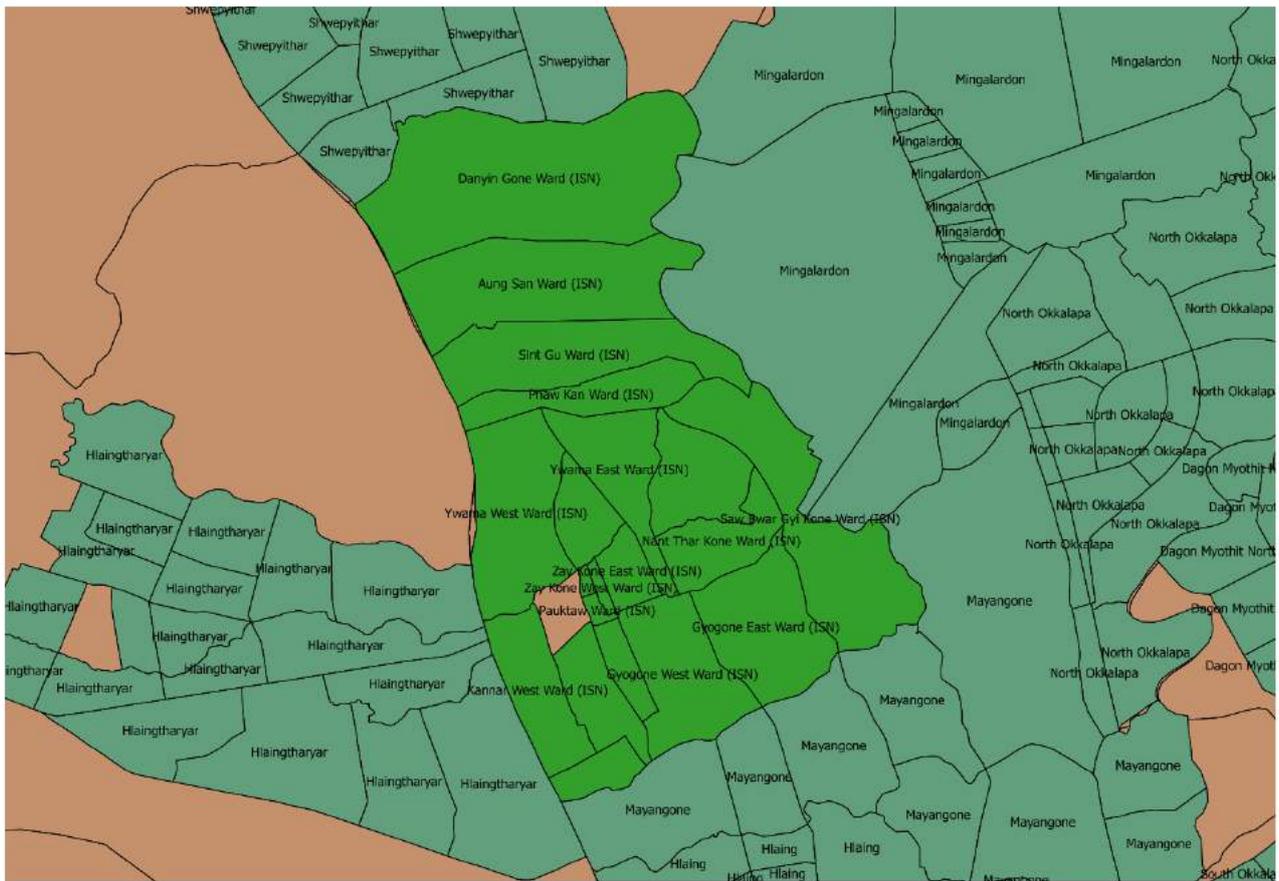




ACCESS TO CLEAN AND SAFE WATER IN YANGON

A Case of Municipal Water Provision in Insein Township



August 2018
Research Report

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Acknowledgement

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Research Team

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Abbreviation

ADB	Asia Development Bank
CSO	Civil Society Organization
IWRM	Integrated Water Resources Management
JICA	Japan International Cooperation Agency
NGO	Non-governmental organization
UN	United Nations
UNICEF	United Nations Children's Fund
WCED	World Commission on Environment and Development
WHO	World Health Organization
YCDC	Yangon City Development Committee

Executive Summary

Access to clean, safe and reliable water remains a challenge to many people across the world, especially in developing countries. Myanmar faces a similar challenge, despite having ample water resources and reliable rainfall. In Yangon city for example, only 38% of the population is reached by municipal water supply, majority relying on alternative sources. This study sought to explore the challenges of current municipal water supply in Yangon city, employing a case study approach of Insein township. Additionally, we aimed to explain factors that hinder sustainable supply of water in the same area and recommend actions that can be taken to improve supply of water to the city residents.

A mixed methods approach was employed in the study where quantitative and qualitative data was collected. Quantitative data came from a household survey comprising of 77 household interviews. These households were randomly selected from the seven wards supplied by YCDC water in the township. Additionally, key informants were purposively selected and interviewed to provide in depth information on water-related management and policy issues in the township level and Yangon city as a whole.

We found out that the provision of water in Insein township does not appear efficient, especially in some wards. Water shortages were reported and were found to be highly seasonal, with most regular and longer shortages being experienced during summer. Although these shortages were reported across the township, there are three wards that seem to experience much more 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 give an immediate focus. Also, water quality was reported to be a big problem. It was observed that this might be caused by contamination along the aging pipelines and poor treatment among others. Additionally, the water tariff has not been properly set and this likely affects the ability of YCDC to collect enough revenue to guarantee efficient and regular supply to its customers. Overall the challenges of municipal water provision in the township were found to be multidimensional, and included, among others, an aging infrastructure and pipes which lead to high amounts of water leakages, low water pressure especially in the morning and afternoon, short duration of water supply, unequal distribution amongst different wards and topography.

In conclusion, the study recommends, among others, improvement of the quality of water supplied by YCDC in order to meet the standards of drinking water safety and rehabilitation of the pipelines to minimize water leakages. Also, YCDC should come up with an immediate action to address the particular issues related to the supply of water to the three wards highlighted above. As the water shortage was particularly high especially in the hilly areas, setting up a pumping system could improve the water provision in these wards. There is also a need to upgrade

the existing collection system of water tariff to a system where YCDC are 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. Lastly, as a long-term measure, YCDC should 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 the household's water consumption and pay according to the volume of water used.

1) Introduction

1.1. Background to the Study

Water is one of the most crucial and non-substitutable environmental resources for human beings. 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 10 people worldwide, or 2.1 billion, lack access to safe, and readily available water.¹(WHO and UNICEF, 2017).

Water scarcity, especially in urban areas of developing countries becomes a pressure for 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 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**² (Cohen, 2006). With 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.³ This will contribute to more depletion of available water resources.

Myanmar is one of many developing countries that experience water scarcity across different urban and rural areas. For one, urban population in Myanmar is estimated to be approximately 30% of

¹ WHO/UNICEF Joint Monitoring Programme 2017 report

² Cohen, B. (2006), "Urbanization in developing countries: Current Trends, Future Projections, and key challenges for sustainability

³ Khaing KK., (2011) "Ground Water Utilization and Availability in Yangon City"

total population (Census, 2014). In most urban areas, however, investment in infrastructure has been low, especially in 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 through improvising self-supply such as the use of private water vendors, private system involving a tube well as well as the reliance on public wells among others. (ADB, 2013)⁴

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 Mandalay⁵ - the second largest city. It is situated at the confluence of three rivers_ 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 Yangon City Development Committee (YCDC) is still inadequate as it covers only 38% of Yangon population (JICA, 2014).

⁴ Asian Development Bank, (2013) "Urban Development, Water Sector Assessment, Strategy and Road Map

⁵ Mandalay is the second largest city in Myanmar. See 2014 census population

Access to clean and safe water remains a pressing issue since Yangon is undergoing rapid economic growth which is likely to result to fast-paced urbanization. These combined are expected to stress further the water supply system and its alternatives. The same could also exasperate differences in services among areas in the same townships. **Yangon city comprises of 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, the township is likely to witness increased levels of migration, partly due to its location, which 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 which can be taken to improve supply to the residents of the city. This is because taking action now will prevent the development of chronic malfunctions and unfair distribution in future.

1.2. 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 remains a challenge for majority of the population in both urban and rural areas. In Yangon city, only 38% of the population is reached by municipal water supply and as mentioned in the introduction, majority of the population has found alternatives in other sources such as groundwater, tube wells, and private water vendors etc., which are untreated and unlikely to meet bacteriological guidelines for drinking (ADB, 2013).

Furthermore, 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. Also, 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. When it comes to 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 therefore 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.

1.3. 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 hope can take up our recommendations and act on them. They include but are not limited

to: 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.

1.4. Research Questions

This study sought to answer the following questions.

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

1.5. Research Objectives

The study's aim was:

- a) To explore current water supply challenges in Insein Township
- b) To investigate factors that hinder sustainable supply of water in 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.

1.6. Limitations of the Study

This study has several limitations. One is the scope of the research. We selected one township out of 33 which all together make up Yangon region. This was due to human resource and financial constraints. We however 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 judgment about the case and possibly apply the information to other similar townships in the city.

Also, Myanmar people are not used to speaking out and expressing their real challenges and concerns to researcher, government representatives and actors viewed as outsiders by the local communities. This may have influenced the nature of their responses 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.

2) Literature Review

2.1. The Concept of Sustainability and Sustainable Water Supply

Previously, most governments in both developed and developing countries 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 United Nations (UN) Report in 1987. In the report, sustainable development is defined as the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. ⁶(WCED, 1987). This definition attempts to balance the social and economic wellbeing of the present with

the impact of current patterns for the future.

There are many other definitions of sustainable development that have been advanced by international organizations and academicians. World Business Council describes sustainable development, as the kind of development that involves the simultaneous pursuit of economic prosperity, environmental quality and social equity. (Elkington , 2002)⁷ 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.

⁶ World Commission on Environment and Development, "Our Common Future" (1987)

⁷ Elkington J (2002) *Cannibals with Forks*. Oxford, UK: Capstone

Sustainable water supply comes from this concept of sustainability. Through the spectacles of sustainability, water supply must be broader than the pure technical aspects, meaning that operational, institutional, contextual and policy aspects ought to be considered as well. Sustainable water supply should therefore be, that supply which 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 uses and for other living things. (Schnoor,2010)

2.2. Urban Water Challenges in Developing Countries

Water scarcity in urban areas is an enormous challenge in developing countries, especially with increasing population 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 (UNICEF/WHO, 2004). The same report predicts

that half of India 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. However, the list is by no means comprehensive but it 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"> • Difficult sites and terrain • Complicated site layout • Conventional System overreliance
Implementation	<ul style="list-style-type: none"> • Investment capital • Institutional capacity • Community capacity
Monitoring and evaluation	<ul style="list-style-type: none"> • Regulations, guidelines, standards • Technical capacity • Decentralization

Operation and maintenance

- Finance, ability to pay
- Post construction support
- Community Participation

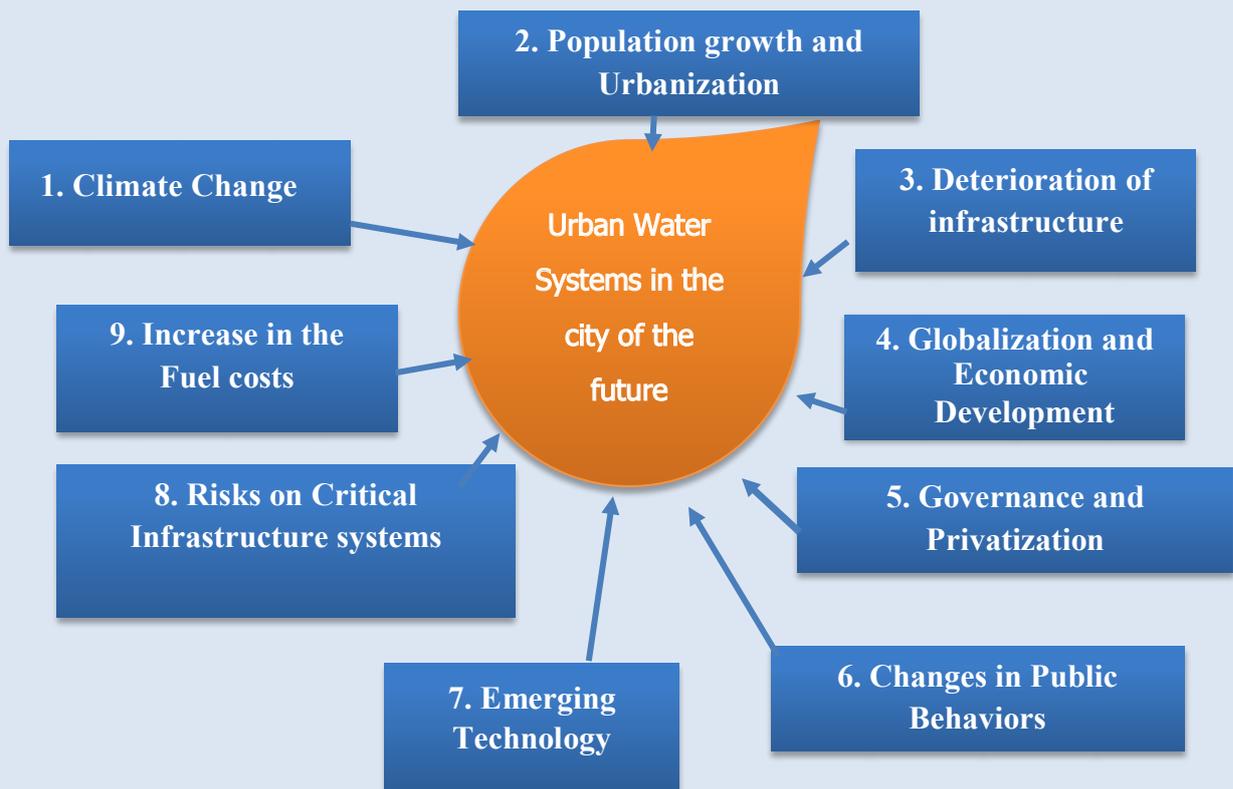
Source: Grady, et al (2014)

2.3. 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

for urban water systems in the city of the future highlighted in figure 2, provides the framework employed to base the study's answer to the question on sustainable water supply challenges.

Figure 2: Global and regional pressures on urban water systems



Source: Vairavamoorthy, 2008⁸ move the source up to the figure

⁸ Vairavamoorthy K. (2008), Cities of the future and urban water management

Some of the challenges mentioned in figure 2 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 it in such a way that quality water can continue to be delivered to all sectors and wastewater can be adequately collected and treated.

2.4. Access to Clean and Safe Water in Myanmar

Myanmar has favorable conditions in terms of water resources - ranging from rivers, lakes, rainfall and forests etc. 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, which accounts for 89 % while the rest is accounted for domestic and small industrial uses. The storage of water varies from large public to 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 which people are relying on. The more the river pollution increases, the more people, especially living close to rivers are at health risk. Furthermore, the over exploitation of ground water is increasing with population growth.

In addition, natural diffused arsenic contamination of ground water becomes a wide spread problem.⁹ (IWRM, 2014)

With respect to access to clean and safe water, 69.5 percent of all households in Myanmar received water from improved sources, while the others did not.¹⁰(Census, 2014). Furthermore, urban areas have better access to improved water than rural areas with 86.7% in urban and 62.7% in rural respectively. Nevertheless, urban supply systems in Myanmar are generally very old, with only intermittent supply and poor water quality.¹¹ Municipal water services do not reach a large proportion of urban population. The dwellers have had to cope with inadequate provision by improvising self-supply through many small private systems and water vendors. The people, especially living in slum and peri-urban areas spend a significant proportion of their household income on buying water (YCDC, 2016).

Urban water supply system in Myanmar aims for the provision of 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. Piped water system in the main cities of Yangon and Mandalay include untreated surface water from open reservoirs and the hours of supply is highly variable. In other cities, there is a noticeable lag and there are some cities where municipal water supply does not even exist.¹²

⁹ Myanmar Integrated Water Resources Management Strategic Study (2014)

¹⁰ Sources considered to be safe are grouped together as improved water- piped water, tube wells (boreholes), protected wells and springs and bottled (purified) water.

¹¹ ADB, "Myanmar urban development and water sector assessment, strategy and road map" (2013)

¹² *ibid*

2.5. Water Supply in Yangon City

In 1842, YCDC water supply in Yangon City was started with 30 wells in the center of the city. Then, it was operated using pumps and conduits 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 reservoir in 1904, Gyo Phyu reservoir in 1940, Phugyi reservoir in 1992 and Ngamoeyeik reservoir in 1995 respectively.

Water Supply in Yangon is categorized into: YCDC water supplied system and non-YCDC water supplied system. Approximately 90% of water supplied by YCDC comes from reservoirs, supplemented by tube wells. The water distribution is through pipes to the users. But, in non-YCDC serviced areas, people have adapted to such various sources such as, tube wells, rain water storage, streams, ponds, neighbors' piped water supply system, bottled water, water vendors, public tube wells and public taps and also include small public water supply system.

The Yangon water supply service area (municipality) is comprised of 33 townships. The townships without 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 have been a lag between supply and demand because of many factors, including aging infrastructure, water leakages and inadequate pipelines connection in most townships. As highlighted earlier in the report, only 38% of total households in Yangon are reached by YCDC supplied water. The rest of the population have relied on other sources.

Water usage per household is directly proportional to household income. The water usage per person is higher in high-income than in low-income families.¹³ The availability of water in the downtown area (central business area) is more than enough compared to their households. Only a small percentage of population with low income can access the YCDC supplied water. And there are still two townships which rely on their self-supply system (YCDC, 2016). Therefore, the water supply in the city is unable to reach all residents round the clock.

As relates to the infrastructure, over 100 years old aged pipes are still operating especially in the downtown area. Approximately 66% of total daily supply

¹³ YCDC, "Comprehensive Development of Yangon" 2016

¹³ JICA, "Participatory Survey Report on Water Improvement Project in Yangon City"

is lost because the pipe line connections have not been rehabilitated properly. Furthermore, 70% of all connections are equipped with meter. The duration of water supply is highly variable. The availability of water depends on the distance from the water resources. The

townships near the main distribution lines or sources can get more 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 insufficient¹⁴. (JICA, 2014)

2.6. 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 more important for Yangon City, which mainly rely on it, as other urban areas in the world. The utilization of ground water from tube well by YCDC was started in 1983¹⁴. The number increased from 17 tube wells in 1983 to 442 tube wells in 2014 operated only by YCDC.

Consequently, ground water depletion is progressing at a fast rate given the conditions in Yangon city. For example, population dynamics, rural-urban migration, urban area expansion, industrialization, improved living standard and insufficient water supply are just but some of the factors leading to

increased ground water usage in Yangon city.

Based on local geological considerations, potential ground water source of Yangon City is divided as high and low potential area. Although 85 % of the city is covered by high potential area, it mainly depends on the long term rechargeable value. This implies that the more groundwater extraction exceeds the rate of rechargeable value, the more the potential ground water source decreases. And if there is negative balance between recharge and discharge, the ground water will be unsustainable. **There are 14 out of 33 townships with negative balance in Yangon City.** These are Ahlone, Kyeemyindine, Sanchaung, Kamayut, Hlaing, Yankin, Insein, Thaketa, Dawbon, Thingangyun, North Okkalapa, South Okkalapa, Shwepyitha, and Dagon Myothit (North) townships.¹⁵ Also, households in these townships have to rely on ground water due to limited

¹⁴ Khaing KK., "Ground water utilization and availability in Yangon City", Universities Research Journal 2011.

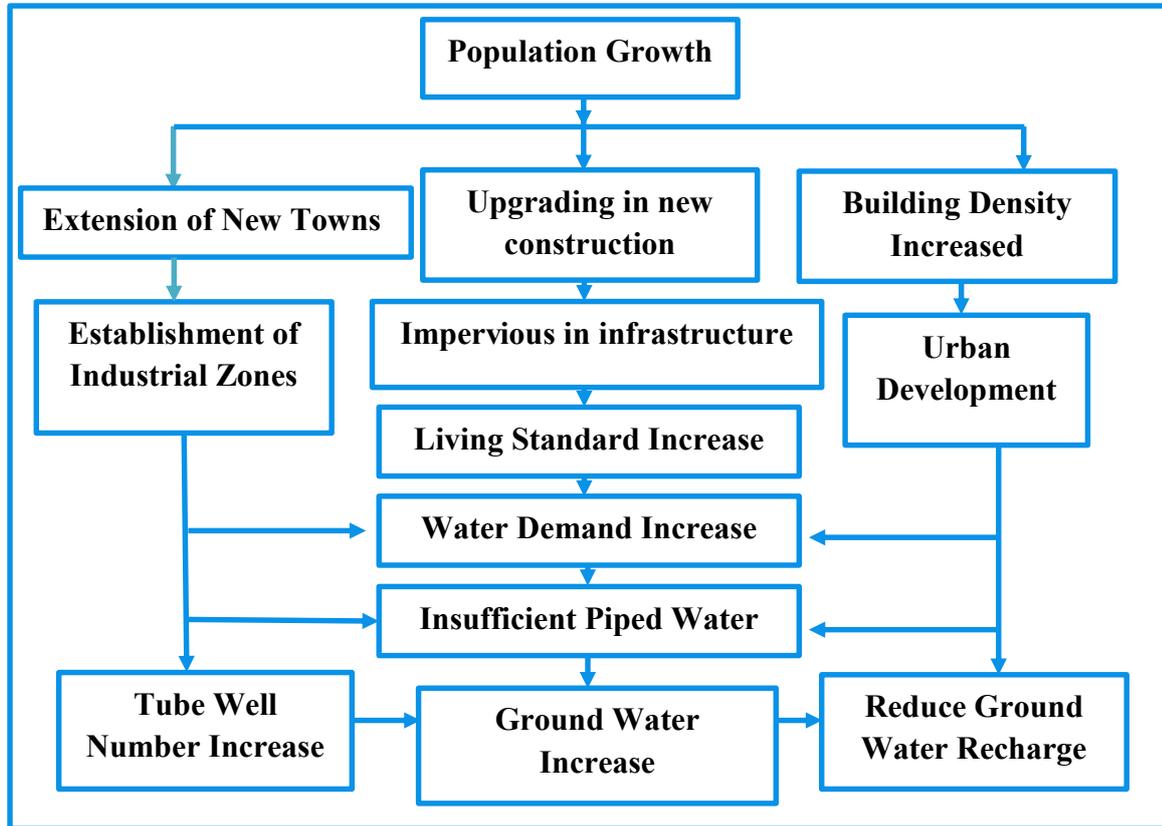
¹⁵ Khaing KK., "Ground water utilization and availability in Yangon City", Universities Research Journal 2011.

¹⁵ *ibid*

YCDC supplied water. This should alert the city planner to extend the existing water supply system to these townships

and to maintain rechargeable areas of the city.

Figure 1: Factors influencing groundwater utilization



Source: Khaing (2011)

3) Research Methodology

3.1. Research Design

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

Given the questions that we sought to answer, a mixed methods approach was found 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.

3.2. Study Site

The selection of the 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 summer season. **Second**, total urban population in Insein is relatively higher than other townships- only three townships have higher urban population than Insein. **Third**, it has potential for economic development, especially in the southeast zone.

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.

3.3. Sample Size

Insein Township comprises of 22 wards. Out of these, only seven rely on municipal water supply through YCDC. This study focused on the seven wards where 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 in the township level and Yangon as a whole. The unit of analysis for this study was the household.

3.4. Data Collection and Data Sources

The 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 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.

3.5. Data Analysis

A combination of quantitative and qualitative analysis was employed to analyse the data. Quantitative data which was generated from household survey was analyzed and presented using simple descriptive statistics such as frequency, mean, percentages and bar graphs. The

analysis was done with the help of Statistical Package for Social Sciences (SPSS) and Excel. Qualitative data collected using KIIs was coded and analyzed thematically and interpretations made accordingly.

4) Result and Discussion

4.1. 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 behind during the day while the younger ones are engaged in work outside the home. As a result, 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, while 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.

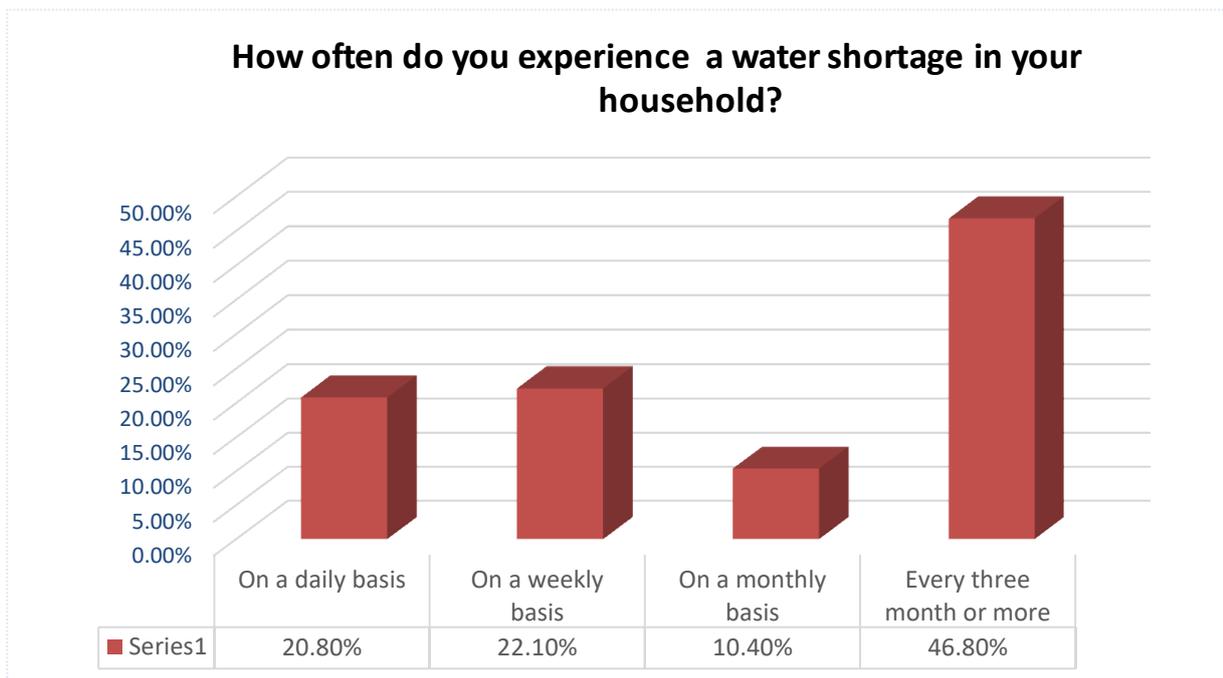
Table 2: Demographic characteristics of respondents

Female	52 %
Male	48 %
Average age	52 years
Average household's size	5.6

4.2. Water Supply Challenges in Insein

Water shortages were reported as common by many respondents. The majority (47%) reported experiencing shortages every three months or more. Those who experienced the shortages daily were approximately 21% while 22% experienced shortages on a weekly basis.

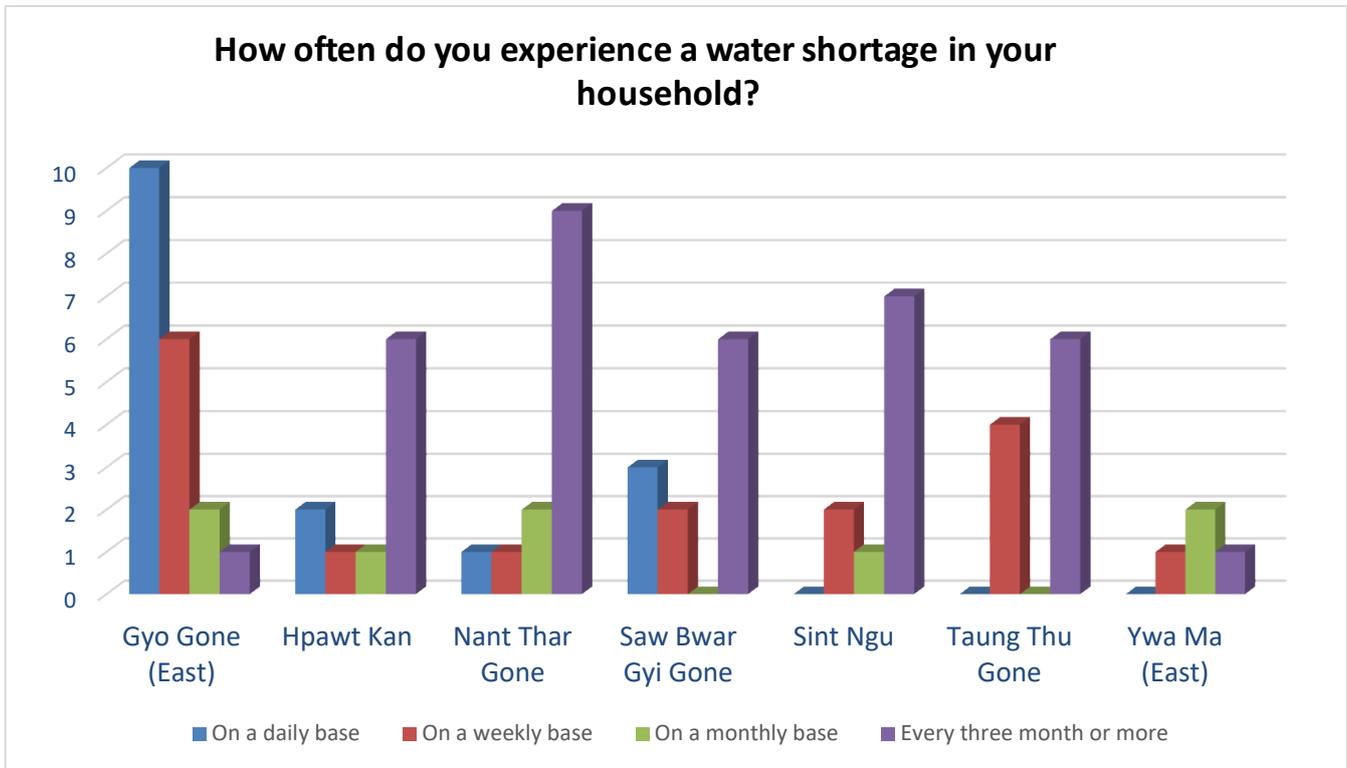
Figure 1: Household experiences of water shortage



Source: Survey data (2018)

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

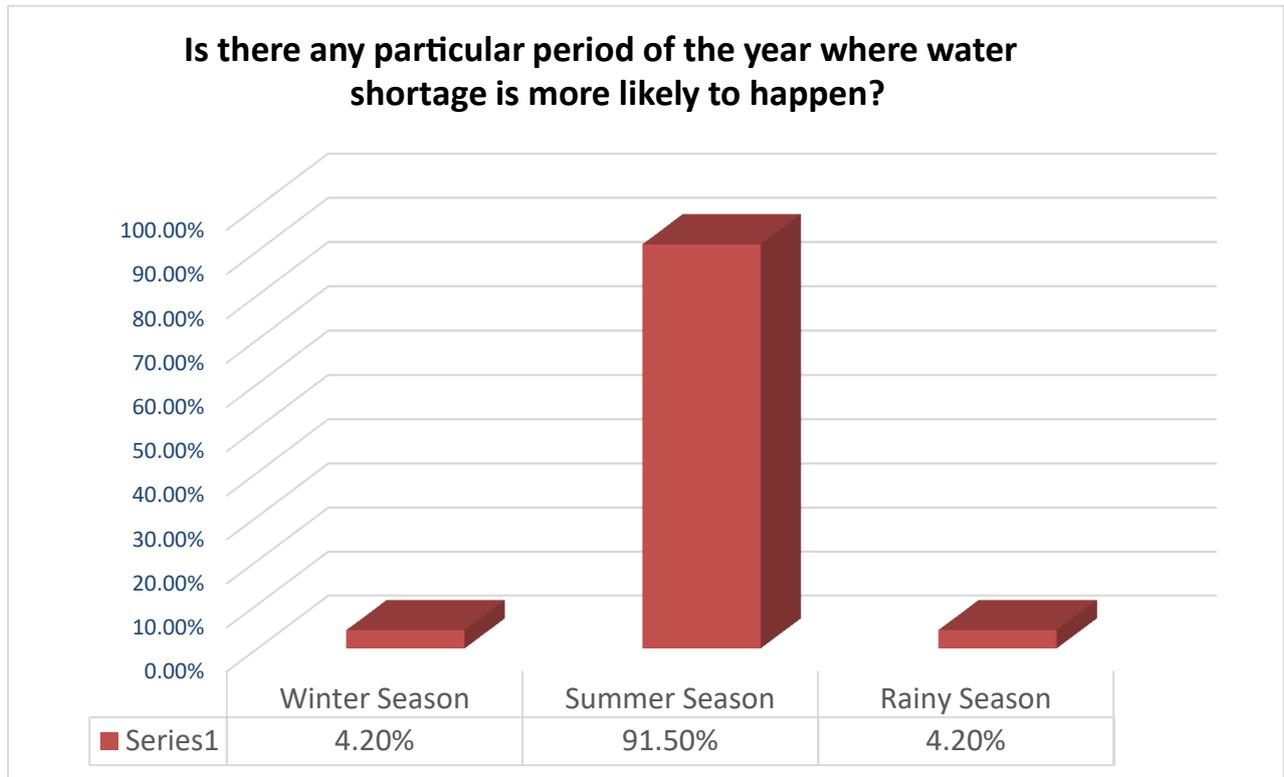
Fig 2: Household experience of water shortage in each ward



Source: Survey data (2018)

Additionally, a key informant from Gyo Gone (East) ward highlighted that “there were still households which did not get water from five to seven days”(December 2017). Furthermore, water shortage was found to be much more 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 March to April each year. This means that majority will have water problems through these months.

Figure 3: Seasonal household experience of water shortages

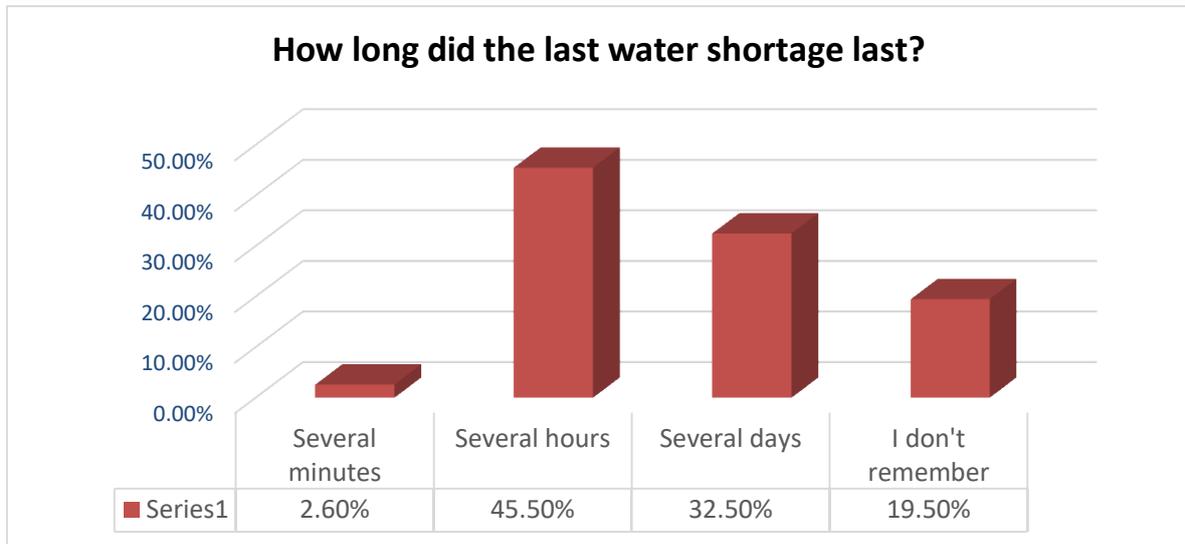


Source: Survey data (2018)

The shortages during 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, i.e. supplying enough water to Yangon city residents during 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.

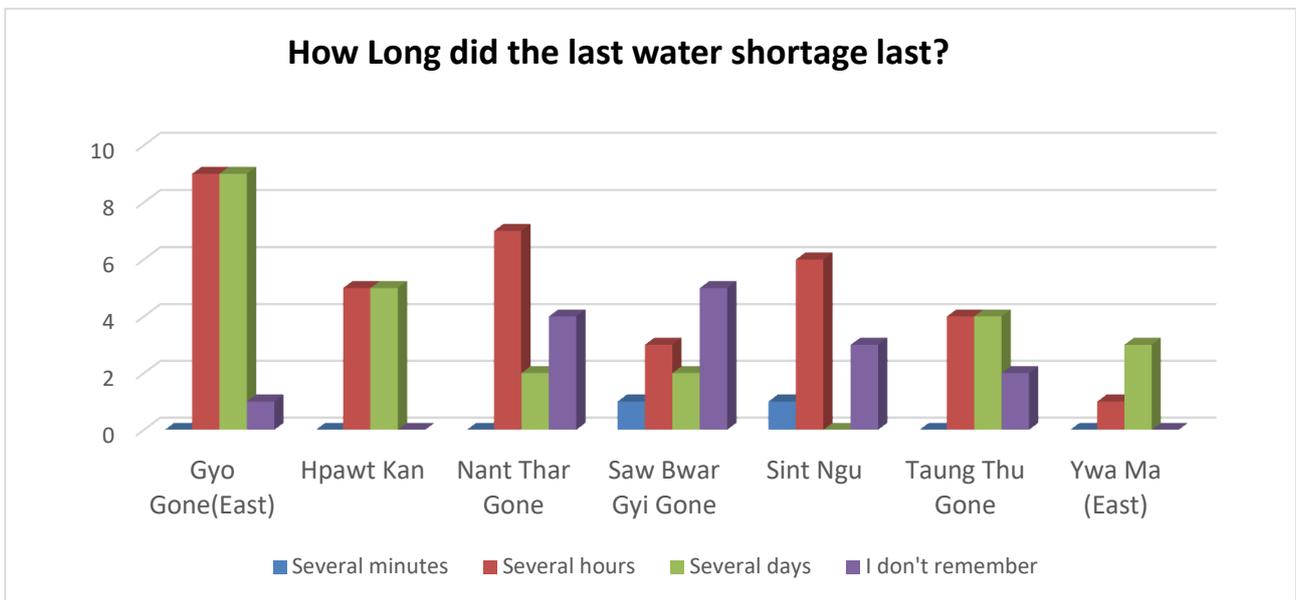
Figure 4: Duration of water shortages among different households



Source: Survey data (2018) – move up to the graph

When we looked at ward disaggregated data, we found out, 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.

Fig 5: Duration of water shortages in each ward



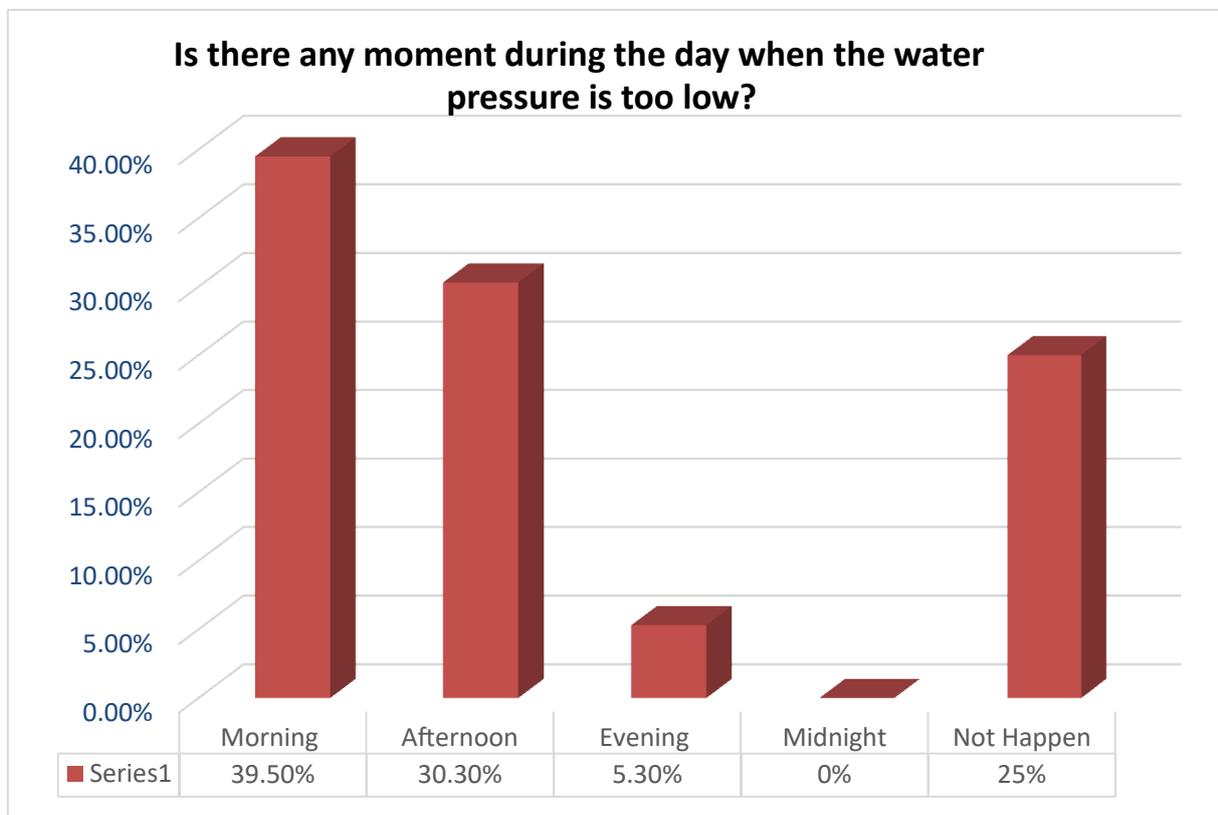
Source: Survey data (2018)

4.3. Water Pressure and Alternative Sources

Water pressure also varied during the day amongst the households. There were hours of the day when the water pressure was considered too low. For example, almost 40% 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 much of the 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.

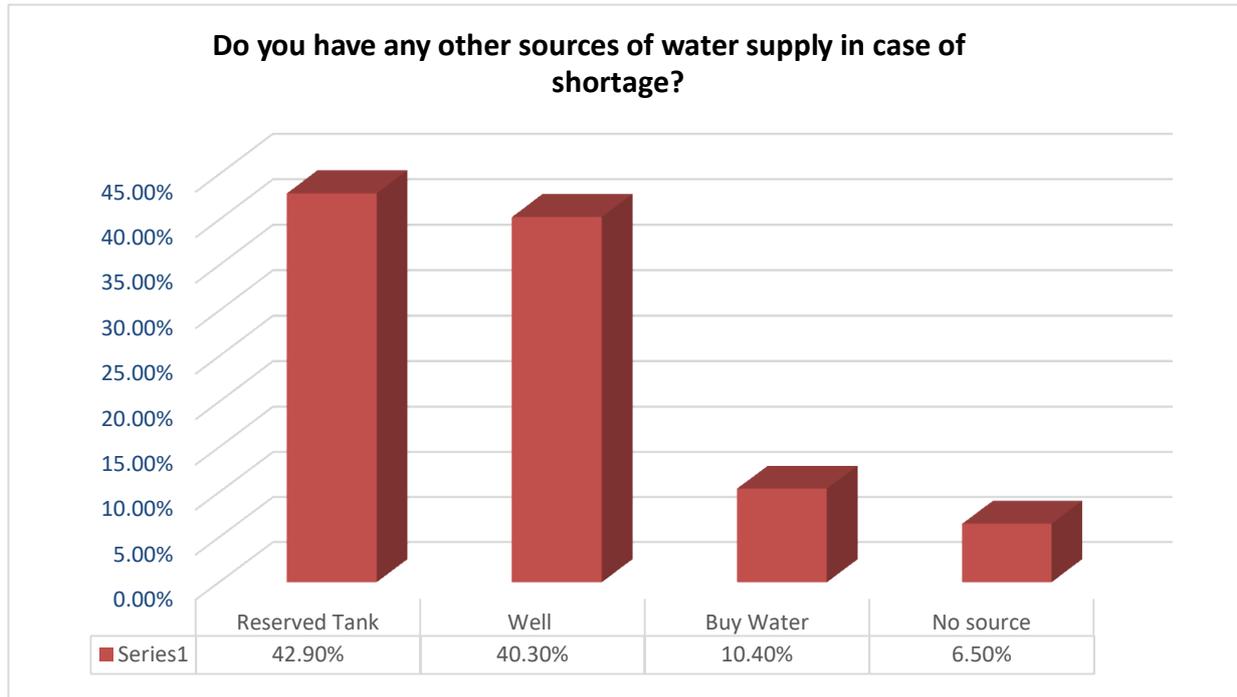
Figure 6: Daily water pressure amongst different households



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. This confirmed what we already knew from available literature.

Figure 7: Alternative water sources of households



Source: Survey data (2018)

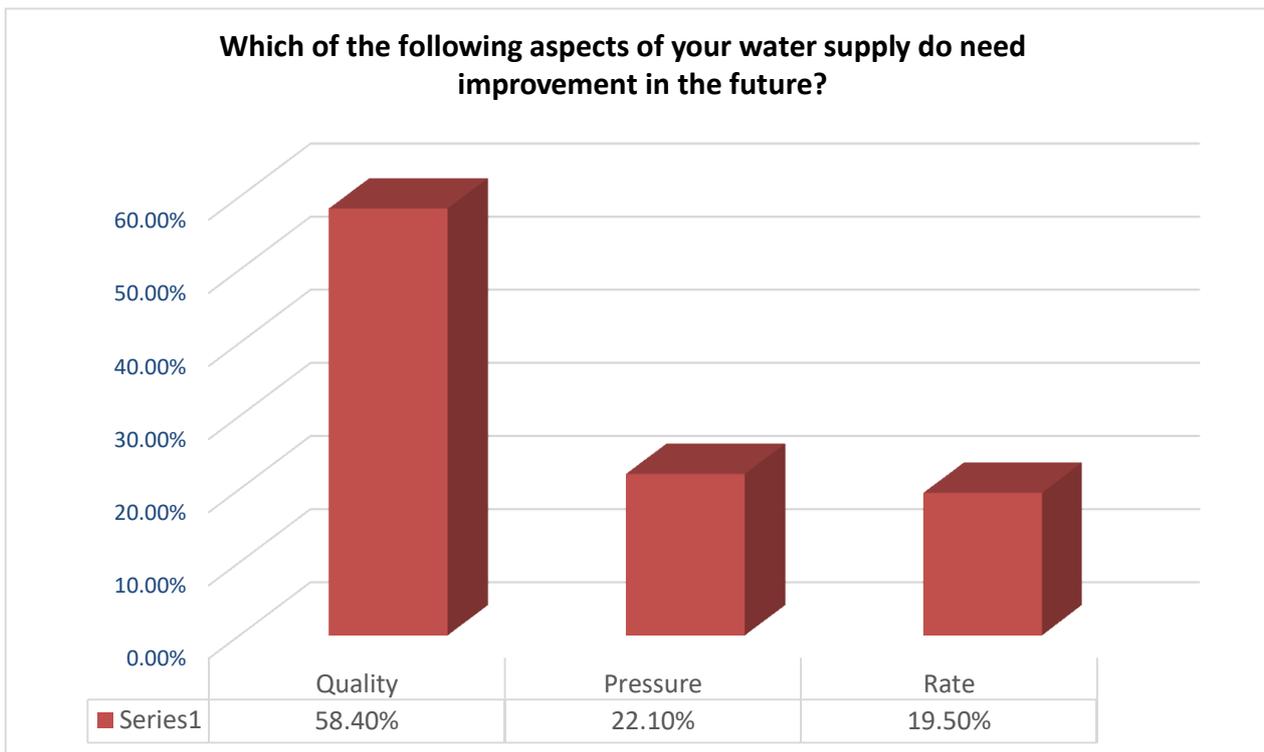
The majority (82%) relied on reserved tanks and wells while 10% had to buy water from street vendors. There was also a significant number of 6% who did not have an alternative source. One key informant stated that **“We have to fix the shortages ourselves because the responsible persons from YCDC only 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, 2018).

4.4. Water Quality and Improvement

Water quality was regarded as a big problem. 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 even the quantity that has been made available to them by YCDC.

Figure 8: 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. Also, this 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 buying drinking water.

This has a negative economic implication for the poor families.

One of the key informants argued that *"Without having 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 water pipe system was the common problem for most of the wards in Insein Township. More than half of the key informants noted the problem of pipelines’ quality and connection. One of them observed that:

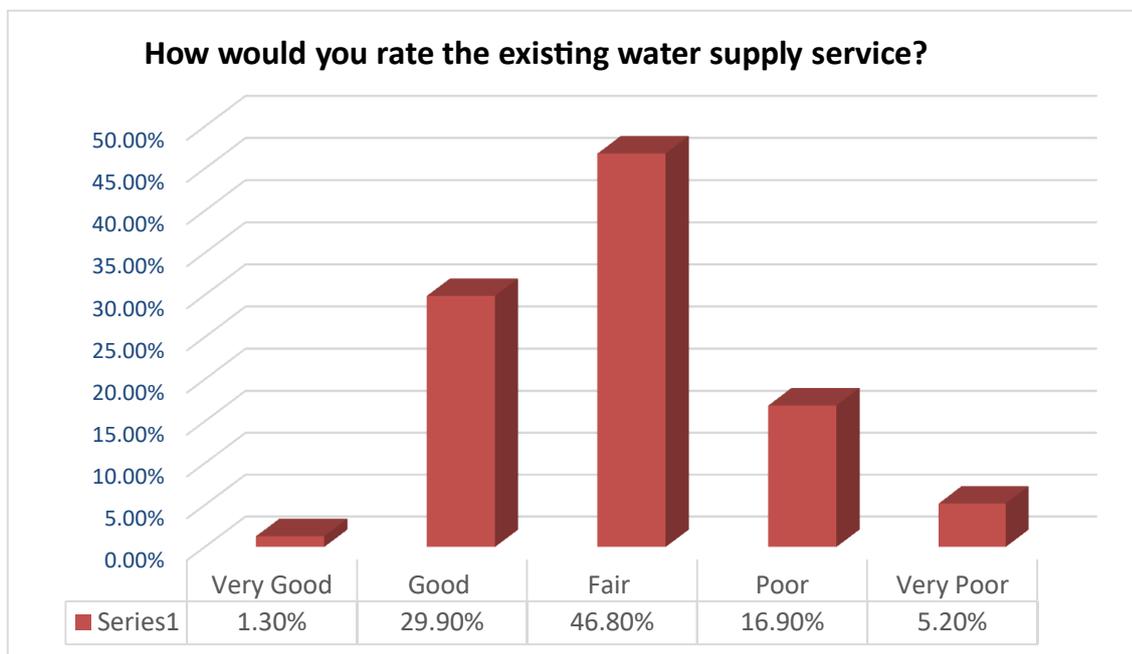
“The pipes were not set up well. Some pipes are not good enough because they were set up many years ago”. Also, the pipes have not been rehabilitated properly. The consequences of this are water leakages and large amounts of

non-revenue water leading to water shortage’. (December, 2017)

Another key informant stated that *“The YCDC’s solution is just for short term, it is not good for 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 on 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 9: 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 great improvement.

Also, despite the concerns with 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 supply service (79%) and a perception of some improvement of the same in the past five years (59%). This could explain the reluctance of majority of residents to report or file any water related complaint. On the contrary, there were also serious concerns related to water quality, which were rarely reported.

One of the key informants observed that *“It was easy to move a complaint regarding water shortage but the action from the responsible person seems slow. ...some people directly complain to*

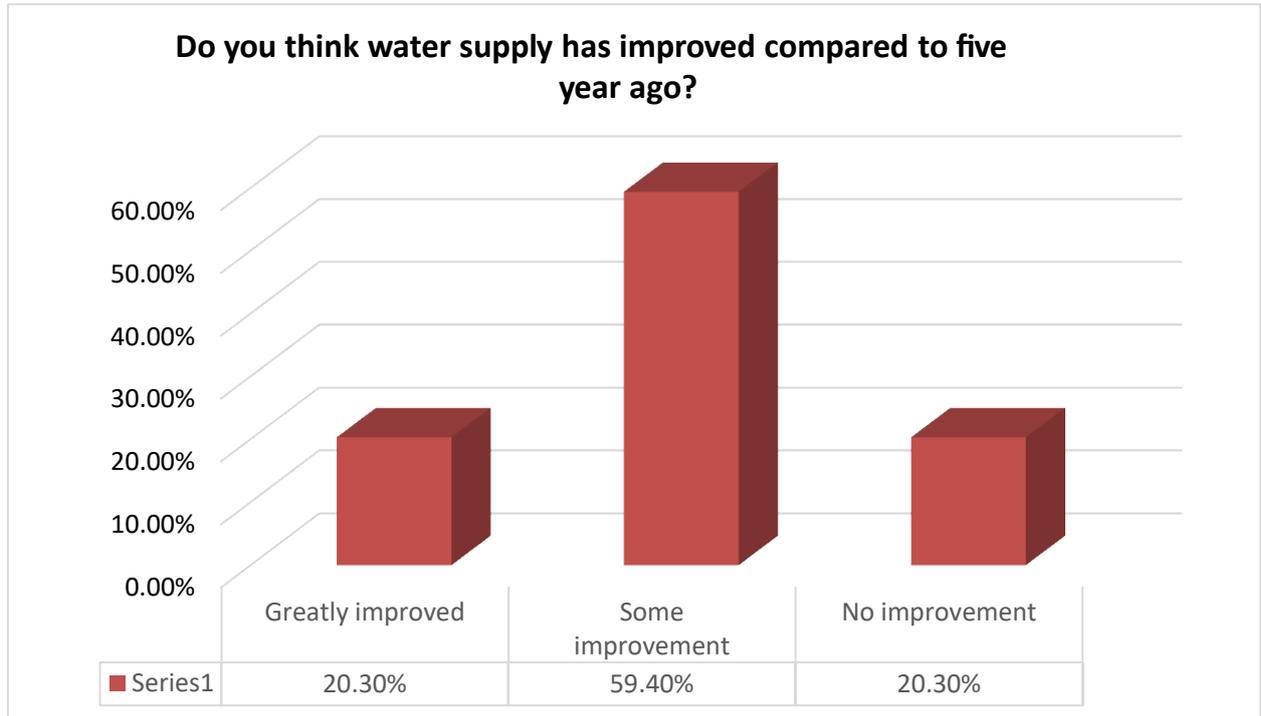
YCDC, some go to the township administrator and some to ward administrator.” (December, 2017)

The sentiments of the key informant above could partly explain the reluctance to report any water service related challenges. A representative of 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 situation within our capacity. Beyond our capacity, we just ask the head office to solve it.” (December, 2017).

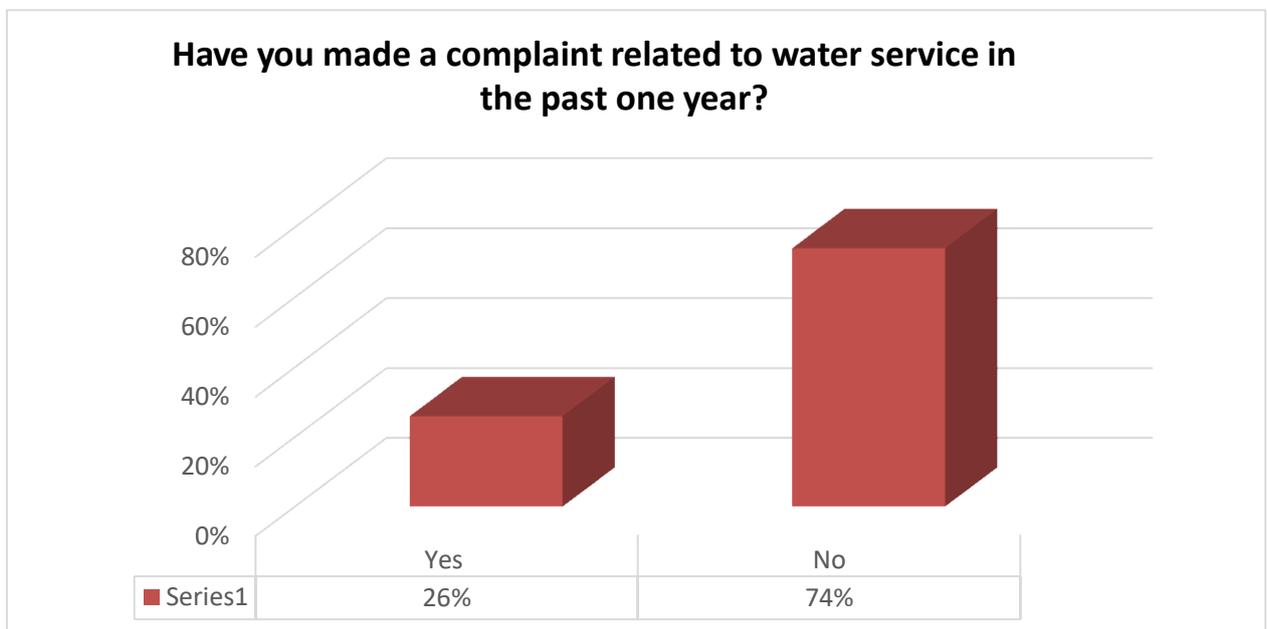
Also, the representative preferred that the YCDC supplied water consumers in the neighborhood channel their complaints to the local department of water and sanitation as they are better placed to handle the problems through ward administrators.

Figure 10: Improvement of water supply services



Source: Survey data (2018)

Figure 11: Households' complaints to water services

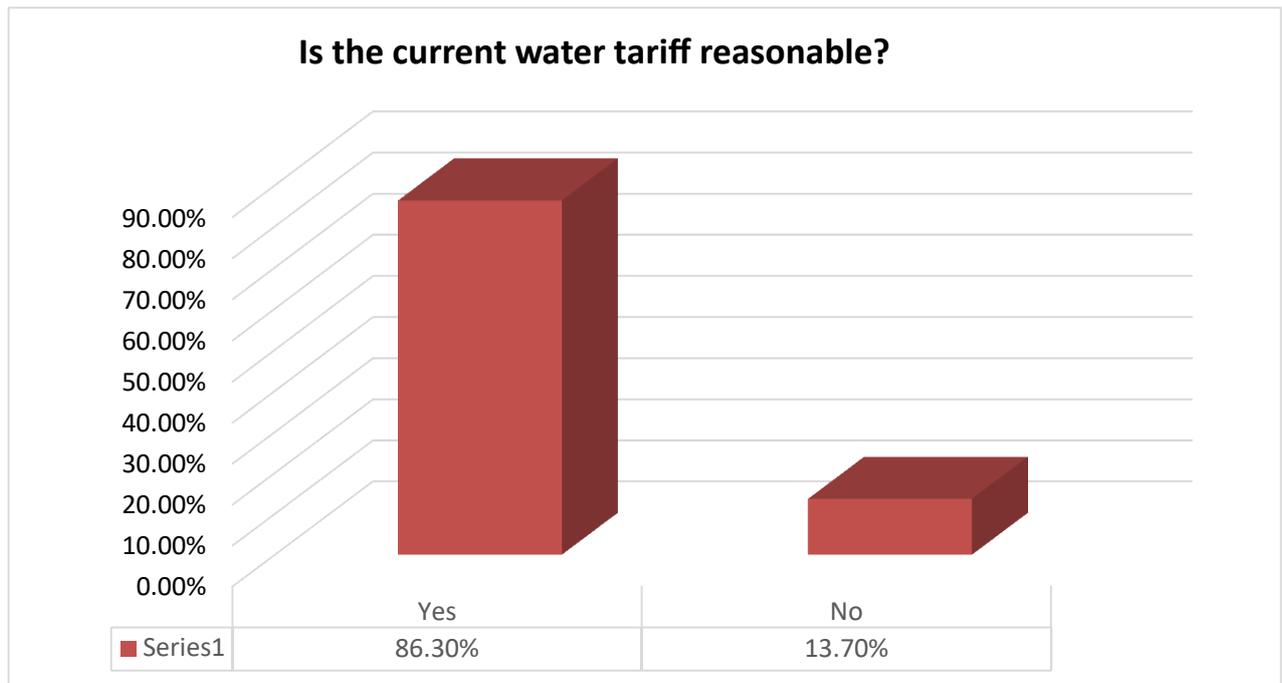


Source: Survey data (2018)

4.5. Water Cost and Distribution

Water tariff is also important in terms of sustainable water supply. Municipal water consumers in Insein Township perceived the current water tariff as reasonable.

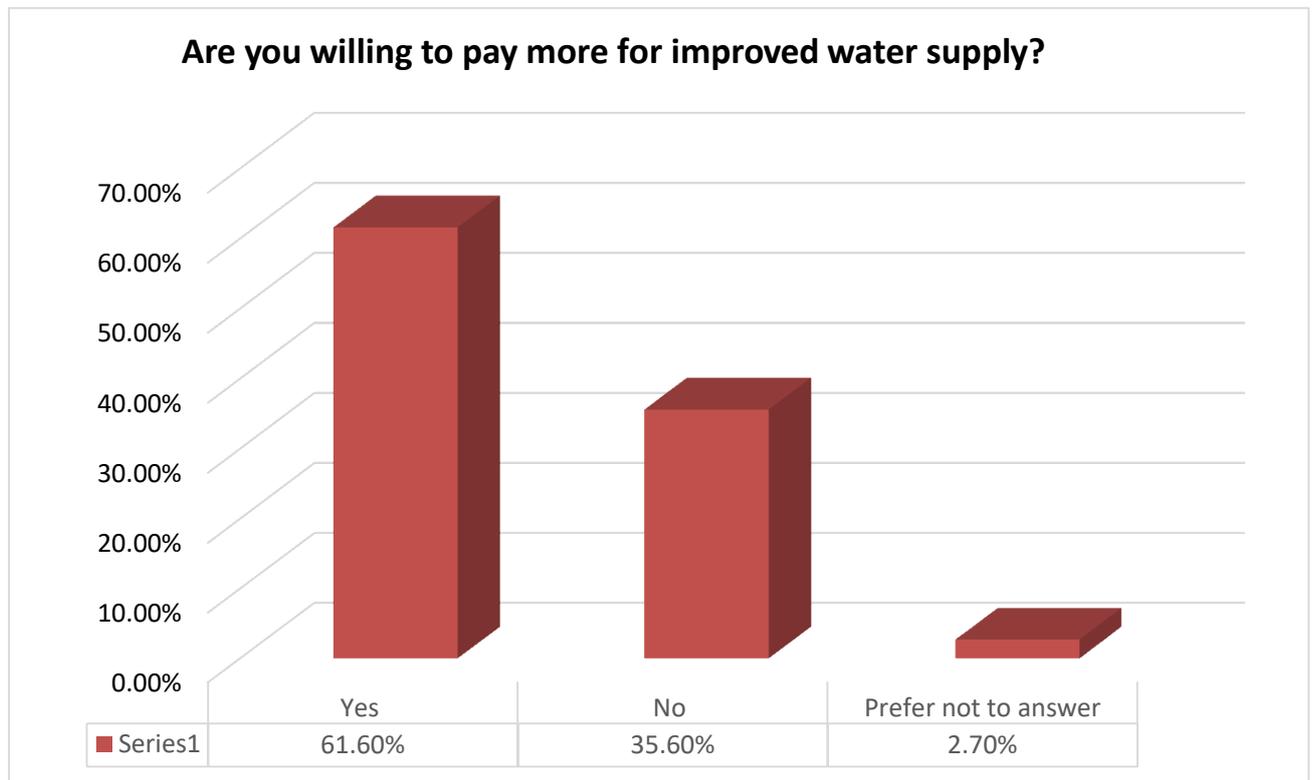
Figure 12: Current water tariff of YCDC



Source: Survey data (2018)

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

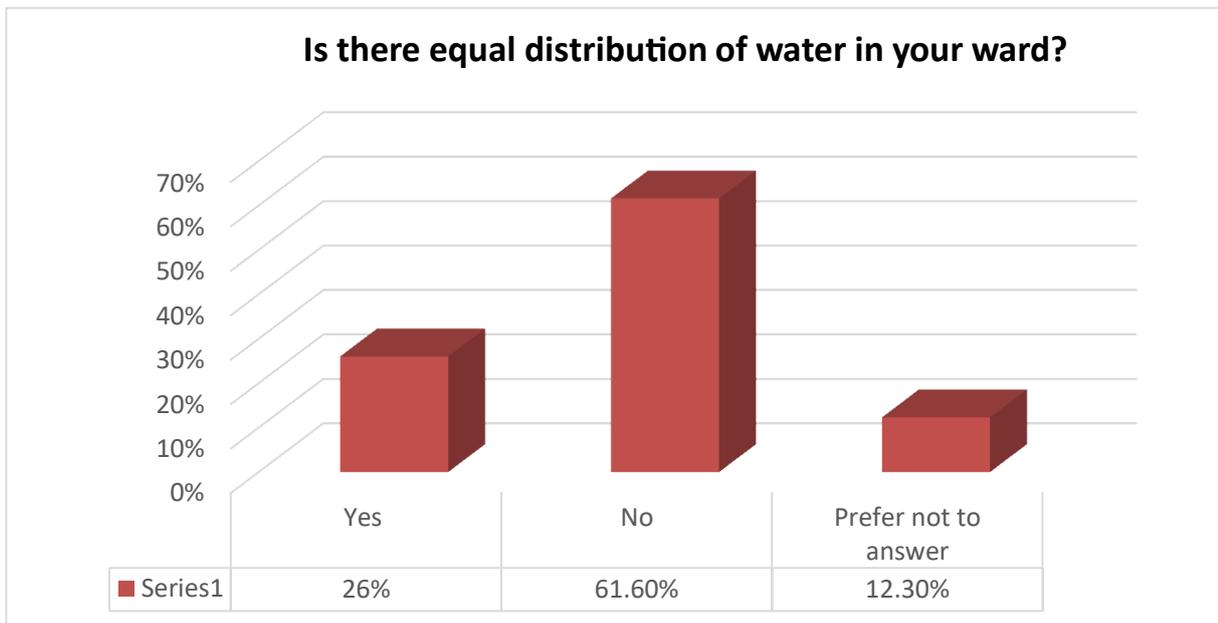
Figure 13: Willingness to pay for improved water supply



Source: Survey data (2018)

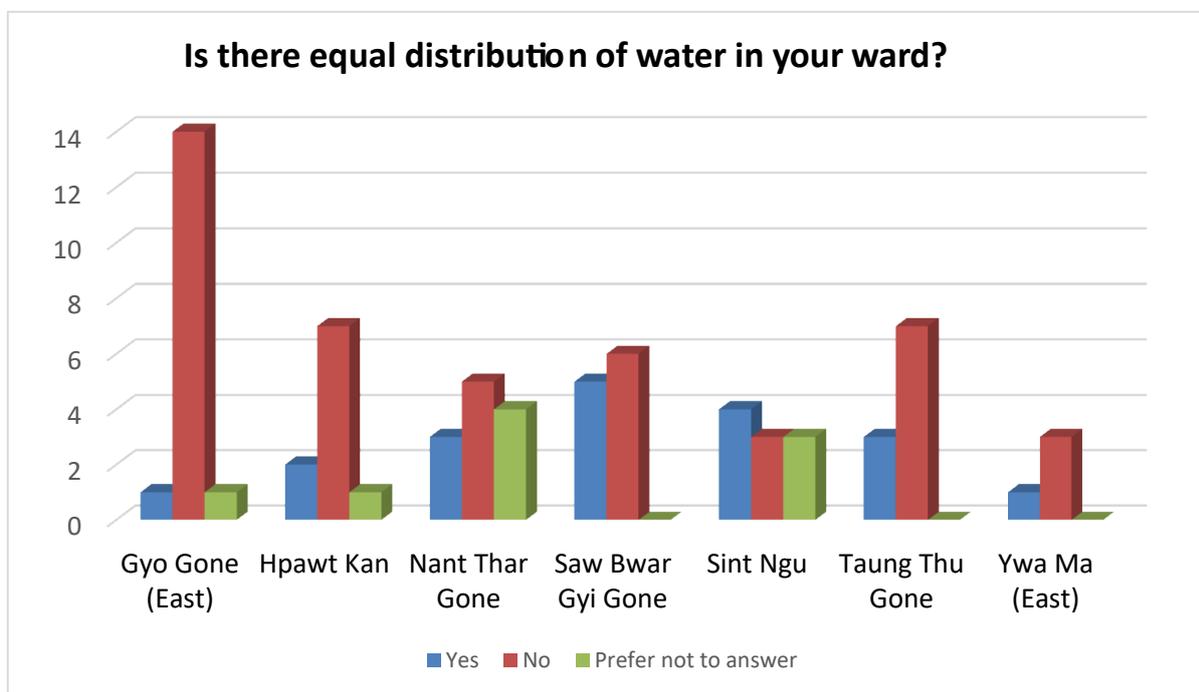
As relates to the distribution of water amongst different wards in the study area, majority (61%) felt that the water distribution was not fair. Some wards experienced much more shortages and for longer duration than others. Specifically, the hilly areas of the township reported received less water than others.

Figure 14: Distribution of water amongst wards



Source: Survey data (2018)

Figure 15: Distribution of water in each ward

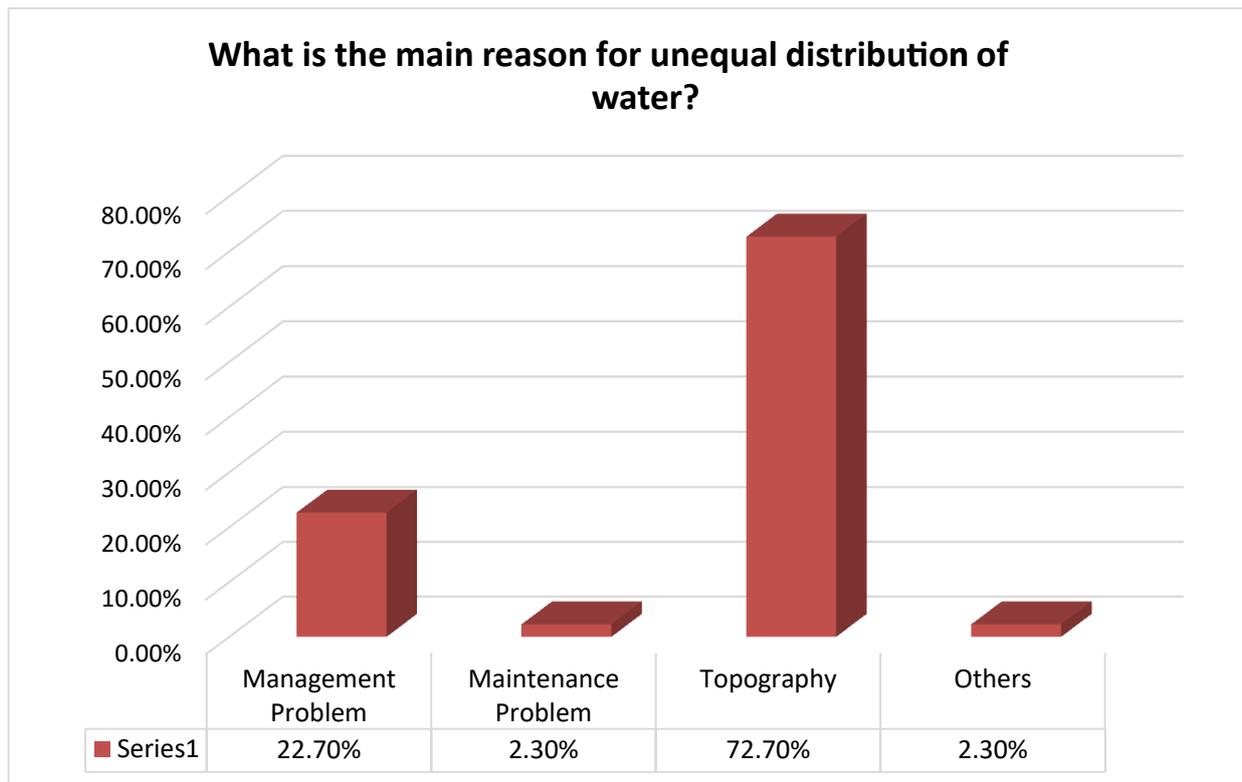


Source: Survey data (2018)

From figure 15, 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 unequal distribution of water across the wards with 73%, 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 16: Reasons for unequal water distribution



Source: Survey data (2018)

5) Conclusions

The provision of water in Insein township does not appear efficient, especially in some wards. With increased urbanization and 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 huge amount of water leakages, low water pressure especially in morning and afternoon affecting many households, short duration of water supply, unequal distribution amongst different wards and topography.

Furthermore, water shortages were found to be highly seasonal, with most regular and longer shortages being experienced during summer. This is partly because the existing sources of water, mostly, comes from surface water which depends 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 future especially due to the rapid urbanization in Yangon.

Also, the water tariff has not been properly set and this likely affects the ability of YCDC to collect enough revenue to guarantee efficient and regular supply to its customers. The small team from YCDC is also not efficient enough in collecting the charges from all households on time. It is highly likely that the set price does not fully charge the actual volume of water consumption of a household.

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

Water quality was also found to be a big problem. It was common among the wards. In our study, most of the

respondents highlighted the quality problem. It was observed that this might be because of the contamination along the aging pipelines and poor treatment among others.

Although water shortages were reported across the township, there are three

wards that seem to experience much more 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 give an immediate focus.

6) Recommendations

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

In the short term:

- i. There is a pressing need to improve the quality of the water supplied in order to meet the standards of drinking water safety.
- ii. 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.
- iii. An 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.
- iv. Upgrading the existing collection system of water tariff to a system where YCDC are 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.

In the long-term:

- i. 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 the household's water consumption and pay according to the volume of water used.
- ii. 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.
- iii. Related to the above point, there is a need for policies of conservation that could protect and monitor the state of water sources and water catchment areas.
- iv. The new water supply strategies should be demand-oriented. This model would allow to tackle specific issues and needs and to provide the best value for the money invested.

References

- Frauendorfer, R. (2013). Myanmar: Urban Development and Water Sector Assessment, Strategy, and Road Map (Publication). Retrieved from <https://www.adb.org/documents/myanmar-urban-development-and-water-sector-assessment-strategy-and-road-map>
- Cohen, B. (2005). Urbanization in developing countries: Current Trends, Future Projections, and key challenges for sustainability (Publication). New York, Washington, DC: Committee on Population, National Research Council. Retrieved from <https://doi.org/10.1016/j.techsoc.2005.10.005>.
- Elkington, J. (1999). Cannibals with forks: The Triple Bottom Line of 21st Century Business. Oxford: Capstone.
- Schnoor, J. L. (2010, July 15). Water Sustainability in a Changing World. Lecture presented at The Seventeenth Annual Clarke Prize Award Ceremony and Lecture in Leatherby's Cafe Rouge in the Renée and Henry Segerstrom Concert Hall at the Orange County Performing Arts Center in Costa Mesa, California.
- Participatory Survey Report on Water Improvement Project in Yangon City (Tech.). (2014). JICA.
- Water Supply Improvement Project Study for Yangon City and Patheingyi City (Tech.) (2014). JICA.
- Participatory Survey for Greater Yangon Water Improvement Project (Tech.). (2017). JICA.
- Khaing, K. K. (2016). Groundwater Environment in Yangon, Myanmar. Groundwater Environment in Asian Cities,317-335. doi:10.1016/b978-0-12-803166-7.00014-3
- Myanmar, Myanmar National Water Resources Committee (NWRC). (2014). Myanmar Integrated Water Resources Management Strategic Study.
- Oo, H. L. (2015). Case study: Integrated Water Resources Management in Myanmar: 2015 UN-Water Annual International Zaragoza Conference. Retrieved from <http://www.dwir.gov.mm/>
- Vairavamorthy, K. (2008). Cities of the future and urban water management. Water And City: Water Tribune – Zaragoza International Exhibition 2008. Retrieved from

Tribune – Zaragoza International Exhibition 2008. Retrieved from <https://www.zaragoza.es/contenidos/medioambiente/cajaAzul/25S7-P1>

- Grojec, A. (Ed.). (2017). Progress on Drinking Water, Sanitation and Hygiene(Publication). Retrieved http://www.who.int/mediacentre/news/releases/2017/launch-version-report-jmp_water_sanitation-higiene.pdf
- Brundtland, G. H. (1987). Our common future. New York, Oxford: Oxford University Press.
- Myanmar, Yangon City Development Committee. (2016). Comprehensive Development of Yangon. Yangon: YCDC.
- Grady, C. A., Weng, S., & Blatchley, E. R. (2014). Global Potable Water: Current Status, Critical Problems, and Future Perspectives. Potable Water The Handbook of Environmental Chemistry, 37-59. doi:10.1007/978-3-319-06563-2_2

Appendix 1: 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 base
- b) On a weekly base
- c) On a monthly base
- 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?

- d) Morning
- e) Afternoon
- f) Evening
- g) Mid-night

h) Not happen

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 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 do 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) Above 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?

- e) Yes
- f) No
- g) I don't remember

11. (In case 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 the improved water supply?

- a) Yes
- b) No
- c) Prefer not to Answer

14. Is there equal distribution of water in your ward?

- a) Yes
- b) No

c) Prefer not to Answer

15. (In case of answer yes in the previous question) What is the main reason for that?

- a) Management Problem
- b) Maintenance Problem
- c) Topography
- d) Other

Appendix 2: Key Informant Interviews (KII) Guide

- 1) How long have you had this job?
- 2) Which is your role in the system of water supply?
- 3) Has any new policy being recently implemented to improve the water supply system?
- 4) Has any foreign assistance or grant be given to lay new pipelines in order to improve the provision of water? (see facts about YCDC 2014, p.28)
- 5) In which townships do public-private partnerships (PPPs) for the provision of water supply exist?
- 6) How many water shortages does this township face every year?
- 7) How easy was to move a complaint regarding a water shortage and how fast was the answer from the responsible bodies?
- 8) Do people rely on informal/community-led solutions to fix the problem of water disruption?
- 9) Has any new strategy being developed to cover the expenditures of water distribution?



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