including economic, environmental, and social factors. It has also been extended to include other dimensions such as cultural diversity and political participation.

The concept of a sustainable water supply comes from this concept of sustainability. Through the lens of sustainability, the term “water supply” must be broader than the pure technical aspects, meaning that operational, institutional, contextual and policy aspects ought to be considered as well. A sustainable water supply should therefore be a supply that meets our present and future requirements for sufficient quantities of good quality drinking water (Gleick et al, 2005). Water sustainability could also mean supplying or being supplied with water for life, perhaps more precisely, as the continual supply of clean water for human use and for other living things (Schnoor, 2010).

### Urban Water Challenges in Developing Countries

Water scarcity in urban areas is an enormous challenge in developing countries, especially with increasing populations and high rates of urbanization. The water supply coverage of populations in developing countries as well as sanitation facilities is far from satisfactory. For example, the number of people without improved water sources in China alone is equal to the number of un-served in all of Africa<sup>10</sup>. The same report predicts that half of India’s population will be living in urban areas and will face acute water problems by 2050.

The major technical challenges for effective water provision in developing countries are highlighted in Table 1. This list is by no means comprehensive, but provides an overview of common technical problems.

**Table 1. Technical Constraints to Effective Water Provisioning in Developing Countries**

Phase	Constraint Examples
Design	<ul style="list-style-type: none"> <li>• Difficult sites and terrain</li> <li>• Complicated site layout</li> <li>• Conventional System overreliance</li> </ul>
Implementation	<ul style="list-style-type: none"> <li>• Investment capital</li> <li>• Institutional capacity</li> <li>• Community capacity</li> </ul>
Monitoring and evaluation	<ul style="list-style-type: none"> <li>• Regulations, guidelines, standards</li> <li>• Technical capacity</li> <li>• Decentralization</li> </ul>

<sup>8</sup> Gro Brundtland, "Our common future: Report of the 1987 World Commission on Environment and Development," United Nations, Oslo 1 (1987): 59.

<sup>9</sup> John Elkington, "Cannibals with forks: the triple bottom line of twenty-first century business. Capstone," (1997).

<sup>10</sup> WHO, UNICEF, "Progress on drinking water, sanitation and hygiene," *Joint Monitoring Programme* (2017).

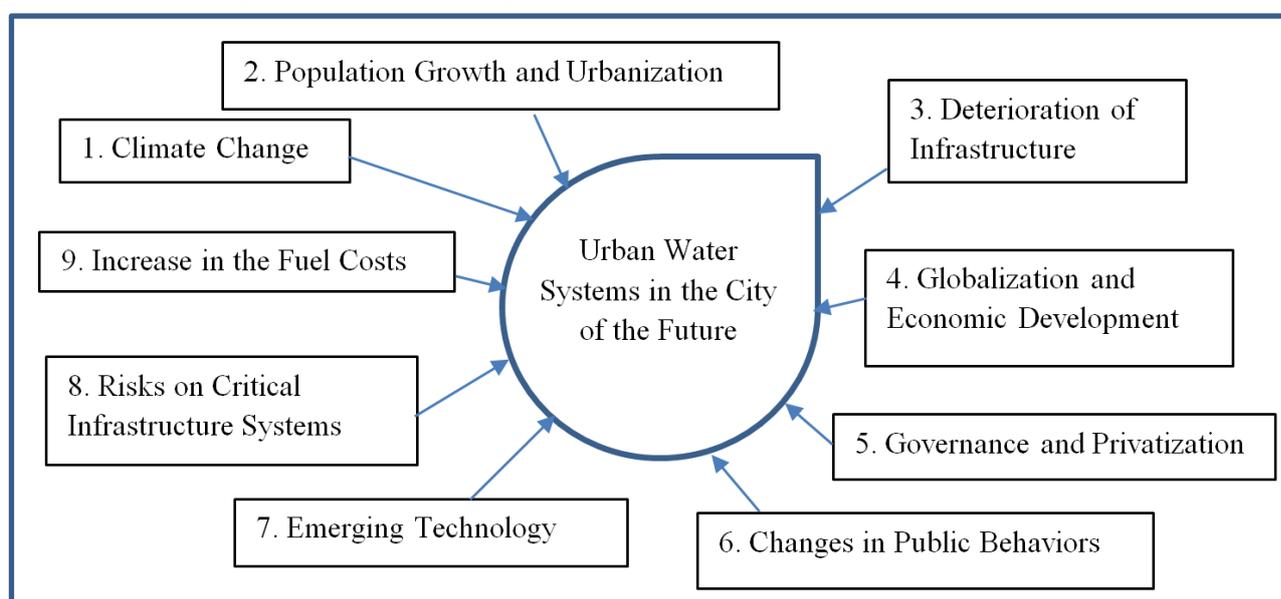
Operation and maintenance	<ul style="list-style-type: none"> <li>• Finance, ability to pay</li> <li>• Post construction support</li> <li>• Community Participation</li> </ul>
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Source: Grady, et al (2014)

### Challenges for Urban Water Systems in Future

With increasing global and regional pressures on urban water systems, cities of the future will experience difficulties in efficiently managing scarce and less reliable water resources. The pressures on urban water systems in the city of the future highlighted in Figure 1 provide the framework employed to base this study's answer to the question on sustainable water supply challenges.

Figure 1. Global and Regional Pressures on Urban Water Systems



Source: Vairavamoorthy, 2008<sup>11</sup>

Some of the challenges mentioned in Figure 1 include:

- a) *Climate Change* which is predicted to cause significant changes in precipitation and temperature patterns affecting both the availability and quality of water.
- b) *Population Growth and Urbanization* which are contributing to rapid changes causing a dramatic increase in high-quality water consumption. Consequently, this demand for water cannot be met by the locally available water sources while the discharge of insufficiently treated wastewater increases costs for downstream users and has detrimental effects on the aquatic systems.
- c) *Ageing Infrastructure* is a technological and financial challenge to maintain and upgrade in such a way that quality water can continue to be delivered to all sectors and wastewater can be adequately collected and treated.

<sup>11</sup> Kalanithy Vairavamoorthy, "Cities of the future and urban water management," *Thematic Week 2* (2008): 1-13.

## Access to Clean and Safe Water in Myanmar

Myanmar has favorable conditions in terms of water resources - ranging from rivers, lakes, rainfall, and forests. The actual water utilization of the whole national population is only five percent of the water potential. Given this figure it can be said that the potential of water resources is quite substantial. The agriculture sector is the major water consumer and accounts for 89%, while the rest is accounted for by domestic and small industrial uses. The storage of water varies from large public facilities to the small individual scale: reservoirs for urban water supply, community ponds for domestic and drinking water supply, and big jars for rain water collection for home use.

However, uneven rainfall distribution is leading to flash floods in some regions and to water shortages and scarcity in others. Water-related problems are exacerbated by increased deforestation in key catchment areas with devastating effects on the sponge function of the forests. This increases pressure on erosion, contamination, sedimentation, and siltation of the main river arteries that people rely on. The more the river pollution increases, the more people, especially those living close to rivers, face health risks. Furthermore, the over exploitation of ground water is increasing with population growth. In addition, the contamination of ground water from naturally diffused arsenic becomes a widespread problem<sup>12</sup>.

With respect to access to clean and safe water, 69.5% of all households in Myanmar received water from improved sources, while the others did not (Census, 2014)<sup>13</sup>. This implies that there are still 30.5% which do not have access to safe and clean water. Furthermore, urban areas have better access to improved water than rural areas- 86.7% of those in urban areas and 62.7% of those in rural areas have access to improved water. In addition, significant disparities exist between urban and rural areas and between the rich and poor. Urban water supply systems in Myanmar are generally very old, with only intermittent supply and poor water quality<sup>14</sup>. Water services do not reach a large proportion of the urban population. These urban dwellers have had to cope with inadequate water provision by improvising self-supply through a large number of small private systems and water vendors. The people, especially those living in slums and peri-urban areas, have spent most of their household income purchasing water (YCDC, 2016).

The urban water supply system in Myanmar aims to provide a safe and reliable water supply to all urban residents. Nevertheless, the municipal water supply with improved public hygiene is still inadequate even in the major cities of Yangon and Mandalay. The piped water system in the main cities of Yangon and Mandalay includes untreated surface water from open reservoirs and the hours of supply are highly variable. In other cities, there is a noticeable lag and there are some cities where the municipal water supply does not even exist<sup>15</sup>.

## Water Supply in Yangon City

In 1842, YCDC water supply in Yangon City was started with 30 wells in the center of the city. At that time, it was operated using pumps and a conduit pipe from Kandawgyi Lake in 1879 and from Inya Lake in 1884. To meet the demand of the growing population, the water supply was improved by developing new reservoirs- Hlawga

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<sup>12</sup> Integrated Water Resources Management Strategic Study Team, *Myanmar Integrated Water Resources Management Strategic Study*, Report. December 2014.

<sup>13</sup> Sources considered to be safe are grouped together as improved water- piped water, tube wells (boreholes), protected wells and springs and bottled (purified) water.

<sup>14</sup> Asian Development Bank, 2013.

<sup>15</sup> Ibid.

reservoir in 1904, Gyo Phyu reservoir in 1940, Phugyi reservoir in 1992, and Ngamoeyeik reservoir in 1995.

Water Supply in Yangon may be categorized into the YCDC water supplied system and non-YCDC water supplied system. Most of the water of YCDC- 90 percent - comes from reservoirs, supplemented by tube wells. The water is distributed through pipes to the users. But, in non-YCDC serviced areas, people have adapted and rely on various sources such as tube wells, rain water storage, streams, ponds, tapping into the piped water supply system of their neighbors, bottled water, water vendors, public tube wells and public taps, and also small public water supply systems.

The Yangon water supply service area (municipality) is composed of 33 townships. The townships without a water connection are being provided for by tube wells, lakes, and ponds. The water supply from available reservoirs can meet the needs of the existing population. However, there has been a lag between supply and demand because of many factors, including aging infrastructure, water leakages and inadequate pipeline connections in most townships. Only 38% in highlighted reports of the total households in Yangon are reached by YCDC-supplied water, as mentioned earlier in this paper. The rest of the population continues to rely on other sources.

Water usage per household is directly proportional to household income. The water usage per person is greater in high-income than low income families<sup>16</sup>. The availability of water in the downtown area (central business area) is more than enough compared to their households. Only a small percentage of the low-income population can access YCDC supplied water. There are still two townships that rely on their self- supply system (YCDC, 2016). Therefore, the water supply in the city is unable to provide 24-hour access to water for all residents.

Infrastructure is also an issue. Pipes over 100 years old are still operating, especially in the downtown area. Approximately 66% of total daily supply is lost because the pipeline connections have not been rehabilitated properly. Furthermore, 70% of all connections are equipped with meters. The duration of the water supply is highly variable. The availability of water depends on the distance from the water sources. The townships near the main distribution lines or sources can get more water in terms of duration and amount. Lastly, two thirds of water from reservoirs is distributed without any form of treatment and even when treated the treatment is still insufficient(JICA, 2014)<sup>17</sup>.

### **Ground Water Utilization**

Ground water is an important source of water supply for various uses and is used to meet the needs of city dwellers. Ground water is especially important for Yangon City, which relies on it more heavily than other urban areas in the world. The utilization of ground water from tube well by YCDC was started in 1983<sup>18</sup>. The number increased from 17 tube wells in 1983 to 442 tube wells in 2014 operated only by YCDC to meet the increase in population.

Consequently, ground water depletion is progressing at a rapid rate given the conditions in Yangon City. Population dynamics, rural-urban migration, urban area expansion, industrialization, improved living standards,

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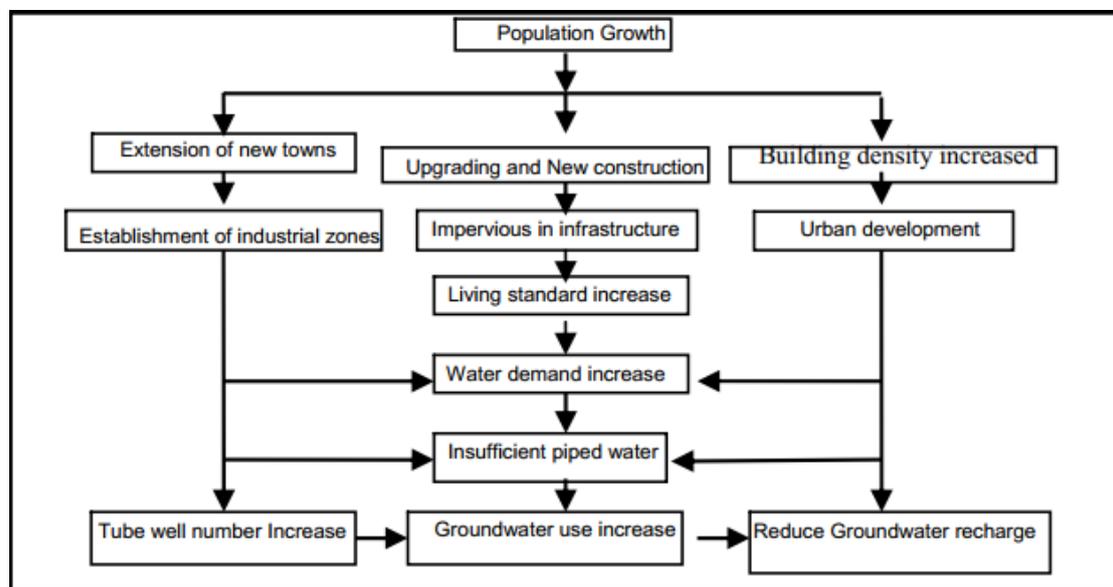
<sup>16</sup> YCDC, "Comprehensive Development of Yangon" 2016

<sup>17</sup> JICA, "Participatory Survey Report on Water Improvement Project in Yangon City"

<sup>18</sup> Khaing, Khin Kay, "Groundwater Utilization and Availability in Yangon City," 2016.

and insufficient water supply are just but some of the factors leading to increased ground water usage in Yangon City.

**Figure 2. Factors Influencing Groundwater Utilization<sup>19</sup>**



Source: Khaing (2011)

Based on local geological considerations, the potential ground water sources of Yangon City are divided into areas of high and low potential. Although 85% of the city is covered by an area of high potential, it depends largely on the long term recharge rate. This implies that the more groundwater extraction exceeds the recharge rate, the more the potential ground water source decreases. If there is a negative balance between the recharge and discharge rates, the ground water will be unsustainable. There are 14 townships with a negative balance in Yangon City: Ahlone, Kyeemyindine, Sanchaung, Kamayut, Hlaing, Yankin, Insein, Thaketa, Dawbon, Thingangyun, North Okkalapa, South Okkalapa, Shwepyitha, and Dagon Myothit (North) townships. The households of these townships have to rely on ground water due to the limited supply of YCDC water. This figure alerts the city planner to extend the existing water supply system to these townships and to maintain the areas of the city where the water supply remains rechargeable.

### III. Research Methodology

#### Research Design

This is a descriptive study that aims to document the water supply challenges in Insein Township, investigate the factors hindering sustainable supply, and recommend actions and strategies to improve access to safe and clean water in the township and city of Yangon as a whole. A research design is informed by the nature of the questions

<sup>19</sup> Ibid.

posed. Given the questions that we sought to answer, a mixed methods approach was deemed appropriate for the study. Quantitative data was collected using a survey of households randomly sampled in the township while qualitative data was collected from relevant key informant interviews. Secondary data was also utilized in the study.

### **Study Site**

The selection of Insein Township as a study area among other townships in Yangon was due to many factors. First, the research team has had personal experiences with water shortages in the township during the summer season. Second, the total urban population in Insein is relatively higher than in other townships- only three townships have a higher urban population than Insein. Third, it has the potential for economic development, especially in the southeast zone of Yangon. Therefore, the rate of water demand is likely to be high in future. Fourth, the township is topographically hilly compared to other townships. So, the availability of water is highly variable. Lastly, the researcher's organization has a strong relationship with Members of Parliament (MP) from Insein Township. So, it can be feasible to give recommendations and suggestions from the findings of the research.

### **Sample size**

Insein Township comprises 22 wards. Out of these, only seven rely on municipal water supplied through YCDC. This study focused on these seven wards and 11 households were randomly selected to represent each ward. In total, we collected data from 77 households. In each household, we interviewed a member who was familiar with issues related to water availability in their home. In addition, key informants were purposively selected to give in-depth information on water-related management and policy issues at the township level and in the city as a whole. The unit of analysis for this study was the household.

### **Data Collection and Data Sources**

This study relied on both primary and secondary data. Primary data was collected through a survey and key informant interviews. In the survey, questionnaires were administered face to face with selected household members. Additionally, key informant interviews were conducted with representatives of YCDC at the township level, ward administrators, and local residents who are knowledgeable on water issues. Secondary data was collected from relevant reports, papers, books, and newspaper articles which formed the desk study review before collection of primary data.

### **Data Analysis**

A combination of quantitative and qualitative analysis was employed to analyze the data. Quantitative data which was generated from the household survey was analyzed and presented using simple descriptive statistics such as frequency, mean, and percentages. The analysis was done with the help of the Statistical Package for Social Sciences (SPSS) and Excel. Qualitative data collected using KIIs was coded and analyzed thematically and interpretations made accordingly.

## IV. Results and Discussion

### Characteristics of Respondents

During the household survey, there was a high probability of finding women respondents and older people in general. This is because, often, they are the ones left at home during the day as the younger household members are engaged in work outside the home. As a consequence, 52% of our respondents were women. Moreover, more than half of the respondents were above 50 years old and the average age of the respondents was 52 years.

In terms of occupation, 35% were categorized as random laborers or casual workers, 20% were retirees, and 18% were shop owners. The average household size of the respondents was 5.6, that is, nearly six family members in each household. This means that the water demand is likely to be high in this township.

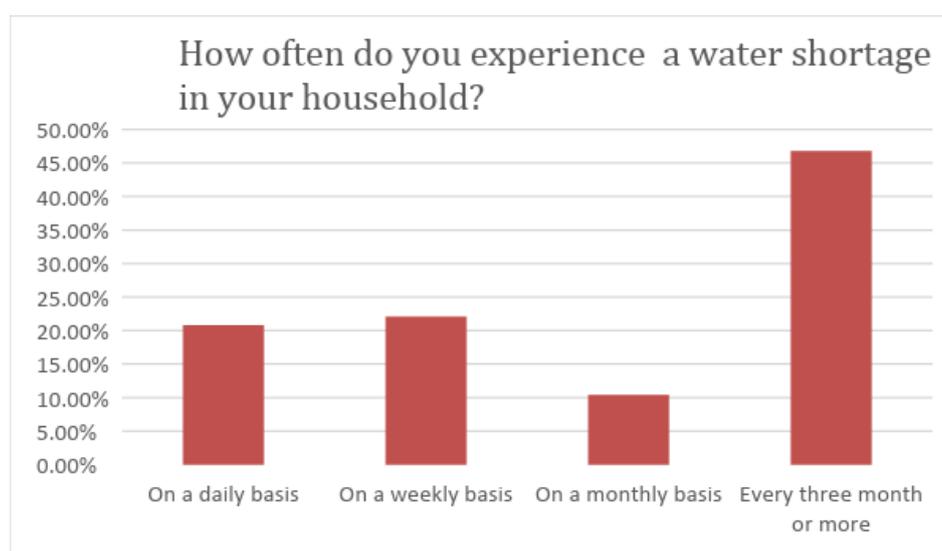
**Table 2. Demographic Characteristics of Respondents**

<b>Female</b>	52 %
<b>Male</b>	48 %
<b>Average Age</b>	52 years
<b>Average Household Size</b>	5.6 members

### Water Supply Challenges in Insein

Water shortages were reported as common by many respondents. Forty-seven percent reported experiencing shortages every three months or more. Approximately 21% of respondents reported experiencing shortages daily while 22% reported experiencing shortages on a weekly basis.

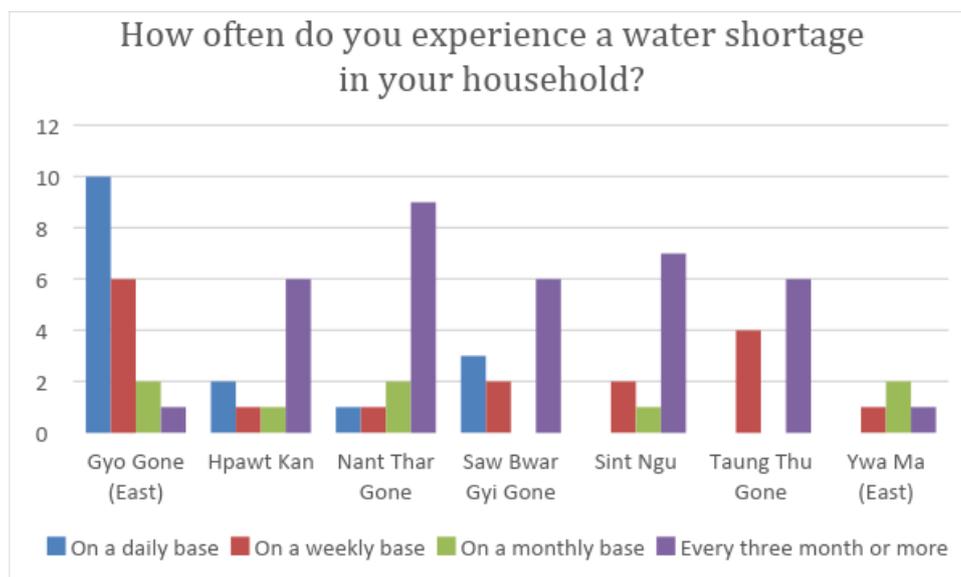
**Figure 3. Household Experiences of Water Shortage**



Source: Survey data (2018)

Additionally, when we looked at the ward-disaggregated data, we found out that the ward that reported most frequent shortages was East Gyo Gone, followed by Taung Thu Gone and Hpawt Kan wards.

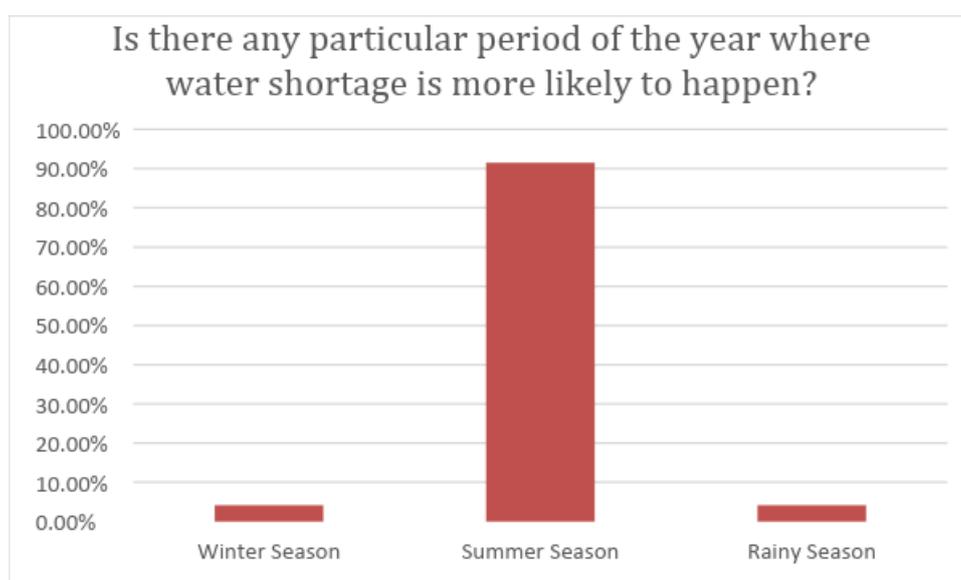
**Figure 4. Household Experience of Water Shortage in Each Ward**



Source: Survey data (2018)

Additionally, a key informant from Gyo Gone (East) ward highlighted that “**there are still households that do not get water for five to seven days**” (December, 2017). Furthermore, water shortages were found to be highly seasonal. For example, over 90% reported to have experienced shortages during the summer season, with only 8% experiencing shortages during the winter and rainy seasons combined. The summer season runs from months March to October. This means that the majority will have water problems through these months.

**Figure 5. Seasonal Household Experience of Water Shortages**

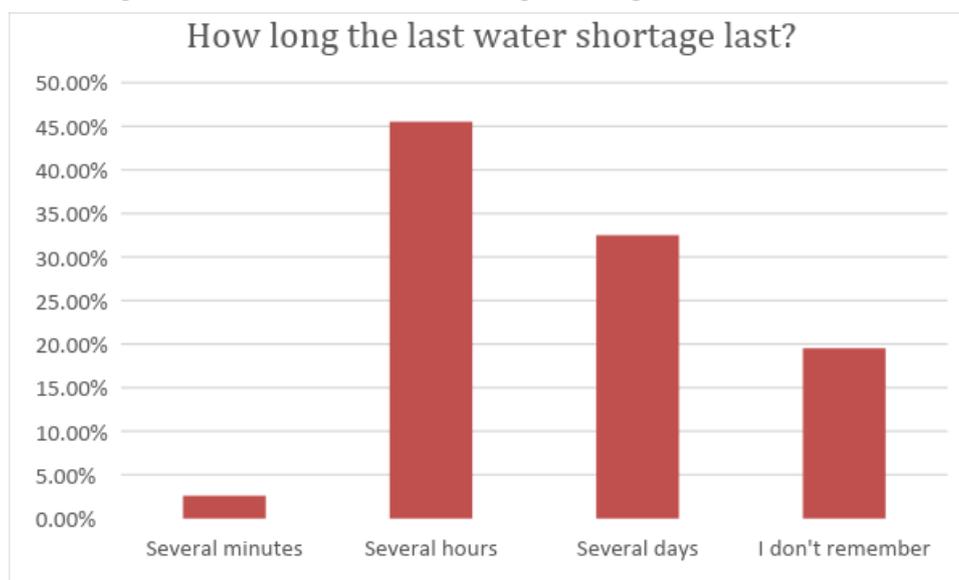


Source: Survey data (2018)

The shortages during the summer season might be related to the volume of water available in the four reservoirs that serve Yangon City. These are Hlawga, Gyo Phyu, Phugyi and Ngamoeyeik. This presents a major challenge for YCDC in terms of supplying enough water to Yangon City residents during the summer, especially in the future with increased urbanization.

The survey also showed that when the shortages occurred, they lasted for different durations ranging from a few minutes to several hours and sometimes they could go for days. Majority (46 %) experienced shortages for several hours while a significant number (33%) had to bear the shortages for days.

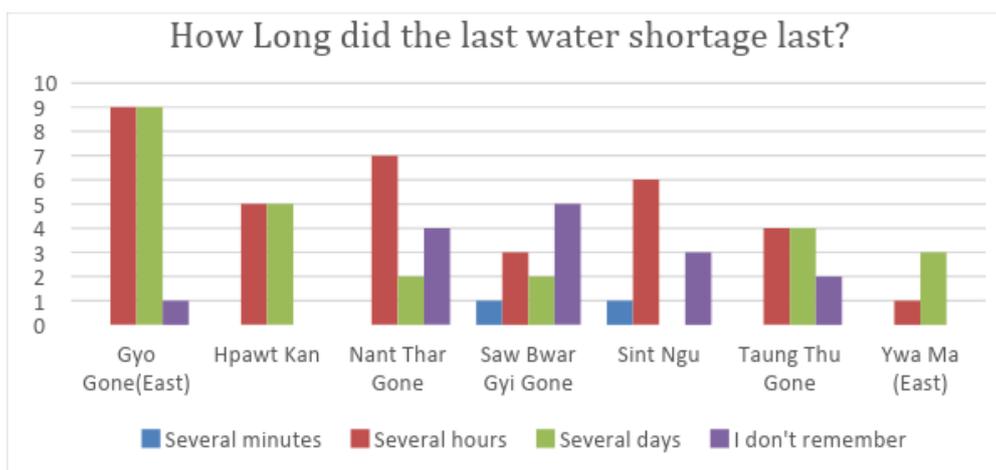
**Figure 6. Duration of Water Shortages among Different Households**



**Source: Survey data (2018)**

When we looked at ward disaggregated data, we found yet again that Gyo Gone East and Hpawt Kan had the longest durations of water shortages compared to the rest of the wards supplied by municipal water.

**Figure 7. Duration of Water Shortages in Each Ward**

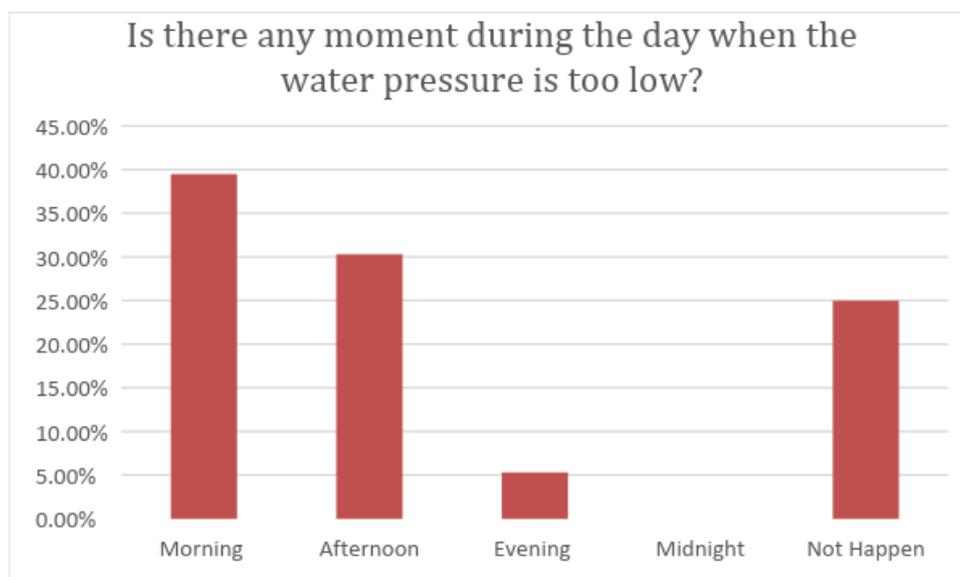


Source: Survey data (2018)

**Water Pressure and Alternative Sources**

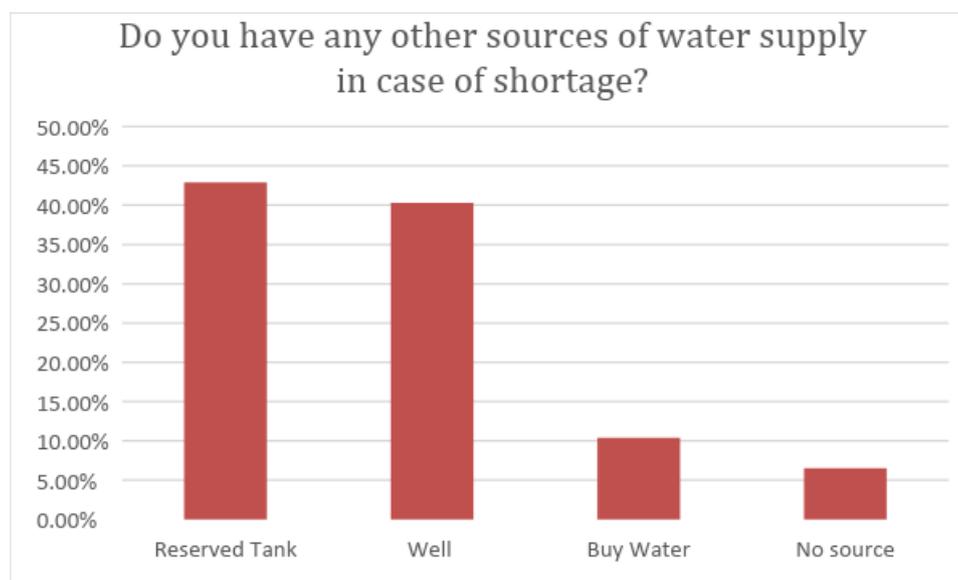
Water pressure also varied during the day amongst the households surveyed. There were particular moments of the day when the water pressure was considered too low. For example, almost 40% of respondents reported experiencing low water pressure in the morning while pressure was highest at midnight. This affects respondents negatively because it is usually in the morning hours that households require water for cooking and cleaning. Also, the fact that water pressure was high at midnight forced some members of the family to either stay up late or wake up in the middle of the night to enable them collect and store enough water for use.

**Figure 8. Daily Water Pressure amongst Different Households**



Source: Survey data (2018)

As a consequence of frequent water shortages, some lasting for hours or days, we found out that the respondents were relying on alternative water sources.

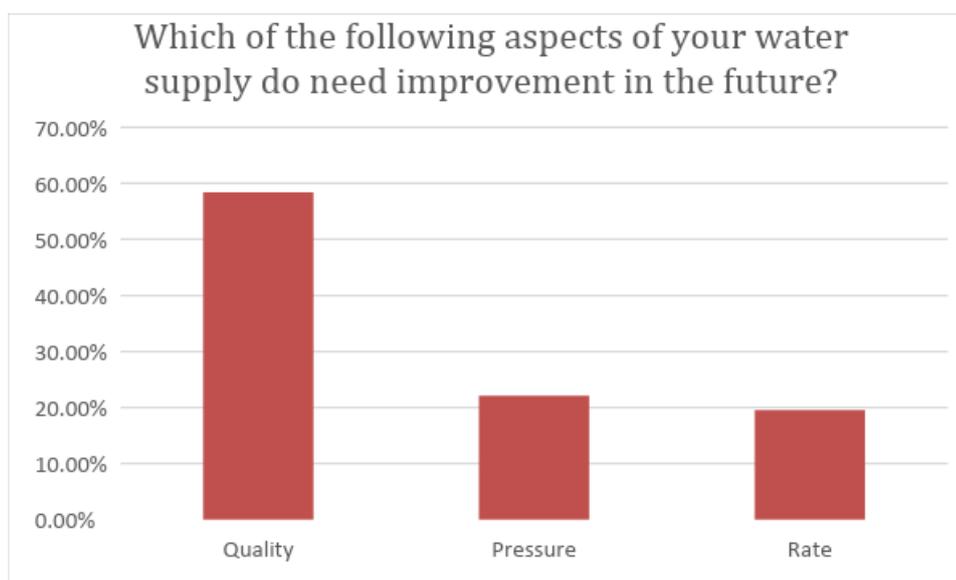
**Figure 9. Alternative Water Sources of Households**

Source: Survey data (2018)

The majority (82%) relied on reserved tanks and wells while 10% had to buy water from street vendors. There was also a significant number of 6% who did not have an alternative source. One key informant stated that **“We have to fix the shortages ourselves because the responsible persons from YCDC only come when they want to (December, 2017)”**. In addition, another mentioned that **“People solve the problem of water by using underground water and water from the lake (December, 2017).”**

### **Water Quality and Improvement**

Water quality was regarded as a big problem. A majority of respondents (over 58%) argued that water quality needed much more improvement than water pressure and rate. This is a challenge for YCDC to improve water quality. It also means that the residents of Insein are much more concerned with the quality of the water that they consume than the quantity that has been made available to them by YCDC.

**Figure 10. Demands for Improved Water Supply Services**

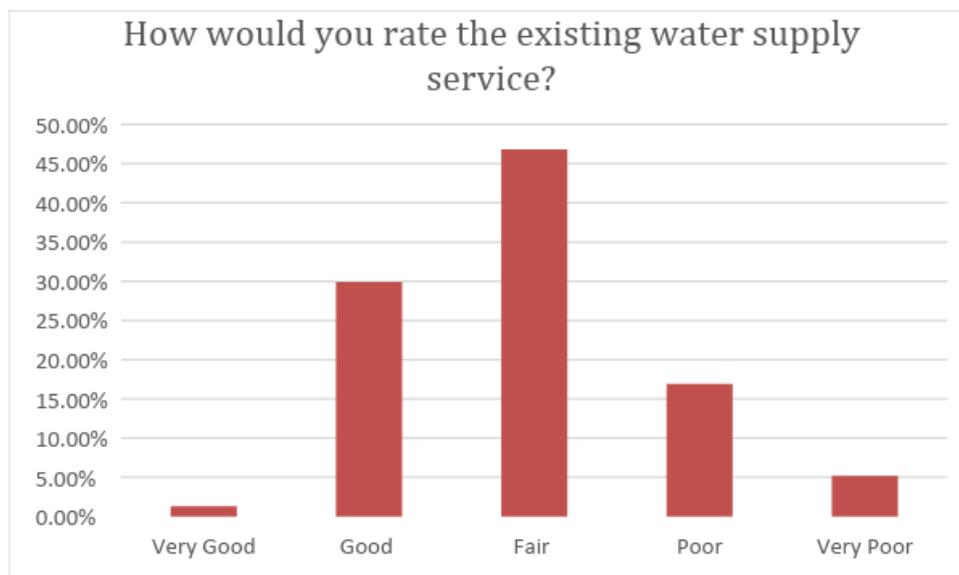
Source: Survey data (2018)

This is a concern because ideally, YCDC water should be the cleanest and safest for cooking and drinking compared to other alternate sources of water whose quality is not assured. This also forces the residents to always buy drinking water. Given that the average household size was six, households end up spending a lot of money on drinking water. This has a negative economic implication for the poor families.

One of the key informants argued that **“Without good quality pipes, the water quality will not be good. They (YCDC) install the pipes along the drainage line. Which is why the water is contaminated or the water cannot be cleaned when the pipes are broken (December, 2017)”**. Moreover, the quality of the water pipe system was a common problem for most of the wards in Insein Township. More than half of the key informants talked about the problem of pipeline quality and connection. One of them said that:

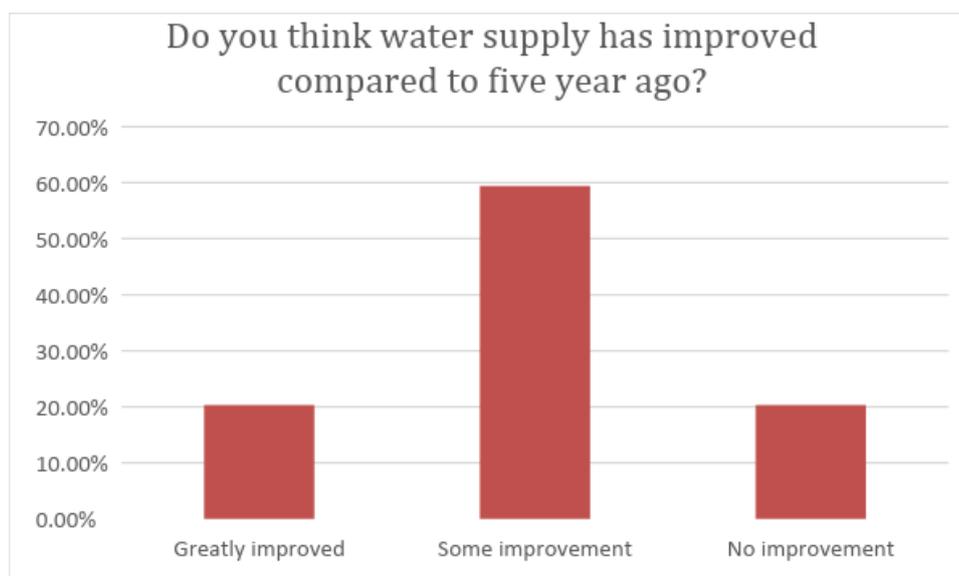
The pipes were not set up well. Some pipes are not good enough because they were set up many years ago. Also, the pipes have not been rehabilitated properly. The consequences of this are water leakages and large amounts of non-revenue water leading to water shortages (December, 2017).

Another key informant stated that **“The YCDC’s solution is just for the short term, it is not good for the long term. When they set up the pipelines, the workers are not technicians. In some places, the pipes are overlapping (December, 2017)”**. Despite the serious concerns expressed regarding water quality, most of the respondents rated the existing water supply service as either good or fair (79%). Only 22% perceived the service as poor or very poor.

**Figure 11. People Perception of the Existing Water Supply**

Source: Survey data (2018)

Additionally, when asked whether the water supply had improved now compared to five years ago, 59% reported some improvement while 20% did not think there had been any improvement. Only 20% reported some improvement.

**Figure 12. Improvement of Water Supply Services**

Source: Survey data (2018)

Despite the concerns over water quality, only a few respondents (26%) had made a complaint related to water service in the past year. There seemed to be a general level of satisfaction with the supplied service (79%) and a perception of some improvement of the same in the past five years (59%). This could explain the reluctance of the majority of residents to report or file any water-related complaints. On the other hand, there were also serious concerns related to water quality, which were rarely reported.

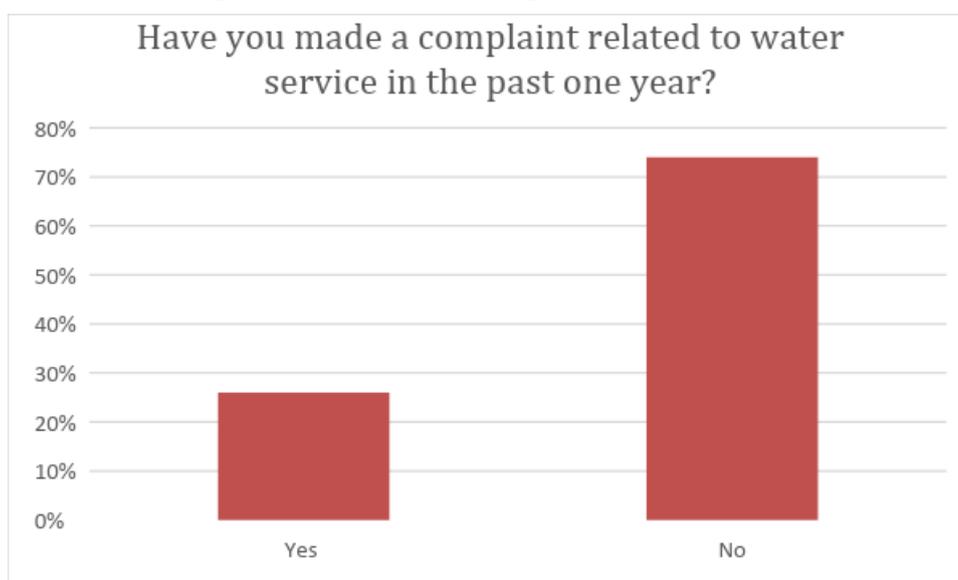
One of the key informants observed that **“it is easy to move a complaint regarding a water shortage but the action from the responsible person seems slow...some people directly complain to YCDC, some go to the township administrator and some to the ward administrator.”** (December, 2017)

The sentiments of the key informant above could partly explain the reluctance to report any water service-related challenges. A representative of the Water and Sanitation Department within the study area described the complaint mechanism path as follows:

We have to move complaints such as water pressure, water leakages and tubes which are commonly reported as they do not work well. We handle the solutions within our capacity. Beyond our capacity, we just ask the head office to solve it (December, 2017).

The representative also said that they preferred that those consumers in the neighborhood receiving water supplied by YCDC channel their complaints to the local department of water and sanitation as they are better placed to handle the problems through ward administrators.

**Figure 13. Households' Complaints to Water Services**

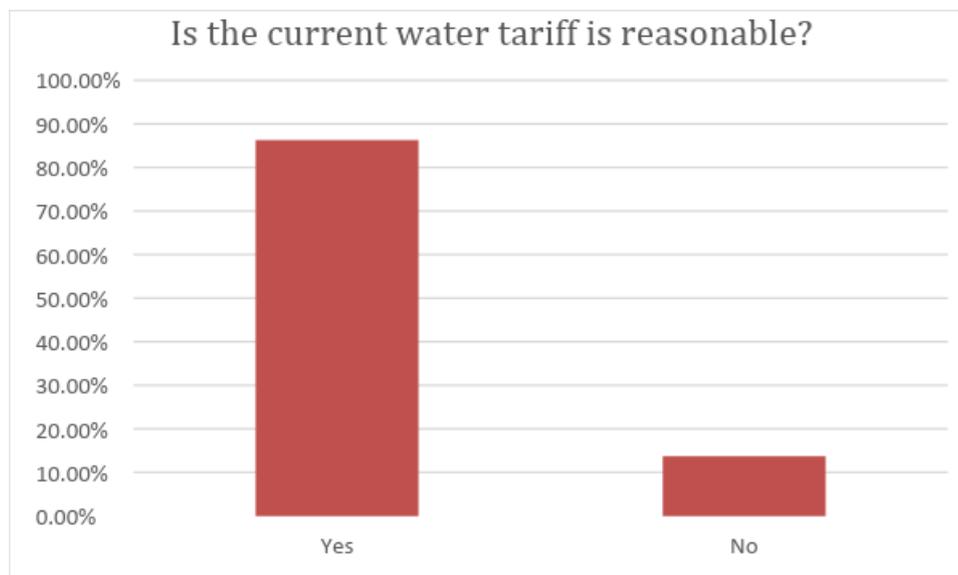


**Source: Survey data (2018)**

### Water Cost and Distribution

Water tariffs are also important to ensure a sustainable water supply. Municipal water consumers in Insein Township perceived the current water tariff as reasonable.

**Figure 14. Current Water Tariff of YCDC**



Source: Survey data (2018)

A majority of 86% felt that the water tariff was reasonable. The current tariff is 88 MMK per unit of water for domestic use. Furthermore, when asked if they were willing to pay more for an improved water supply, a majority (61%) of the respondents said yes. This means that residents do not mind paying more for an improved supply of water.

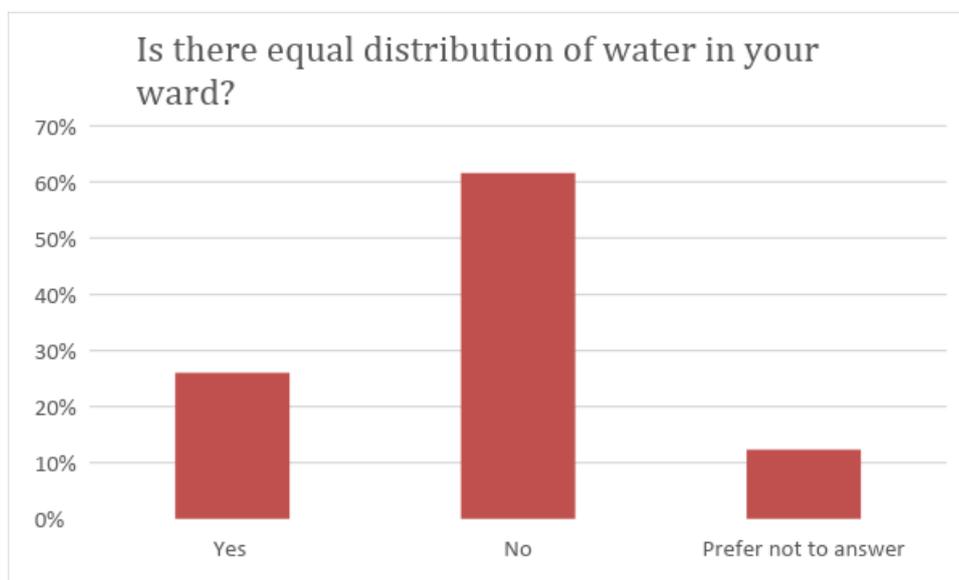
**Figure 15. Willingness to Pay for an Improved Water Supply**



Source: Survey data (2018)

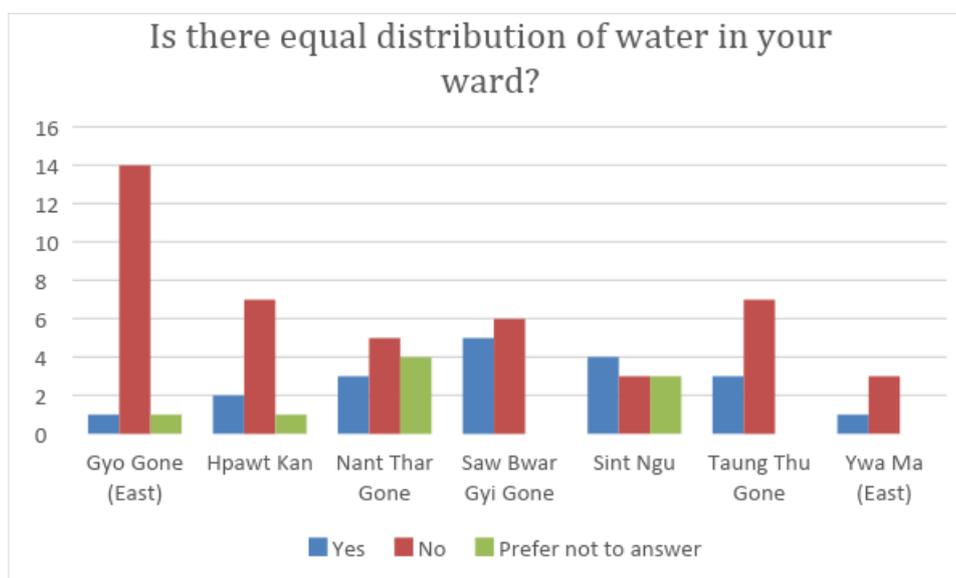
When asked about the fairness of water distribution throughout different wards in the study area, the majority (61%) of respondents said that they felt that the water distribution was not fair. Some wards experienced much more shortages and for longer durations than others. Specifically, the hilly areas of the township reported receiving less water than others.

**Figure 16. Distribution of Water amongst Wards**



Source: Survey data (2018)

**Figure 17. Distribution of Water in Each Ward**

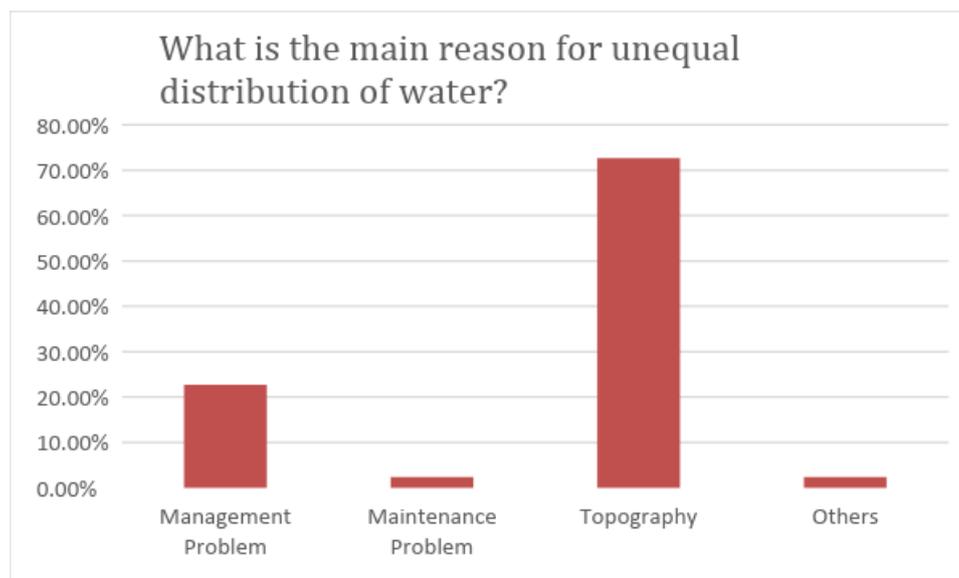


Source: Survey data (2018)

From Figure 17, Gyo Gone (East), Hpawt Kan and Taung Thu Gone reported higher dissatisfaction with the water distribution in the township.

Topography was identified as the main reason for the unequal distribution of water across the wards by 73% of respondents, while management problems were identified as the second highest cause with 23%. Although there were concerns about the quality and age of the pipes as well as how they are laid - all related to maintenance challenges - only 2.3% of respondents thought that this could explain the unequal distribution.

**Figure 18. Reasons for Unequal Water Distribution**



**Source: Survey data (2018)**

## V. Conclusions

The provision of water in Insein Township does not appear efficient, especially in some wards. With increased urbanization and an enhanced need for water for economic activities, there is likely to be increased pressure on the use of surface water and extraction of ground water. Our study showed that this is the case for Insein Township as people try to look for alternative sources of water.

The challenges of municipal water provision in Insein Township are multidimensional in terms of reliability and accessibility. They included, among others, an aging infrastructure and pipes which lead to a huge number of water leakages, low water pressure especially in morning and afternoon that affects many households, short duration of water supply, unequal distribution amongst different wards, and topography.

Furthermore, water shortages were found to be highly seasonal, with the most regular and longest shortages being experienced during summer. This is partly because the majority of the existing sources of water come from surface water which is dependent on the volume of the water in the reservoirs. Therefore, this is a constant challenge facing YCDC during the summer season, and one they will have to address in the future especially due to the rapid urbanization in Yangon.

In addition, the water tariff has not been properly set and this likely affects the ability of YCDC to collect enough revenue to guarantee an efficient and regular supply to its customers. Besides, the small team of YCDC is inefficient when it comes to collecting the charges from all the households in time. It is highly likely that the set price does not fully reflect the actual volume of water consumption of each household.

In addition, there is no monitoring of the service or systematic plan for its maintenance. YCDC did not have enough human capacity to promptly support all the affected households when a water supply or leakage problem was reported. They only implemented short-term fixes for complex problems.

Water quality was also found to be a big issue common among the wards. In our study, most of the respondents highlighted the quality issue. It was observed that this might be because of the contamination along the aging pipelines and poor treatment of water among other factors.

Although water shortages were reported across the township, there are three wards that seem to experience much more frequent shortages than the rest, with longer durations. These are Gyo Gone (East), Hpawt Kan and Taung Thu Gone respectively. These, in our view, are the wards that YCDC should prioritize.

## VI. Recommendations

While YCDC is improving the existing water supply system, it should consider the following measures:

In the short term:

- There is a pressing need to improve the quality of the water supplied in order to meet the standards of drinking water safety.
- Increase the quality of the pipelines to minimize water leakages so that water is not wasted and the service is more efficient and able to provide a larger volume of the commodity.
- Immediate support should be given to the three wards in which the water supply system performed poorly. As the water shortage was particularly high especially in the hilly areas, setting a pumping system could improve the water provision in these wards.
- Upgrade the existing collection system of water tariffs to a system where YCDC is able to collect the fees. This could include the creation of a new method of collection or of a new unit that only works on water taxation.

For the long term:

- Formulate a proper water tariff policy so that the costs of water provision are covered. Furthermore, there is a need to develop new methods to gauge household water consumption and have households pay according to the volume of water used.
- In order to prevent the depletion of ground water sources - already under considerable stress – which would lead to higher prices and land subsidence, it is necessary to expand and strengthen the water supply system that originates from surface water.
- Related to this above point, there is a need for policies of conservation that could protect and monitor the state of water sources and water catchment areas.
- The new water supply strategies should be demand-oriented. This model would allow officials to tackle specific issues and needs and to provide the best value for the money invested.
- It is necessary to invest in the development of a larger number of water treatment plants to improve the general quality of the water supplied over time. ■

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## Appendix I: Questionnaires

### Part One: Household Profile Data

Wards	Sex	Age	Occupation	No. of People in the Household

### Part Two: Questionnaire

1. How often do you experience a water shortage in your household?
  - a) On a daily basis
  - b) On a weekly basis
  - c) On a monthly basis
  - d) Every three months or more (please specify)
2. Is there any particular period of the year where shortage is more likely to happen?
  - a) Winter Season
  - b) Summer Season
  - c) Rainy Season
3. Is there any moment during the day when the water pressure is too low?
  - a) Morning
  - b) Afternoon
  - c) Evening
  - d) Midnight
  - e) No
4. How long did the last water shortage last?
  - a) Several dozen minutes
  - b) Several hours
  - c) Several days
  - d) I don't remember

5. Do you have any other source of supply of water in case of a shortage?
  - a) Reserve tanks
  - b) Wells
  - c) I buy water from my neighbors/private services (please specify)
  - d) No
6. How would you rate the existing water supply service?
  - a) Excellent
  - b) Very good
  - c) Good
  - d) Bad
7. Which of the following aspects of your water supply need improvement in the future?
  - a) Quality
  - b) Pressure
  - c) Rate
  - d) Reliability
8. How many water shortages did you experience last year?
  - a) 1 – 5
  - b) 6- 10
  - c) 11 -15
  - d) 16 – 20
  - e) More than 20 (times)
9. Do you think the water supply system has improved compared to five years ago?
  - a) It has greatly improved
  - b) There have been some improvements
  - c) There have been improvements but they are not sufficient
  - d) There have been no improvements

10. Have you made a complaint related to the water service in the past one year?
  - a) Yes
  - b) No
  - c) I don't remember
11. (If a respondent answered yes to the previous question) What was the result of the complaint?
  - a) Prompt action taken
  - b) Delayed action taken
  - c) No action taken
  - d) Prefer not to answer
12. Is the current tariff reasonable?
  - a) Yes
  - b) No
  - c) I don't know
13. Are you willing to pay more for an improved water supply?
  - a) Yes
  - b) No
  - c) Prefer not to answer
14. If there equal distribution of water in your ward?
  - a) Yes
  - b) No
  - c) Prefer not to answer
15. (If a respondent answered yes in the previous question) What is the main reason for that?
  - a) Management Problem
  - b) Maintenance Problem
  - c) Topography
  - d) Other

This series of reports was compiled as a part of the “Strengthening the Capacity of Civil Society in Myanmar Year Two” program. The research for these reports was conducted entirely by EAI’s partner think tanks in Myanmar, including Sandhi Governance Institute, Open Myanmar Initiative, Yangon School of Political Science, Yone Kyi Yar Knowledge Propagation Society, Salween Institute for Public Policy, Another Development, and Naushawng Development Institute.

This program was funded in part by the National Endowment for Democracy (NED).

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