

The Impact of Foreign Aid in Access to Clean Water:

A Case Study in Dhaka

by

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Author's declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

Dhaka, the most densely populated megacity in Bangladesh, has been a major contributor to the country's economic growth. To keep the city livable and its economy in motion, access to clean, drinkable, and adequate water is necessary. The ongoing COVID-19 pandemic demonstrates the importance of proper access to safe water to prevent infection. However, despite a significant increase in the flow of aid to Dhaka's water supply over the last few years, the city has failed to maintain an adequate supply of fresh, clean water to its burgeoning population, especially to the sprawling slum areas occupied by destitute and low-earning people, which harms economic potential and hinders the achievement of SDG targets.

Moreover, to ensure access to clean water for all and achieve SDG by 2030 requires huge investment in Dhaka's water sector. However, most of the funding for Dhaka's water sector is met by foreign aid.

Through a simple linear regression model, this study investigates the impact of foreign aid on the water supply in developing countries and found foreign aid on the water supply has a statistically highly significant and positive impact on health outcomes in developing countries. Moreover, similar regression reveals that foreign aid on the water supply can significantly improve social and economic development in Bangladesh. Furthermore, this study attempts to uncover whether access to water and the SDG implementation of Dhaka can be achieved without relying on foreign aid. Through a qualitative approach, this paper explored all the existing domestic sources of funding in Dhaka's water and finds that foreign aid is still a critical source of finance for Dhaka's water supply to fill the budget gap.

The study also analyzes Bangladesh's National Strategy 8th Five Year Plan and Delta Plan 2100, reviewing the impact of foreign aid in financing on Dhaka's water supply as well as the strategies adopted to address and mitigate current challenges. Finally, the study proposes a set of recommendations to increase the investment and efficiency of foreign aid in Dhaka's water supply, ensuring resident's access to water and contributing to the SDG achievement.

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Dedication

To the people of Dhaka in which all residents, including the poorest, informal settlement dwellers, women, and girls, enjoy adequate affordable and safe water services of a high standard.

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List of Abbreviations

DWASA	Dhaka Water Supply and Sewerage Authority
SDG	Sustainable Development Goal
UN	United Nation
WWAP	World Water Assessment Programme
UCCRN	Urban Climate Change Research Network
DAC	Development Assistance Committee
OECD	Organization for Economic Cooperation and Development
ODA	Official Development Assistance
LIC	Low Income Communities
NRW	Non- Revenue Water
MDG	Millennium Development Goal
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
WB	World Bank
WSUP	Water & Sanitation for the Urban Poor
GNI	Gross National Income GNI
GLAAS	Global Analysis and Assessment of Sanitation and Drinking-Water
WASH	Water, Sanitation, and Hygiene
NGO	Non-Governmental Organization
ADB	Asian Development Bank

GDP	Gross domestic product Gross domestic product
GED	General Economics Division
ERD	Economic Relations Division
LDC	Least developed country
DANIDA	Danish International Development Agency
GCF	Global climate Fund
CPD	Centre for Policy Dialogue
UNCTAD	United Nations Conference on Trade and Development
SWG	Sector Working Group (SWG)
MICS	Multiple Indicator Cluster Survey
8FYP	8 th Five Year Plan
JICA	Japan International Cooperation Agency
COVID	Coronavirus Disease
PP2041	Perspective Plan 2041
SDP	Sector Development Plan
NSD	National Savings Directorate
MTBF	Medium Term Budget Framework
IWA	International Water Association
DPE	Directorate of Primary Education
BBS	Bangladesh Bureau of Statistics

APSC	Annual primary school census
WDI	World Development Indicator
CRS	Creditor Reporting System
WHO	World Health Organization
IWRM	Integrated Water Resource Management
SWOT	Strengths, Weaknesses, Opportunities and Threats
GLS	Generalised Least Squares
DMA	District Metres Areas
UNICEF	United Nations Children's Fund
CBO	Community Bases Organization
MLD	Million Liters per day

“Unsafe water kills more people than war”

- Ban Ki Moon, 2010

Chapter One: Introduction

1.1 Introduction

Cities, especially megacities, are the main strongholds for the economy of developing countries. In general, cities generate revenue, wealth, jobs, labor, land, infrastructure, and services through transportation, health, power, education, water supply, and sanitation industries, which measure the cities' growth. Using a unified theoretical framework, the World Bank presents evidence on the effects of cities on productivity and economic growth in developing countries (Duranton, 2008.) Among these sectors, water supply is an essential part of urbanization. Access to water is a human right (Ki-moon, 2010). Everyone, at the most basic level, requires clean water in sufficient quantities for drinking, cooking, individual hygiene, and sanitation without jeopardizing health or dignity. However, lack of access to clean, adequate water has severe effects on the health of citizens, the local environment, food, and energy, which creates an economic crisis in cities.

The Sustainable Development Goals (SDGs) or Global Goals, which are a set of 17 interconnected global goals, 169 objectives, and 231 indicators for global sustainable development, were endorsed by the United Nations General Assembly in September 2015 (UN, 2021). To reflect the increased attention on water and sanitation concerns in the global agenda, the SDGs include a dedicated goal, SDG 6, on water and sanitation to "ensure availability and sustainable management of water and sanitation for all" (UN, 2021). Water was a significant factor in the location of the earliest settled societies. The history of public water supply systems is directly linked to the development of cities (Nathanson, 2020).

As a case city, Dhaka, Bangladesh's capital, has played the most important role by supporting its country's current phenomenal growth. Dhaka contributes more than half of the urban sector's GDP (Ahmed & Ahmed, 2017). Now, Dhaka has become a megacity with a population of nearly 21 million and a total area of 300 square kilometers (Dhaka Population, 2020). Attracting people from all over Bangladesh as a source of income and livelihood, Dhaka's population is projected to reach over 31 million by 2035 (Dhaka Population. 2020). Sustainable cities must ensure reliable access to safe drinking water and adequate sanitation must be ensured (UN, 2014).

Large population densities provide opportunities for scale economics in water supply and cities, in general, can be the main engine of economic growth (Edwards et. al., 2014). However, current challenges in water supply, such as dependency on groundwater, polluted surface water, informal slum, and squatter settlements, and unplanned infrastructure, could pose serious obstacles to fulfill this city's future water (Roy & Dutta, 2017). Ensuring sufficient access to safe and clean water, as well as achieving the SDG Goals of 6 and 11, access to water and a sustainable city, respectively, hinges on overcoming these bottleneck challenges by 2030, a prospect remaining to be seen.

1.2 Problem Statement and Research Questions

This study intended to address these unexplored issues and was designed to work on certain research questions not dealt effectively so far in the context of Bangladesh. The core research question was: How does foreign aid investment in the water supply contribute to meeting SDGs in Dhaka? The research questions concerning mainly the impact of foreign aid are as follows:

1. Does foreign aid to water supply has an impact on developing countries?
2. Is there any effect of foreign aid to water supply on Bangladesh's development ?
3. How does foreign aid play a role in financing Dhaka's water supply to achieve SDG in the context of Bangladesh's national strategies?

Through this thesis, the study was able to find the answers to these research questions and thereby ascertain the impact of foreign aid in providing access to clean water to achieve SDGs by 2030. In effect, this study focused on the relationship between the water supply of Dhaka, foreign aid, and SDG achievement of Bangladesh, while also looking at how the allocation of aid linked to government plans ensures the intended benefit of aid utilization.

1.3 Research Objectives and Method

The objectives of this paper involve:

- (1) Analyzing the connection between health outcomes and foreign aid in the water supply in developing countries and tracking whether aid to water supply helps developing countries' health progress.
- (2) Analyzing the connection between socio-economic outcomes and foreign aid in Bangladesh's water supply and tracking whether aid to this sector helps Bangladesh perform better in those outcomes.
- (3) Explore all financial sources of Dhaka's water and suggest alternative policy solutions to determine the importance of foreign aid in meeting the SDGs.

Through a quantitative study, I will demonstrate a relationship to evaluate whether increased foreign aid has assisted health development in developing countries and Bangladesh's socioeconomic progress..

The reason I chose to employ a quantitative method was that there was ample latest secondary data on various websites, such as the World Development Indicators (WDI), which helped me comprehend the complicated links existing among several factors and make predictions. Additionally, this method helped me identify unrelated variables and, consequently, prevented the waste of effort of needlessly finding out a cause-and-effect relationship among that irrelevant data.

A quantitative approach is best suited for problems that require understanding the best predictors of outcomes (Creswell, 2018).

Utilizing a quantitative method, and focusing on foreign aid in the water sector, this study intends to correlate the health outcomes of developing countries and socio-economic indicators of Bangladesh, as well as identify the necessities of water aid for Dhaka through financial analysis. The paper concludes by identifying policy issues of the government in managing the country's water sector. To narrow the research field, this paper focuses on the water supply in Dhaka.

1.4 Contribution of this Study

This paper contributes to the literature in a variety of ways. First, the majority of the previous studies on the impact of foreign aid in WASH analyzed data covering from 1990 to 2012 (Wayland, 2013; Rajan, 2016; Ndikumana, 2017). Using more recent data from 2005 to 2019, I re-examine these findings in the study. Considering both the MDGs period and the SDGs period, it is critical that I have kept my research up-to-date.

Second, the majority of past studies have focused solely on the influence of foreign aid on all developing countries or a country, and in some cases, the impact of foreign aid in the water sector (Ekanayake, 2010; Odokonyero, 2018; Rajan, 2016; Wayland, 2019). My study, on the other hand, looks at the influence of foreign aid on the water supply and adds value not only to developing countries but also to a specific country and its megacity level.

The central area of this study's research revolves around the prospects of meeting SDG goals by 2030 and ensuring an adequate clean water supply to the city of Dhaka through the utilization of foreign aid. This paper aims to determine foreign aid's importance in achieving SDGs related to

Dhaka's clean water supply, integrating this aid with the existing strategic plans of Bangladesh, and propose, based on the study's results, strategies for Bangladesh to meet the SDG target by 2030.

Along with understanding foreign aid's importance in improving Dhaka's water sector, this paper has also aligned Bangladesh's latest strategic plans with this research field, identifying the aid's role in improving the water sector in Dhaka. The findings create a correlation among SDG 6, SDG 11, and SDG 17, and set out an image of Dhaka WASA. Additionally, policymakers, project implementers, government officials, and development partners will benefit from the findings of this study and can translate them to practical action for the benefit of Dhaka's 160 million+ residents.

In a nutshell, water supply is becoming increasingly important, and the deployment of foreign assistance in this sector makes it highly relevant to public policy, which distinguishes this study from others.

1.5 Thesis Outline

This thesis includes six chapters: 1) Introduction, 2) Background, 3) Literature Review, 4) Methodology, 5) Results, 6) Policy Options, and 7) Conclusions.

Chapter 1: Introduction introduces the research and key issues in Dhaka's water supply, including research design.

Chapter 2: Literature Review elaborates some background information and examines the literature on the concepts of foreign aid in developing countries and Bangladesh, discussing the importance of foreign aid in these countries' water sectors for SDG achievement and economic growth in Bangladesh and **Theoretical Background** refers to the theories from which this study drew its conceptualization.

Chapter 3: Methodology provides details of this study's theory, research design, explaining both the quantitative and qualitative analyses used and their respective results.

Chapter 4: Results describes the findings of this study based upon the applied methodology.

Chapter 5: Financing in Dhaka's Water explores all the existing financial sources of Dhaka water using qualitative approach.

Chapter 6: Policy Options highlights the involvement and implications of Bangladesh's SDG-related strategic plans on foreign aid in Dhaka's water supply.

Chapter 7: Conclusion summarizes this study's research and outlines its contributions to theory, practice, and recommendations, as well as limitations and suggestions for future research.

Chapter Two: Literature Review

2.1 Introduction

The allocation of foreign aid in Bangladesh's water sector contributes to ensuring access to a clean and affordable water supply for the residents of Dhaka. This paper will contribute to a vast body of literature assessing the role of foreign aids in impacting the receiving countries positively or negatively. Generally, numerous studies have demonstrated the impact of foreign aid. Much literature has also been examined on the role of foreign assistance at the sectoral level, especially on poverty reduction (Arvin, 2002; Zakaryan, 2011), education (Asiedu, 2014), and health (Williamson, 2008). However, there have been few studies on the relationship between foreign aid and the water sector in a developing country.

The current inefficiency of supplying safe drinking water, which will affect both the health of Dhaka dwellers and the city's environment, will hinder achieving SDG by 2030. To examine the effectiveness of foreign aid in improving the water supply, some past and recent studies have been reviewed here. Among many papers which studied the water supply and management sector in Dhaka, most worked on water governance, infrastructural planning, institutional capacity, or citizens' awareness, with some papers emphasizing high investment in the sector, recommending increased mobilization of internal resources (Azharul Haq, 2006; Akbar et al., 2007). Azharul (2006) advised the private sector to invest in the construction, operation, and maintenance of infrastructure in the water and wastewater management sector in Dhaka. Through an experiment in Dhaka, Bangladesh, Akbar (2007) provided a paradigm for communal and institutional delivery of drinking water to the urban poor, in which private sector investors would play a critical role.

This chapter therefore firstly reviews the impact of foreign aid from a global perspective and a national basis. Secondly, it discusses the impact of foreign aid in the water sector. Finally, this paper examines the findings from prior studies and national plans to summarize the foreign aid's effectiveness in Dhaka's water sector.

2.2 Foreign Aid

Foreign aid (also known as “development assistance”) is the international flow of aid from developed countries to developing countries through multilateral and bilateral organizations. Foreign aid can be defined as economic assistance from one country to another country, intended to provide relief for economic emergency or to fund military expenses (Black, 2012). Aid comes in many diverse forms, such as capital, technical assistance, and capacity-building for civilian or military purposes. Lancaster (2008) defines foreign aid as a voluntary flow of public resources with a grant element of at least 25% from one country to another government, NGO, or international organization. Official Development Assistance (ODA) is defined by The Development Assistance Committee (DAC) of Organization for Economic Cooperation and Development (OECD) as “government aid that promotes and specifically targets the economic development and welfare of developing countries. The DAC adopted ODA as the “gold standard” of foreign aid in 1969 and it remains the main source of financing for development aid” (OECD, 2021).

After World War II, foreign aid was notably used to rebuild Europe, and the United States announced the Marshall Plan in 1948 to provide political and economic aid to Western Europe. Michael Hogan (1987) in his book “The Marshall Plan: America, Britain, and the Reconstruction of Western Europe” explains the Marshall plan in detail: over \$12 billion was transferred to 16

Western European nations to restructure their economies. Due to the popularity of foreign aid over the following years, developed countries increased their amount drastically (Rady, 2012). Official development assistance (ODA) from the 30 members of the OECD's Development Assistance Committee (DAC) totalled US\$153.0 billion in 2018 (OECD, 2019).

Bangladesh is significantly dependent on foreign aid to carry out several development undertakings, as it has heavy constraints on domestic resources (Kabir, 2018). As a result, foreign aid has become a critical financial source for both national and international adoption of the 2030 Agenda.

2.3 Foreign Aid in Developing Countries

It is not easy to define the role of foreign aid in the economic development of a country. Most studies have suggested that foreign aid either negatively impacts economic growth or is a perfect instrument in supporting the development of a country (Papanek, 1973; Ramesh Durbarry, 1998; Easterly, 2003; Mosley, 2004; Tarp, 2016). Burnside and Dollar (2000) found a positive impact of aid on the growth of countries having “good” policies, for example: low budget deficits and access to the global market. Likewise, both theoretically and empirically, Tobin (2006) shows that aid contributes strongly to economic growth and human capital, essential for sustainable development.

Furthermore, a long-run relationship between foreign aid and economic growth in 36 Sub-Saharan African (SSA) countries was investigated by Njoupouognigni and Ndambendia (2010). They found foreign aid was impacting economic growth positively, which was statistically significant. Similarly, Martinez (2015) examined 104 of the least developed countries and evaluated the impact of foreign aid on their GDP. His results categorized the impact of foreign aid as a quick positive and as being modest on those recipient countries. A different view about the impact of foreign aid on GDP growth has been observed in a recent empirical study by Yiew and Lau (2018). Studying 95

developing countries, they developed a U-shaped relationship. This means foreign aid initially adversely impacts economic growth and later positively contributes to economic growth, indicating that foreign aid has a lower effect on GDP. Their study also concluded that if these countries utilize their aid effectively, they will achieve SDGs. Blizkovsky & Emelin (2020) examined the impact of foreign aid on the agricultural sector in three countries: Mali, Ghana, and Cameroon, where agriculture is the main economic development sector. They found foreign aid had a major effect on Ghana, a lesser impact on Mali, and no relevant correlation in Cameroon in this analysis. Addison, Mavrotas & McGillivray (2005) examined foreign aid towards Africa during the 1960-2002 era and concluded that foreign aid actually promoted development and poverty reduction, predicting that drastic aid decline would hinder the implementation of the MDGs, even rendering it impossible.

Hopkins (2000) discusses, in his essay, three different political viewpoints. In one, foreign aid is decided by the economic interests of the most powerful set of contributors, and economic policies are designed to benefit them. Aid is interpreted in the second manner as an attempt to maximize benefits for donor countries. Third, bargaining results between units, a form of political market made up of donor support bureaucrats, multilateral assistance agencies, and recipient government officials, are included in third support. All three of these factors contribute to a better understanding of why people give.

These research studies concentrate not only on economic growth, but also on their relevance for the future. From the discussions above, it appears that foreign aid is most useful to countries with low incomes, as these countries use aid to provide education and health services, thereby effectively improving long-term economic development. On the contrary, a considerable number of studies show either no effect or negative effects of foreign aid on economic growth. Bazoumana (2009) finds that although foreign aid asserts a positive and substantial impact on the agricultural sector, it has a weak impact on industrial GDP per capita. For example, Mohamed (2014) noted that in

Egypt, the aid had had a significant negative effect on external resources in the long- and short-term because of their weak policy, floundering political administration, and high budget deficit; as a result, this poor environment makes foreign aid ineffective. He also recommended that Egypt utilize domestic resources rather than foreign aid. Mallik (2008) considered six of the poorest African countries — namely the Central African Republic, Malawi, Mali, Niger, Sierra Leone, and Togo — and investigated why these were still vulnerable in spite of receiving a large amount of aid every year. He established that during more than 35 years of receiving foreign aid, these countries had become dependent on the aid, which has a negative impact on their economic growth.

Some studies claim that foreign aid creates corruption. On the other hand, corruption decreases the effectiveness of foreign aid in developing countries. Moyo (2009) reveals that foreign aid makes a country poorer and its economy slow. She gives examples of countries such as China and India, role models of how foreign aid promotes corruption, undependability, and economic laziness. In the same way, Schudel (2008) reveals that corruption decreases the impact of foreign aid and influences the donor policies in developing countries. In contrast, Menard (2016) does not find any relation between aid and corruption, and strongly supports that there is no evidence of foreign aid raising corruption. Additionally, Gunter (2007) supported debt for economic development and argued that the growth of a country could be seriously hampered if borrowing is stopped.

Considering the above, I may assume that foreign aid increases the chance of corruption and contributes to the weakening of the local currency. Still, measures can be taken to reduce the negative impacts of foreign aid. While there is little agreement on the role of foreign aid, the literature concurs that it can create fiscal space and help a country invest in new development activities. Reviewing all of the above studies, foreign aid can greatly contribute to the socio-economic development of a country with good policies, good governance, political stability, skilled officials, and a good relationship with donors.

2.4 Foreign Aid on the Water Supply in Developing Countries

The World Bank generally uses the term ‘Developing Countries’ to refer to countries with low and medium incomes, measured by Gross National Income (GNI) per capita, and this paper has worked on developing countries classified by the World Bank (Appendix-A1).

A considerable number of empirical studies have been explored on aid in social sectors such as education, healthcare, drinking water supplies, and sanitation. Asiedu (2014) analyzed 38 countries and found that aid has a positive and significant impact on primary education in Sub-Saharan Africa (SSA), promoting economic growth. On the other hand, by investigating the impact of aid in stimulating human development, Williamson's (2008) study results found foreign aid ineffective in improving the health and human development sectors. Over the last decade, sectoral significance in water supply has emerged for developing countries among the various social sectors. This study will explore the role of foreign aid in improving the water sector in developing countries.

According to the GLAAS 2018/2019 Country Survey, participating countries spent 26% of their total WASH costs from foreign aid (GLAAS Report, 2019). They want to make their water services more affordable, mainly for urban water supply, through policy measures and financial plans. As domestic funds cannot meet the estimated funds for achieving SDGs, development partners seek water aid assistance to catalyze additional funding (GLAAS Report, 2019).

A number of recent empirical studies have been conducted on the effectiveness of foreign aid in the water and sanitation sector (Wayland, 2013; Rajan, 2016; Botting, 2010; Ndikumana, 2017). By examining the effectiveness of foreign aid in the water and sanitation sector and using generalized least squares (GLS) on the dataset of 133 recipient countries over the 50-year period from 1960 to

2009, Wayland (2013) indicates that access to safe drinking water, as calculated by life expectancy, infant mortality, and child mortality, is a statistically relevant and numerically important predictor of health, as anticipated, also arguing that foreign aid allocation in the water sector is strongly proportional to improved water source access. In a paper dealing with a similar question, Rajan (2016) claimed that the countries that received more aid had increased access to improved water supply than those receiving less. They also concluded that access to improved water and sanitation services was strongly and positively affected by aid disbursements. A similar result has been found in the most recent paper investigated by Ndikuman (2017). He recommended increasing aid disbursement in the water sector to achieve SDGs in Sub-Saharan Africa (SSA).

There have been limited studies regarding SDG in relation to foreign aid and water. A relationship between investment in the water sector and economic development has been observed by Sadoff (2007), which reveals that, as it is not possible to develop the water sector in poor countries without financing their water supply, there will be no economic development in those countries. A similar view has been established from SIWI (2005) that a country's economic growth can be enhanced by improved water supply and management, which can eradicate poverty in a developing country. However, Botting (2010) was unable to find out a statistically significant correlation between country GDP and absolute change in access to an improved water supply. It is well-established that improving the water sector through investment also influences health and water-dependent occupations, including agriculture, mining, and industries. It not only ensures productivity, but also fosters economic growth with a major return.

Bilateral donors and the World Bank, according to Hayter & Watson (1985), support countries that may interfere in the political system or have the opportunity to pursue their own political goals. Moreover, donors, particularly bilateral donors, provide help based on their own interests rather than the interests of the recipient country. Japan and Germany, for example, help with water

treatment rather than water supply. Thus, they can save money by utilising already developed technologies and establishing contracts for the installation and maintenance of W&S infrastructure in recipient nations while also meeting their international commitments (El Khanji, 2021). He found that donor's aid commitment for the water and sanitation sector aligned with SDG's objectives, and that donors generally allocated W&S assistance to countries with higher governance indicators.

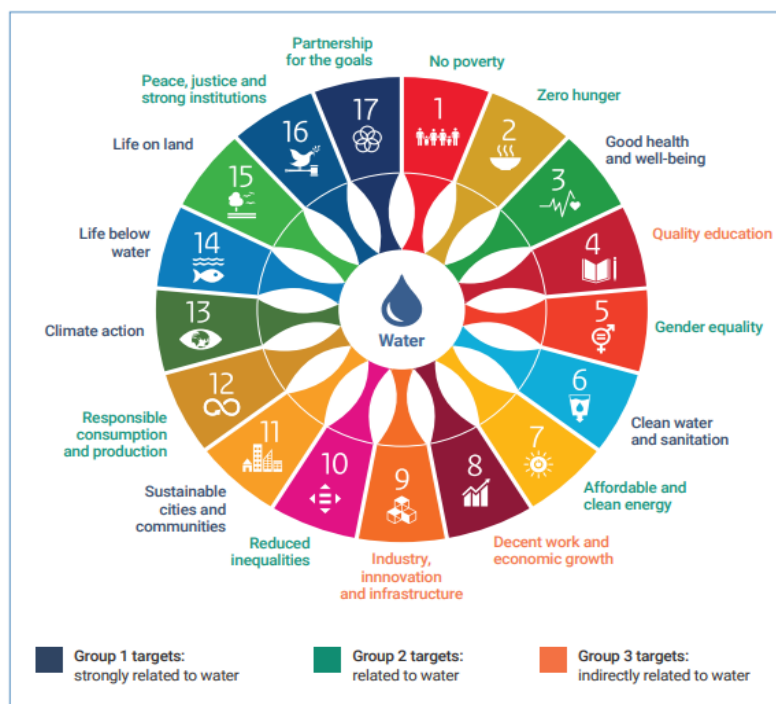
Having reviewed the impact of foreign aid on the water sector at the global and national levels, this study will turn its focus on establishing a correlation between the water sector, foreign aid, and SDG achievement of Dhaka. This study draws attention to the impact of foreign aid in the water sector and discussion of the policy issues of financing the water supply in Dhaka to achieve SDG 2030, which is the primary focus of the above studies.

2.5 Access to Water and SDG

Access to water is a basic requirement and human right.. SDG 6's first goal aims to enhance access to safe and sustainable water supplies. It aspires to “achieve universal and equal access to safe and cheap drinking water for all” (Target 6.1). Meeting this goal will necessitate significant financial and resource expenditures for developing countries. In this case, SDG 6.a — 'international collaboration and capacity building' — has been promoted to extend external assistance in water and sanitation programs and strengthen the capacity of developing countries to achieve their goals (UN, 2021). The indicators related to SDG 6.1 and 6.a include a proportion of these countries' populations using safely managed drinking water services (6.1.1), and a certain amount of water- and sanitation-related official development assistance (ODA), which is part of a government-coordinated spending plan (6.a.1), and which is critical for ensuring sustainable city development in accordance with SDG 11. The achievement of water supply targets 6.1 and 6.a in developing countries is typically foiled by inadequate funding and absence of proper use. The considerable

SDG financing gap has hindered access to clean water for the developing countries' marginalized segments, resulting in SDG underachievement.

Expanding access to water is one of the goals that has sweeping implications for attaining other SDGs. The UN's Water Policy and Analytical Brief analyzes water-related linkage with the other goals. SDG 1 (poverty reduction), SDG 2 (agriculture), SDG 3 (health), SDG 4 (education), SDG 5 (gender), SDG 7 (energy), SDG 8 (economic growth), SDG 9 (infrastructure), SDG 10 (inequality), SDG 11 (cities), SDG 12 (production), SDG 13 (climate change), SDG 14 and 15 (environment), SDG 16 (governance), and SDG 17 (development partnership) are closely linked to SDG 6: water (UN Water, 2016). Therefore, it is apparent that the 17 goals of SDG are closely related and profoundly interlinked to water directly or indirectly. Water is directly linked to 14 out of the 17 SDGs (PBL Netherlands Environmental Assessment Agency, 2018). Figure 1 shows the relation of SDGs with water.



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Figure 1. SDGs related to water (Source: Image from PBL Netherlands Environmental Assessment Agency. 2018)

Water is an enabler and a necessity for achieving all the SDG goals. Examining the multiple roles, Merrey et al. (2015) presented examples of the importance of water for achieving 17 individual SDGs, and found water as a potentially successful and, indeed, critical entrance to achieve the SDG 2030 agenda. (Merrey et al.,2015).

It is not difficult to comprehend the relationship between water, hygiene, sanitation, and the interdependencies among them. It is almost impossible for communities to provide adequate sanitation facilities or practice good hygiene without a clean, secure source of water nearby. Similarly, without adequate sanitation and hygiene, clean water will become polluted, and water projects will cease to be successful in improving health. This paper studies only water supply and sanitation is not included to narrow the study area. However, water being one of the essential parts of sanitation is a fact which is observed by UNWWDR 2021: "Water is a basic human need, required for drinking and to support sanitation and hygiene, sustaining life and health." (Connor, 2021). Papers studying the need for foreign assistance in water supply to implement the SDGs have been scant.

Pickbourn & Ndikumana (2016) identified gender inequality in developing countries as a key contributor to hindering the SDGs' achievement. According to them, improved water and sanitation reduce the burden on women, helping them devote time and energy to earn income that can enhance their living standards, children's education, and production potential. Their paper analyzed access to water as one of the major indicators for measuring gender inequality, recommending increasing foreign aid to the water, sanitation, and education sector to reduce gender inequality and to support maternity.

Moreover, Pickbourn & Ndikumana (2017) provided new findings by empirical analysis on the impact of foreign aid on access to social services in Sub-Saharan Africa. They tried to connect

proportional access to water and sanitation in SSA with the disbursement of foreign aid at social and human development services, which leads to SDG implementation. Cha et al. (2017) explored inequalities of water and sanitation coverage and health outcomes in developing countries, and the trend in foreign aid in the water and sanitation sector to meet SDGs. Countries receiving more foreign aid made more progress in water and sanitation, which indicates that foreign aid is disproportional to the water and sanitation sector. They suggest that bridging the gender gap should be prioritized in tracking the success of the SDGs in the water and sanitation sector.

Sustainable water management requires long-term infrastructure development, which demands enormous investment, and SDG creates a platform to work with development partners to succeed in this vision (World Bank Group, 2019). There is a need to implement the 2030 Agenda to achieve Sustainable Development Goal 6 before uncontrolled disasters in developing countries. If underserved groups are not addressed clearly and responsibly in both policy and practice, access to safe and clean water will remain a distant reality to the poor and marginalized, the highest priority in this regard.

According to the 2021 Sustainable Development Report, Bangladesh is placed 109th out of 165 countries in the world, with a total score of 63.5 percent, up 4.4 percent in the last five years. As a result, Bangladesh is ahead of India and Pakistan in terms of SDG implementation (Sachs et.al., 2021). According to the report, the global COVID-19 pandemic is affecting many important aspects of sustainable development. Bangladesh has achieved overall progress in achieving the SDG 6 and SDG 11 targets, despite the global COVID-19 epidemic affecting a number of areas crucial to the SDGs and the slow pace of development and project implementation; however, considerable obstacles still remain.

This study highlights the importance of foreign aid in access to clean water to meet the SDG 2030 target in Dhaka city and the role in this regard.

2.6 Foreign Aid in Bangladesh for Economic Growth

Bangladesh has achieved tremendous growth in its economic and social sectors since 2004. The country has become one of the top five fastest-growing economies in the world, according to the World Bank, with a GDP growth rate of 7.3% in FY2019 (World Bank, 2019). After the war for freedom in 1971 which devastated much of the nation's infrastructure, Bangladesh became independent and faced multiple challenges, especially in rebuilding its shattered economy. United States Presidential Security Advisor Henry Kissinger jeeringly called Bangladesh a "bottomless basket", predicting a dull future for its economy, heavily dependent on external resources — particularly on grants received in foreign aid, food aid, and commodity aid. However, in the decades following the war, the country recovered and saw a long period of economic growth, lifting millions from poverty and gaining momentum in the path towards development. The current trend of foreign assistance received by Bangladesh pales when compared to the past. Foreign assistance is coming in the form of concessional or semi-concessional loans for project assistance. At the same time, food aid and commodity aid almost vanished altogether in 2006 due to the recovery of the economy and huge development in the agricultural sector (Brief, E. c.,2017).

In the case of Bangladesh, the studies assessing the impact of foreign aid on economic progress are few and have had mixed (and often contradictory) results about the contribution of foreign aid to the development and growth of Bangladesh. The role of foreign aid on gross domestic savings and growth in Bangladesh during 1960-70 was examined by Alamgir (1974), who showed aid had caused positive growth on gross domestic savings and negative growth on Gross Domestic Product (GDP). Similarly, Islam (1992) explored how domestic resources bear a stronger impact on growth than foreign resources, which have no significant impact to growth. Likewise, foreign aid has little positive effect on GDP growth in Bangladesh (Muhammed, 2007; Ahmed, 1992; Basharat, 2014).

On the contrary, to measure the impact of foreign aid on GDP growth, Quazi (2005) estimates the aid-growth model with 26 years of data since the beginning of Bangladesh's independence and finds that the aggregated aid has had marginal effects on GDP growth, whereas loans have a positive impact compared to grants due to sectoral allocation. Using 10 years of data (1972-82), Rahman (1984) studies the importance of foreign aid in domestic resource mobilization and finds that aid has prompted economic growth and enhanced domestic savings. After evaluating the effect of foreign aid on growth in a large number of developing countries including Bangladesh, Durbarray (1998) strongly agrees with the positive effect of aid on growth in a constant macroeconomic policy environment.

From the above discussion, it is found that, due to budget deficit and constraints of domestic resources, the role of foreign aid still remains significant and Bangladesh needs to rely on foreign aid for the development activities.

2.7 Foreign Aid in the Water Sector in Bangladesh

In 1972, the very first year after its independence, the disbursement of foreign aid in Bangladesh as a share of actual allocations was US\$14.1 million foreign aid in water resources out of US\$80 million in the same year. During 48 years of independence, Bangladesh received a total of US\$6,519.96 million. US\$7,371.016 million were disbursed to this country as foreign aid, of which US\$128.4 million and US\$83.5 million were utilized for water resources in 2019 and 2020, respectively (ERD, 2020).

It is indeed a historical achievement that Bangladesh has advanced to a developing economy from a Least Developed Country (LDC) and is on track for graduation in 2026. Bangladesh has started its 8th Five Year Plan (FYP) 2020–2025, aiming to develop strategies, policies, and institutions that

will allow it to meet Sustainable Development Goal (SDG) targets. However, from 2017 to 2030, Bangladesh will need an additional US\$928.48 billion to achieve its Sustainable Development Goals. Foreign aid and grants are projected to account for US\$35.69 billion between FY 2017 and FY 2030 (GED, 2017), meaning the average additional amount required annually from foreign grants and aid is US\$2.55 billion. Learning from the MDG finance experience, Bangladesh needs to mobilize these amounts and utilize those funds completely by 2030 to fulfill its SDG commitment.

Several projects, supported by multilateral and bilateral organizations, have been commenced for the urban sector in Bangladesh, of which a considerable number is linked to the urban water supply. The World Bank, as a 1st agency, focuses on water supply for Dhaka. Over the years, ADB also started funding for rehabilitation and augmentation of water supply systems in Dhaka, DANIDA funded the water treatment plant in Dhaka, and the World Bank provided funding for slums (ADB, 2009). However, the overall picture of foreign aid in Bangladesh has changed during the last twenty years regarding sectoral allocation, as well as quality and availability. Sectoral allocation related to MDG has been prioritized, especially health, education, and physical infrastructure (Hasan, 2011). Hence, Bangladesh is collaborating with international partners to address its current challenges and to ensure access to water for everyone in Bangladesh.

2.8 Water Supply in Dhaka

Dhaka Water Supply and Sewerage Authority (DWASA) is the only authorized body responsible for water supply in Dhaka. Increasing population has a substantial impact on increased water consumption, which is unresponsive to the present Dhaka WASA price guideline. Increased water delivery capacity is ineffective in mitigating water shortages in the face of escalating demand due to system failure, old equipment, and management failure (Arfanuzzaman & Rahman, 2017). According to the annual report of Dhaka WASA (2018-19), water demand was 2500 million liters

per day (MLD) during 2018. Ensuring sufficient access to safe and clean water to this increasingly large population has become an enormous challenge for this city.

It may be encouraging to note that, for the first time in the last 50 years since the establishment period of Dhaka WASA, Dhaka's water supply has exceeded its daily demand. In 2018, water supply capacity reached 2500 MLD by using 887 tube wells with no shortage (Dhaka WASA, 2019). Despite having progress in water service, the government water supply is of questionable quality, with many areas still suffering from water shortages in the summer season. With 205,000 individuals per square kilometer, and dominated by local political leaders and thugs, the slums in Dhaka suffer deeply from an abysmally unhygienic water supply (Nahian, 2015). The reduction in water supply deficiency, therefore, will be of little satisfaction, as providing clean and safe water to the city residents, rich and poor, will persist as an immense challenge for Dhaka WASA.

Dhaka's water supply system is mostly dependent on groundwater, whereas the ratio of the underground source and the surface source is 22:78 (Dhaka WASA, 2019). Groundwater provides many opportunities to meet the city residents' basic drinking water needs using tube wells in most areas (ADB, 2009). However, Dhaka's alarming scenario is that the groundwater level is falling 2-3 meters per year, caused by continuous extraction (Dhaka WASA, 2019). Uddin & Baten (2011) projected that if the existing groundwater extraction trend occurs, the groundwater level will fall 120 meters in Dhaka by 2050.

Moreover, people are suffering from water-borne diseases devastating to health. A low-lying land, flooding, and water-logging in the rainy season wreak havoc to the city's water supply, causing the degradation of drinking water and boosting water-related diseases (World Bank, 2015). Mismanagement and inefficiency of the Dhaka WASA present another obstacle to meet the high water demand (Arfanuzzaman & Rahman, 2017). This has a huge impact on the economic growth

of Dhaka. Dhaka WASA identifies some core challenges, such as dependency on the donor's timely fund, lack of community participation to implement the project, leakage of pipes, illegal water vendors, unplanned slum eviction, and frequent fire in slums (Dhaka WASA, 2019).

In a 2020 project "Water Pollution Management in Dhaka" conducted by the University of Waterloo and funded by WSUP, 39% of households were perceived their water source as unsafe to drink. The study recommended investing in infrastructure and capacity to ensure a better water supply (UW, 2020). Moreover, Dhaka WASA delivers legal water connection to low-income communities (LIC) in some slum areas in Dhaka with the support of local NGOs and Community Based Organizations (CBOs). During 2009-2019, Dhaka WASA provided water connections to 435 slums for 624,564 citizens with the support of UNICEF, local NGOs, and CBOs. (Dhaka WASA, 2019).

Targeting 70% dependency on surface water, Dhaka WASA is implementing four water treatment plants. Moreover, Dhaka WASA is implementing District Metros Areas (DMAs) to keep non-revenue water (NRW) below 10% and to turn around their project to provide 100% legal water connections to the low-income communities and slum dwellers with the support of development organizations.

Consequently, water has become one of the core aspects of economic growth for Dhaka. Facing up to the challenges of the city's water supply, including cuts on groundwater dependency, improved water conditions in slums, and improved health conditions, Dhaka will require huge infrastructural investments and effective utilization of foreign funds in the water sector. This paper will align the water aid with the existing national plans from Bangladesh's perspective. The inefficiency of the water authorities in supplying safe and clean drinking water reveals underlying threats to the health and the environment of Dhaka, which might ultimately hamper SDG 6 and SDG 11 targets achievement by the year 2030.

2.9 Theoretical Background

Measuring the impact of foreign aid in the growth process is challenging. However, different theories and frameworks are used to explain the influence of foreign aid on the growth process. Researchers applied a variety of theories and models, to establish a theoretical framework in analysing the impact of foreign aid on development.

The “Harrod-Domar Model” establishes a relationship between savings and investment. The main theme of this model is that economic growth primarily depends on the quantity of capital and labor, and increasing investment leads to capital accumulation. Which may then be wisely invested to stimulate economic growth. Foreign aid may fill the gap of revenue expenditure mismatch by increasing the savings-investment cycle. According to the Harrod-Domar model, it is predicted that aid has a positive impact on growth.

In aid-growth research, neoclassical growth models predominate among others. Neoclassical growth theory explains that steady economic growth arises from three factors, technology, labor, and capital. The fundamental purpose of aid in this case is to raise capital for economic growth. As a result, boosting capital in developing countries can improve the capital-labor ratio, resulting in higher per capita income (Byron, 2012). The neoclassical concept helps in both capital preservation and technical advancement (Willis, 2011).

Yet, there is not much clear evidence in the literature regarding sectoral allocation of foreign aid, however, savings-investment models suggest that allocation or investment in a particular sector will have a positive impact on that particular area.

The study of water supply on economic growth has an ever-evolving theoretical framework that is congruent with contemporary conceptions. Frone & Frone (2014) developed a theory that investment in water infrastructure has a direct impact on poverty reduction and economic growth. Therefore, by estimating GDP, it can be developed that water infrastructure capital boosts economic growth by increasing productivity.

The social development approach promotes people's overall well-being, including the development of social development such as health, education, skills development, social security nets, governance, and other things, and allows them to participate equally in economic activities, contributing to the country's economic growth (Edwards, 2015).

The human development approach focuses on improving people's livelihoods which leads to economic growth through education and healthcare and other factors (Sen, 1999).

Social-Cognitive Theory (SCT) describes the effect of human experiences, others' actions, and environmental circumstances on individual health habits. SCT fosters social support through embedding expectations, building self-efficacy, and achieving behavior change through observational learning and other reinforcing (Stajkovic & Luthans, 1998).

The OECD framework defines investment in a wide way, encompassing everything from physical capital to human or intellectual capital. It can increase capacity or improve the efficiency of existing assets through investment, such as a change of ownership. Under the current circumstances, it increases overall production by accumulating factors and, as a result, the country's standard of life.

Considering the evolution of conceptual frameworks of investment-saving, aid-growth, infrastructure-growth, Human and Social Development, SCT, and OECD policy framework and reviewing literatures, this paper measures the contribution of aid to growth by evaluating the investment of aid in the water supply sector and establishes an assumption that foreign aid investment in water supply sector improves water, education, health, income which boosts economic growth.

Chapter Three: Methodology

3.1 Study Design and Data

For the 1st and 2nd objectives, I analyzed quantitative data in simple linear regression and selected variables based on theories. A single independent variable is used to predict the value of a dependent variable in this methodology. It can show how strong the relationship between two quantitative variables is (Rosenthal, 2017)

To examine health outcomes with aid to water supply, the independent variable is the sum of aid disbursement to the water supply-large system and the basic drinking water supply sector in developing countries from all donors, the data of which has been taken from the OECD Creditor Reporting System (CRS) database on disbursement for official development assistance (ODA) at the project level. The dependent variables are infant mortality (per 1000 live births), under-5 mortality (per 1000 live births), and life expectancy at birth. Total years and data are collected from the World Development Indicator (WDI) for the years 2010 to 2019 for 55 developing countries encompassing lower-middle-income countries from all regions (as classified by World Bank) (World Bank, 2021). This assessment, using health indicators, was done to determine whether the use of foreign aid in the water sector improves the health sector in those countries. For the independent variable sets, there exists data from 2010 to 2019.

After assessing foreign aid's role in the water sector on a global level, the study moved to explore the individual country as a case Bangladesh. For the 2nd objective, this study explores the impact of foreign aid on the water supply in Bangladesh. To do this, I have selected some socio-economic indicators based on the proposed theories. For this 2nd objective, the aid disbursement to the water

sector for Bangladesh is considered the independent variable, the data of which has been collected from the OECD Creditor Reporting System (CRS) database on disbursement for official development assistance (ODA) at the project level. The dependent variables, on the other hand, are GDP per capita (current US\$), net primary enrolment rate, female labor force, people with basic handwashing facilities including soap and water (as a % of the population), and people using at least basic drinking water services (as a % of the population). The net primary enrolment data has been collected from the Department of Primary Education (DPE), Bangladesh, and others from the World Development Indicator (WDI). The indicators which have all the variable data for the selected years have been chosen, while those with missing or unavailable data have been ignored. At this stage, this study seeks to determine whether the use of foreign aid in the water sector has led to socio-economic development in Bangladesh.

The study's third objective is to identify various funding options for Dhaka's water supply. In order to reach SDG targets, the exercise also includes an assessment of the latest national strategies to determine the need for foreign support in Dhaka's water supply.

3.2 Establishment of Relation Between Outcome Variables and Access to Water

For the 1st purpose, this study investigates the health outcomes associated with the foreign aid allocation in the water supply in developing countries. Access to clean water is a human right and an adequate water supply has to be available. Here, "water supply" includes drinking, cooking, food hygiene, and washing and for industry, commerce, transport, energy, recreation, and agriculture. However, this paper explores the evidence on the impact of adequate water for health in developing countries where domestic use (drinking, cooking, food, hygiene, and washing) is directly related to health. Here, I will check with statistical data whether foreign aid for water supply in developing countries improves health services or not. Firstly, establishing a relationship between health

outcomes and water supply, I have explained why I used health outcomes as an indicator in developing countries to measure development in providing foreign aid for water supply.

Inextricably linked with health, clean water is an essential component of human health and wellbeing, the lack of which harms the quality of life and violates fundamental human rights. Inadequate clean water also undermines our health systems, threatens health protection, and places economies under extreme pressure (WHO, 2019). Safely managed drinking water services include improved drinking water facilities on-premises, which provide continuous, uncontaminated drinking water. Recently, the WHO reported that 60% of all diarrhea-based deaths in developing countries are owed to insufficient drinking water (35%), sanitation (31%), and hygiene (12%), resulting in 829,000 deaths per year (WHO, 2019). One significant contributor to global infant mortality is diarrheal diseases, causing 8% of all child mortality under five years (WHO, 2019), primarily transmitted by the faecal-oral system and most commonly activated by polluted drinking water, contaminated food, or unclean hands (Prüss-Ustün et al., 2014).

Moreover, inadequate clean water for hand washing leads to respiratory infections, which kill about 9 million children below the age of 5 each year (WHO, 2019). About 45% of all child mortality is related to malnutrition, which causes frequent diarrhea and other infectious diseases because of insufficient WASH. WHO (2019) also identifies many more conditions, such as trachoma, schistosomiasis, dengue, drowning, arsenic contamination, fluorosis, legionellosis, leptospirosis, hepatitis A and E, cyanobacteria toxins, lead poisoning, poliomyelitis, and neonatal sepsis diseases, which are directly or indirectly linked with water and affect the health of people of all ages, including children.

In the functioning of the human body, water plays a vital role, facilitating food digestion, the ingestion, transfer, and use of nutrients, and the removal of toxins and waste from the body (Kleiner, 1999). Manz & Wentz (2005) discovered an adequate amount of fluid replacement

decreased an infant's hypertonic dehydration. Adult bodies have a water content of 50%-60% of body weight, while infants have 75% of the bodyweight (EFSA, 2010). Water losses therefore from infant's bodies are proportionately far higher than those for adults, illustrating why an infant needs more fluid to absorb missing liquid per kilogram of body weight than an adult (Kleiner, 1999). The WHO recommends that a person intake 2.5 to 3 liters of water per day for survival (drink and food), 2 to 6 liters per day for basic hygiene, and 2 to 5 liters per day for basic cooking, which varies according to the environment, the general quality of the individual's health, and physical activity (WHO, 2011).

COVID-19 demonstrates the relationship between clean water and health. With little to no access to clean water, the urban poor, mostly slum dwellers, have been significantly affected by the ongoing COVID-19 pandemic, demonstrating the importance of proper access to safe and clean water to prevent infections (UN, 2020). According to the WHO, hand washing is one of the most important steps to minimize disease transmission and eliminate illnesses, including the COVID-19 virus, yet billions of people are already suffering from a lack of clean water and inadequate funding (UN, 2021). From the above statements, it can be said emphatically that access to clean water is directly related to health impacts, particularly for children and infants. Therefore, developing countries need to build infrastructure to maintain good health through improved access to clean water, which requires the mobilization of large amounts of foreign aid.

For the 2nd purpose, for Bangladesh's perspective, I have selected the socio-economic outcome variables based on the theories. GDP per capita (current US\$) measures a country's overall economic development. I expect a good relationship between Bangladesh's greater levels of economic development and access to water. Net primary enrollment reflects the primary school attendance which may affect due to the lack of clean water, and I hope that the increase in clean water supply has a positive impact on primary school attendance. The female labor force, which is

favorably connected with overall market-based labor activities, captures both woman empowerment and demand for social services. As a result, this variable is expected to be positively connected to water availability. People with basic handwashing facilities including soap and water identifies the priority indicator for global monitoring of hygiene is expected to be positively correlated with access to water. People using at least basic drinking water services measuring the percentage of people using both basic water services and safely managed water services are likely to have a positive relationship with access to water.

3.3 Statistical Analysis

Simple linear regression has been used to explore the relationship between two quantitative variables. For the 1st and 2nd objectives, the estimating equation, sketched in the following, will be used to understand the aid to the water sector with the outcomes:

$$Y = bX + a$$

where,

Y = Dependent variable

X = Independent variable

b is the coefficient term or slope of the intercept line, and

a is the constant term or the intercept.

For the 1st objective, dependent variables pertain to infant mortality, under-five mortality, and life expectancy at birth while GDP per capita, net primary enrollment rate, female labor force, people using at least basic drinking water services, and people with basic handwashing facilities including soap and water are the dependent variables for the 2nd objective.

Aid to water supply-large system and aid to basic drinking water supply are the independent variables for both objectives. In regression analysis, I use the summation of these.

A brief description of the dependent variables and source of data as defined by the World Bank are given in Appendix A2.

3.4 The impact of Covid-19 on Data Collection

The Covid-19 pandemic epidemic had a big impact on my study method. I made questionnaires for Dhaka WASA and ERD officials' interviews. I couldn't contact the officials because all offices in Bangladesh were closed owing to the lockdown. I had to adjust my strategy and deal with secondary data instead of primary data. However, by implementing my intended strategy, I was able to acquire insight into government employees' perspectives and experiences, uncover obstacles in allocating and distributing foreign aid and pinpoint the true causes of foreign aid project inefficiency.

Chapter Four: Results

4.1 Foreign Aid in Water Supply on Health Outcome in Developing Countries

For the 1st objective, three different simple linear regression models were run, and the following results were found:

1st regression line has been run for the infant mortality variable. Table-1 indicates that the model can explain only 87% of infant mortality (the value of R square is 0.876). The negative coefficient shows that infant mortality decreases 2.398 units when water aid is increased. However, the result under this model is highly statistically significant (p-value <.0001).

Table 1- Regression results for Infant Mortality Rate (per 1000)

Dependent Variable	R	R Square	Adjusted R Square	Std. Error of the Estimate	Coefficient B	Significance
Under-5 Mortality Rate (per 1000)	0.936	0.876	0.861	174.670	-2.398	0.000153802

Predictors: (Constant), Aid disbursement in water supply

Similarly, for the Under-5 Mortality Rate, from Table-2 it can be found that R square is “0.848”. This means that 84% variation in Under-5 mortality can be explained by the model. According to coefficient, with the increase of foreign aid, a 1.451 unit decreases in the Under-5 Mortality Rate

per 1000 births (B value is -1.451) follows. Moreover, these results are as highly statistically significant as those obtained previous results (p is 00001).

Table 2- Regression results for Under-5 Mortality Rate (per 1000)

Dependent Variable	R	R Square	Adjusted R Square	Std. Error of the Estimate	Coefficient B	Significance
Under-5 Mortality Rate (per 1000)	0.921	0.848	0.830	193.303	-1.451	0.000153802

Predictors: (Constant), Aid disbursement in water supply

Finally, the life expectancy at birth, as the last health indicator, was examined. Table-3 found R square as “0.890”. The result of coefficient indicates a high yield of 6.967 units of life expectancy at birth with the increase in foreign aid. As such, life expectancy at birth will moderately increase with the increase of total aid and the relationship is also highly statistically significant (p <.0001).

Table 3- Regression results for Life expectancy at birth (years)

Dependent Variable	R	R Square	Adjusted R Square	Std. Error of the Estimate	Coefficient B	Significance
Life expectancy at birth (years)	0.943	0.890	0.876	164.808	6.967	0.000042

Predictors: (Constant), Aid disbursement in water supply

For the 1st objective, my findings paint a consistent picture of what occurred over time. I investigated how foreign aid to the water supply affected health outcomes in developing countries between 2010 and 2019.

All the factors such as infant mortality, under-5 mortality, and life expectancy at birth are considered as highly statistically significant as P-value is less than .001 meaning that foreign aid for the water supply does have highly statistically significant effects on health outcomes. More precisely, since increases in disbursement water aid have been shown to improve health results, gradually increasing foreign aid for the water sector will have a positive impact on health outcomes under the current circumstances. Amazingly, as a result of the regression, I've been able to show a strong link between overall water aid to developing nations and the health sector in very recent years, which was my desired result. Moreover, the adjusted R-squared shows that all the regression models are fitted well with data.

4.2 Foreign Aid in Water Supply on Socio-Economic Outcomes in Bangladesh

For the 2nd objective, five different simple linear regression models were run, and the following outcomes were found. From Table 4, it can be found that the Adjusted R square is 0.785. This means 78% of females in the labor force can be explained by this model. Table 4 shows the participation of women in the labor force rises with the increase of aid disbursement in the water sector in Bangladesh (B value 50.032). In this Table 4B, P-value is less than the 0.001 level (0.00005), so this model is highly statistically significant.

Table 4- Regression results for Female Labor Force

Dependent Variable	R	R Square	Adjusted R Square	Std. Error of the Estimate	Coefficient B	Significance
Female Labor Force	0.886	0.785	0.766	55.728	50.032	0.00005

Predictors: (Constant), Aid disbursement in water supply

For the Variable Net Primary Enrolment Rate, Regression found R square as 0.576 (Table 5). Table 5 indicates 29.201 units of net primary enrolment rate increase with water aid increase. As such, it can be seen that the net primary enrolment rate will moderately rise with the increase of water aid, which is an important indicator to observe, though the result is also statistically significant as the P-value is .002.

Table 5- Regression results for Net Primary Enrollment Rate

Dependent Variable	R	R Square	Adjusted R Square	Std. Error of the Estimate	Coefficient B	Significance
Net Primary Enrollment Rate	0.759	0.576	0.538	78.309	29.201	0.002614

Predictors: (Constant), Aid disbursement in water supply

Only a 71.7% variation in the percentage of people using at least basic drinking water services can be explained in Table 6, as Adjusted R square has been found as 0.691. From Table 6 with the increase in foreign aid to the water sector, the percentage of people using at least basic drinking water services has increased (311.862 units), and is highly statistically significant (p-value .000).

Table 6- Regression results for People using at least basic drinking water services

Dependent Variable	R	R Square	Adjusted R Square	Std. Error of the Estimate	Coefficient B	Significance
People using at least basic drinking water services	0.846	0.717	0.691	64.056	311.862	0.000262957

Predictors: (Constant), Aid disbursement in water supply

The next regression (Table 7) has been run for the GDP per capita (current US\$) variable. This model can explain only 84% of GDP per capita (in current US\$, the value of Adjusted R square is 0.825). Table 7 shows that GDP per capita (in current US\$) increases a high yield of .307 units when water aid increases and P-value is less than the 0.001 level (0.00), so this model is statistically highly significant., indicating a significant relationship between foreign aid on water and GDP per capita (in current US\$).

Table 7- Regression results for GDP per capita

Dependent Variable	R	R Square	Adjusted R Square	Std. Error of the Estimate	Coefficient B	Significance
GDP per capita	0.916	0.840	0.825	48.168	0.307	0.00001

Predictors: (Constant), Aid disbursement in water supply

For the variable “people with basic handwashing facilities including soap and water (% of population)”, the Regression table 8 shows Adjusted R square as 0.489. However, in Table-8 only this result shows -37.381 units of the percentage of people having handwashing facilities with both soap and water, which means that, with the increase in foreign aid to water supply in Bangladesh, the percentage of people using basic hand-washing facilities including soap and water has decreased and statistically significant. (P-value .004).

Table 8- Regression results for People with basic hand washing facilities including soap and water

Dependent Variable	R	R Square	Adjusted R Square	Std. Error of the Estimate	Coefficient B	Significance
People with basic hand washing facilities including soap and water	0.729	0.531	0.489	82.373	-37.381	0.004706396

Predictors: (Constant), Aid disbursement in water supply

The above results establishes the relationship between foreign aid on the water supply and Bangladesh's social and economic sectors, and indicate that for Bangladesh, foreign aid on the water supply is a statistically significant determinant for the socio-economic sectors, such as female Labor force, GDP per capita, net enrollment rate, people using at least basic drinking water services and people with basic handwashing facilities including soap and water. Foreign help to the water supply, on the other hand, can have a positive impact on all social and economic factors, with the exception of people using hand washing facilities with soap and water.

Chapter Five: Financing in Dhaka's Water

5.1 Introduction

The above regression results indicate that the disbursement of foreign aid in Bangladesh's water supply is a statistically significant determinant of health and socio-economic outcomes. These indicators are linked with SDG 4.2.4 (Net Primary Enrolment Rate), 3.2 (Under-5 and infant Mortality), 5.5 (Women's Labour Participation), 8 (GDP), 6.1 (drinking water), 6.2.1 (handwashing facilities), and 6.a (water and sanitation support to developing countries). Therefore, both regression analysis results suggest that the allocation of foreign aid in the water sector positively impacts some SDG targets. Additionally, the UN-Water policy and analytical brief, analyzing the water-related linkage with the other goals (UN Water, 2016) have found that 17 goals of the SDG are closely related to water directly or indirectly. If a city's water is sustainable, it will be easier to meet other goals (UN Water, 2016).

According to the International Water Association (IWA), sustainable water supply means providing adequate water quantity and appropriate water quality (IWA). The failure of the Sustainable Development Agenda may be triggered by the failure to understand the agenda's social, economic, and environmental dimensions (Merrey et al., 2015). As a case megacity, Dhaka, in order to meet the SDG by 2030, must ensure that a sustainable water supply is a prime and indispensable need. Although Dhaka WASA claims that their water is 100 percent safe, research and news review shows that Dhaka WASA water is unhygienic, undoubtedly not sustainable, and certainly poses a health threat to Dhaka residents, as well as the whole country

Dhaka WASA, the only responsible government authority for water supply in Dhaka and Narayanganj, has achieved noticeable improvement in the condition of the water supply, but the pace of the achievement is still far below the level of targets set by SDG (The Daily Star, 2021). Moreover, the water supply situation for the poor, slums and squatter dwellers is unsatisfactory, which has become more fragile due to COVID-19. The problems plaguing the water supply as identified by Dhaka WASA, such as illegal connections in the slum area, contaminated water due to inferior materials in illicit connections, many holes, leakage in the pipes, dirty water in the Dhaka WASA line due to the infiltration of filthy objects, and high system loss, will require a considerable investment to address the plight and deprivation of a long list of subscribers still living with shortages and dirty water every day. Lack of national service quality or a pricing and monitoring system and insufficient financial allocation in this sector in Bangladesh has created gaps in water quality and safe sewage management (World Bank, 2018).

As a strong linkage among the water sector and SDG goals have been found, I examine how foreign aid is essential in improving water supply by exploring all the existing financial sources of Dhaka WASA. More specifically, for the 3rd objective, this thesis uses a qualitative approach to study how aid helps Dhaka achieve the SDGs and create a sustainable water supply. For this, all sources of financing in the water supply sector of Dhaka have been investigated.

According to the SDG financing strategy of Bangladesh, the additional costs for achieving SDG 6 from 2017 to 2030 were expected to be \$11.80 billion or \$850 million per year, where about 50% of the budget allocation for the wash sector for SDG 6 is funded by public sector funds, 30% is from the private sector, and 20% is from development assistance. According to the Economic Relations Division, during 2014-2018, \$1,193.832 million of foreign aid was committed into the water and sanitation sector, averaging \$238.7 million annually (GED, 2019). That means that the allocation of foreign aid in WASH services in Bangladesh is on track for the SDG financing strategy.

According to the Dhaka WASA budget, the allocation and expenditure of the government's budget and foreign aid have increased in the last few years, with foreign aid exceeding government finance. According to the Annual Report (2018-2019), 70% of WASH's total allocation came from foreign aid, 85% of which was spent on water supply. Therefore, it is apparent that the project funding in Dhaka's water supply is led by foreign aid. Moreover, the findings of the first and second regressions imply that foreign investment in the water sector helps to improve other sectors, including water, which contributes to the achievement of other SDG targets. However, the non-availability of foreign aid may reduce the scope of achieving SDGs. The Table 9 examines different financial sources for Dhaka WASA's improved water supply. The following figure shows the allocation and expenditure of government finance and foreign aid by Dhaka WASA.

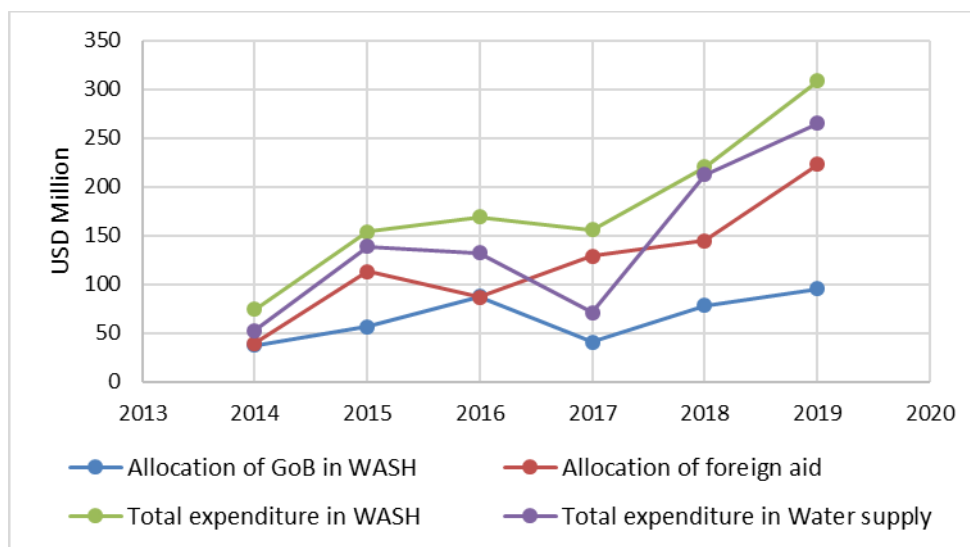


Figure 2 :Allocation and Expenditure of Dhaka WASA;

5.2 Sources of Funds for Dhaka WASA

Despite Bangladesh's SDG Finance Strategy and other economic policies emphasizing domestic resource mobilization to fund the water sector, the majority of Dhaka WASA's budget allocations and expenses depend on foreign aid. Without any foreign assistance, the ability of Dhaka WASA to improve the water supply to achieve the SDGs is a question worthy of much scrutiny. The Table 9 examines all the financial sources of Dhaka WASA in this regard.

According to Sector Development Plan 2011-2015 (SDP), the sources of funding for the water and sanitation sector are divided into three groups:

- Public sector (revenue generated by utilities, funding by the government and Development Partners)
- Private sector (including community contribution in terms of cost-sharing, private household investment, and private entrepreneurs); and
- NGOs (including direct funding from the donors and their funds)

Table 9: Roles of financial sources of Dhaka's water

Sources	Illustrations
Public Sector	In the short period of the Sector Development Program (SDP), for the period 2011-2025, the public sector investment required for Dhaka WASA in WASH services is BDT 97,901 million, compared to a total budget availability of BDT 50,456 million, resulting in a budget deficit of 48%. Currently, the majority of Dhaka WASA's expenditure comes from the public sector, and such a large disparity, if not managed cautiously, may

	jeopardize the future development program of the organization.
Revenue Income	Dhaka WASA is a service-oriented autonomous commercial organization in the Public Sector and can meet its expenses in different ways. Firstly, water and sewerage taxes are Dhaka WASA's primary source of revenue and expenditure. Currently, Dhaka WASA's revenue is declining, leaving a balance between revenue and expenditure. According to DWASA, despite the revenue increased over the last four years, declined sharply since 2019. However, the current revenue collection is hardly enough to meet the budget gap and financial long-term development projects to address the city's fast-growing water demand and the SDGs.
Domestic Borrowing	Dhaka WASA does not have the legal authority to borrow from the domestic market. They must borrow through and from the central government, which borrows predominantly from two domestic sources for budget financing: the banking system and the non-banking system. Borrowing from the banking system includes borrowing from the central bank and scheduled banks. On the other side, borrowing from a non-banking system involves savings instruments (NSD) and government bills and bonds owned by non-bank financial institutions, insurance firms, and individuals.

	<p>Currently, Bangladesh Bank charges 7.75% as a special repo rate (interest rate) for domestic borrowing (Bangladesh Bank). The revenue collection shows that Dhaka WASA is not collecting enough revenue to pay for this high interest. The government is providing subsidies for this purpose; however, these subsidies are not acceptable in the long run, and there is a possibility of breaking the Bangladesh government's financial discipline. The government borrowed almost twice as much as it had expected at the start and plans to pay Tk. 582.5 billion interest for domestic borrowing in the current fiscal year, as opposed to Tk 55.3 billion for the interest of foreign loans (The Daily Star, 2020). Economists claim that increased use of foreign aid for pipelines would relieve the pressure of domestic borrowing.</p>
<p>Revenue Generation by Utilities</p>	<p>Every year, Dhaka WASA increases the price of water for residential and commercial areas to repay the implementation and maintenance of various development projects and meet its operating costs. Recently, for the second time in the space of six months, Dhaka WASA has raised the price of water for residential and commercial users by 24.97% and 7.99%, respectively (Daily Star, 2020). This hiking in water tariffs makes it harder for low-income earners and slum dwellers to bear the cost. Consequently, the poor people in Dhaka will be unable to access water, illegal connections will increase, health</p>

	will deteriorate, and ultimately, the situation will impact education and labor, which will slow Dhaka's economy. Moreover, frequent tariff increases do not allow inflationary pressures to set fair tariffs. (WSP, 2014).
Private Sector Participation	The private sector in WASH services includes community contribution in cost-sharing, private household investment, and private entrepreneurs. Water supply has not drawn as many private entrepreneurs as sanitation has. According to SDP, private households' contribution for their tube wells and latrines is 18 percent of total investment. Bangladesh has been experimenting with using the private sector in rural water supply for short-term programs like tube wells (Joseph et. Al., 2018). The private sector participates with the public sector under the PPP model for long-term projects, which is an effective way of financing Dhaka WASA.
PPP Model through NGOs	In recent years, Dhaka WASA has embraced, slowly and somewhat waveringly, the Public-Private Partnership (PPP) model in implementing several PPP projects. Through the PPP model, Dhaka WASA seeks funds from different development partners and distributes them to selected National Government Organizations (NGOs) for use in WASH programs. Saidabad Water Treatment Plant and the Lower Income Community WASH program could be cited as projects based on the PPP model. However, the country's investment situation is not especially

	<p>favorable to advanced PPP models. The utilities must be well designed, as is one of the PPP's prerequisites (SDP, 2011). PPPs in the WASH sector face additional obstacles such as regulatory uncertainty, the inefficiency of the officials, and restricted independence of WASH operations, low tariffs, revenue collection difficulties, and limited coverage (Rashed et.al., 2014). There is also the possibility of community resistance which reduces investors' ability to invest in PPPs (2030WRG, 2015).</p>
<p>Non-Concessional External Borrowing</p>	<p>With the LDC graduation in 2024, Bangladesh will no longer be able to get soft loans as a low-middle-income country. In that case, Bangladesh must take non-concessional loans from development agencies and other sources at higher interest rates. Moreover, in the future, a developing nation's status will raise additional obstacles in terms of securing grants and low-interest loans. Dhaka WASA, as a result, might be subjected to, instead of soft loans, high-interest-bearing finances to bear all costs, and as a result, the country's debt burden will increase.</p>

5.3 Findings

Among all the financing sources discussed above, concessional loans from multilateral and bilateral partners are, as the description reveals, the most suitable options for Dhaka WASA in achieving the organization's stated goals. The reduction of groundwater dependency and the fulfillment of water-related SDGs will require Dhaka WASA to set up enough treatment plants to be financed by concessional loans.

With the current revenue collection trend, the gap between taxes and GDP will fall further when vast amounts of government funding will be needed to meet the cost demand for recovery from the pandemic and to implement SDGs (Ovi, 2020). According to the CPD, it is now critical to seize new funding opportunities from external sources, especially multilateral and bilateral sources, and to pool funds to tackle the Covid-19 epidemic. The government has already taken steps in this direction, which should be expanded upon and any possible opportunity should be taken advantage of (Khatun et. al., 2020). Relying on its source, Dhaka WASA won't be able to provide the required funds for the earmarked large infrastructure projects and will be hard-pressed to cover up the budget deficit as well. The city's water authority, therefore, will have to look for loans, grants, and aid, and donor assistance in its quest for meeting water and SDG targets.

Chapter Six: Policy Options

Currently, Bangladesh is facing 4 major challenges simultaneously, such as: preparation for LDC graduation, SDG implementation, Covid-19 and climate change. In this situation, I examine what strategies have been adopted by the most recent national plans to cope with the possible impacts of these challenges regarding Dhaka's Water sector.

6.1 8th Five-Year Plan (FY 2021-FY 2025)

The 8th Five-Year Plan (FY 2021-FY 2025, 8FYP) of Bangladesh, titled "Promoting Prosperity and Fostering Inclusiveness", was approved in December 2020, and stands distinctive when compared to the previous two plans (the 6th and 7th Five-Year Plans) for three reasons: it incorporates COVID-19 recovery techniques into the macroeconomic system, employs LDC graduation coping strategies, and aims at meeting the SDG goals. The preceding two plans averaged 6.3 and 7.1 percent GDP growth, respectively, whereas the 8FYP set a high goal of 8.5 percent by 2025. This high GDP growth target, combined with COVID-19, LDC graduation, and SDG targets, presents a challenge for Bangladesh, which has been met with inclusive growth measures.

8FYP focuses on pro-poor development, encompassing seven themes in its technique: labor-intensive activities, agricultural diversification, export-oriented manufacturing-led development, small and medium businesses, dynamism in cottage industries, modern services sectors, overseas jobs, and ICT-based entrepreneurship. This strategy was intended to help Bangladesh achieve SDGs and move the nation one step closer to becoming a hunger-free, stable country. However, as the country's COVID-19 situation

deteriorated, it initially struck the country's marginalized groups, forcing more people into poverty and jeopardizing the achievement of 8FYP's techniques. To deal with these setbacks and the resultant emergency, the government is cutting back on lower-priority expenditure and providing more resources to the country's labor-intensive economic sector and health sector.

As stated, 8FYP will invest significantly in urban emergency services, including water and sanitation, to improve health and tackle the COVID-19 virus. It will address the core issues rendering the water situation insufficient and poorly functioning, such as inconsiderate groundwater extraction, infiltration of pollutants, and lack of groundwater monitoring, calling for improved surface water management and a proactive cost recovery policy for the urban water supply and irrigation. As COVID-19 emphasizes the importance of safe water and healthcare, 8FYP places special emphasis on the development of a safe water and sanitation sector.

To overcome the economy's loss due to COVID, 8FYP has advised the government to use a mix of domestic resources and foreign aid, and to increase foreign aid mobilization. Additionally, the government has been advised to use a comprehensive Government Financing and Debt Management Strategy to establish its relations with the international capital market.

To satisfy and hasten the growing urbanization demand which has enhanced internal demand and positive economic growth, this approach advises taking innovative measures to mobilize extra capital by enlisting the private sector to build facilities for city dwellers. Private sectors, furnished with their inherent innovative mechanisms, can mobilize additional funds from the financial market or the banking system to invest in

urban housing, health, education, and recreational facilities. The government's responsibilities in this sector must be reduced to leave space for the private sector's innovative financing. In addition to creating a congenial environment for the private sector, the government should look into ways to improve revenue collection, capacity building for PPP projects, and undertake massive efforts to better leverage donor concessional funding, particularly from the World Bank, the Asian Development Bank, the Government of Japan, or any other source, as well as making preparations for long-term debt financing through bond issuance.

6.2 Bangladesh Delta Plan 2100

The governments of Bangladesh and the Netherlands have collaborated on Bangladesh Delta Plan 2100 (BDP2100) for Bangladesh, which was approved in September 2018. This long-term, coordinated, and comprehensive strategy is aimed at ensuring healthy living and sound economic growth in the delta area while taking climate change into account. The Delta Plan spans a 100-year development strategy for Bangladesh's delta area, which will guide the country to a sustainable future and outlines the need for an investment program linked with financial resource mobilization by 2030. The Plan has recognized six hotspots, urban areas included, at the national level to assist in strategic development and implementation. This forward-thinking vision has also articulated six goals, notably including ensured water conservation, water use efficiency, and a sustainable and integrated river system, all of which are fully or partially aligned with SDG goals of 1, 2, 5, 6, 9, 11, 13 and 14.

The BDP 2100 Investment Plan (IP) consists of a total of 80 projects, two of which will improve Dhaka's water quality. One of those strategies, a \$186 million project involving

river and waste management to be implemented by the Ministry of Water Resources, will revitalize four important rivers in Dhaka, addressing issues caused by unplanned urbanization and setting up new solid waste management and sewage treatment facilities. This project will receive 10% of its financing from the private sector and 20% from the Green Climate Fund (GCF), which includes concessional loans and grants. Private operators would be allowed to build systems on their own as part of a package deal, having been granted access to revenue generation from the use of these systems. Despite the GCF being designated as the financial source of this project, though, Bangladesh has yet to demonstrate its ability to mobilize funds from the GCF, leaving financial prospects to be seen.

The other project, one of the largest, will cost a staggering \$4763 million, be implemented by DHAKA WASA. It will provide high-quality water and sanitation to all Dhaka residents. Construction of the project, a sewerage network and sanitation system spread across the region, will begin in 2021 and will take decades to complete. This project will have to be delivered by the public sector, as there is no private or climate financing potential. If the project is implemented, the city will have a sustainable water supply, but existing infrastructure such as roads, train tracks, and utility supplies will be a great hindrance. To carry out the project, much of the existing infrastructure will have to be dismantled or replaced.

During the plan's first five years, the government would fund an average of \$2 billion in capital expenditures per year. Budgetary support for public finance will continue to come from government taxes and borrowing. This plan aims to cover O&M expenses by usage fees and recurring government revenues from taxes and other sources in case of shortage. Foreign aid in the form of grants and concessional loans would likely account for the

majority of the increase in government capital expenditure. The effect on the country's external debt service burden is expected to be minimal in BDP2100.

BDP2100 proposes to finance a significant portion of the projected resource gap for the water sector from the private sector and climate funds. While some gaps can be filled through private partnerships, organizations like DHAKA WASA are advised to establish appropriate cost recovery policies based on the beneficiary and polluting policies by strengthening capacity. Through the adoption of a time-bound policy, all public urban water and sanitation services need to gradually recover 100% of O&M costs.

6.3 National Sustainable Development Strategy 2010-21

The National Sustainable Development Strategy (NSDS) was designed to overcome the economic, social, and environmental challenges that Bangladesh faces to achieve middle-income status by 2021. In the case of water and sanitation, NSDS has devised some strategies to diversify water supply sources by limiting groundwater abstraction, shifting surface water supply sources, such as a new intake at Meghna for Dhaka, and promoting rainwater harvesting as an in-situ water supply source.

6.4 Analysis

I strongly agree with the core strategy of this plan to ensure successful partnerships with development partners, especially multilateral development finance institutions, to quickly recover from the losses caused by COVID-19 and increase the use and results of existing pipelines and new loans. The 8FYP also calls for increased coordination with

development partners through the Sector Working Group (SWG) under the local Consultancy firms to avoid duplication of foreign aid.

However, there should have been more emphasis on improving the water sector by realizing the need for water due to the COVID-19 pandemic. Given the ongoing project's delays due to COVID-19, this plan should have included some solutions for promptly resolving the water problem. The strategy might have strongly focused on investing in protecting individuals from infectious diseases and promoting hand-washing steps by providing safe and clean water in households and public places, especially those inhabited by poor people. However, it is hoped that SDG 6 will be able to meet the target if the guidelines of 8FYP are followed (Dey, 2021). Moreover, with the current revenue collection trend, the gap between taxes and GDP will fall further, and vast amounts of government funding will be needed to meet the cost demand for recovery from the pandemic and to implement SDGs (Ovi, 2020).

In 2014, 28% of Dhaka's total population lived in slum facilities, including makeshift houses (Census of Slum Areas and Floating Population 2014). Slum evictions and frequent fires are damaging water connections (DHAKA WASA Annual Report, 2018-19). The strategy should have targeted 100 % clean and safe water, without the need to boil or filter, for every urban dweller by 2041 as boiling water and using filter devices is expensive for poor people living in slums. Lack of coordination between government and development partners about sector planning results in inconsistent, unplanned development in said sectors. 8FYP has emphasized collaboration with multiple technically experienced bilateral sources in water management for large-scale, long-term water projects that fully support my thesis.

During the 8FYP's implementation phase, the government will face a variety of challenges: the COVID-19 pandemic, graduation from the least developed country

(LDC) group, SDG implementation, and climate change. At the end of the 8FYP, Bangladesh will have five years remaining to fulfill its SDG goals. As a result, Bangladesh must plan for a smooth transition and mitigate the effects of the removal of numerous trade facilitation and foreign aid agreements (Fahmida, 2021). It requires not only strong commitment and resources but also more specific guidelines and policy reforms in various areas of investment of funds and their proper use for the development of emergency basic services in urban areas. Similarly, BDP2100 has also planned to implement two water supply projects in Dhaka with climate funding and foreign assistance, which fully supports my research. Overall, BDP2100 is a formulation process that is heavily dependent on foreign advice and financing. However, the issue of meeting the SDG targets in BDP2100 was not significantly observed. Khatun (2020) said that the 8FYP should have focused on negotiations for a climate change fund to invest in green building, energy, transportation, and agriculture.

After reviewing the regression results, policy review, and CPD approach, I've found that to meet all the targets of the SDGs by 2030, development in the water sector in particular among all emergency services in Dhaka must be prioritized and requires substantial funding for infrastructure, including other developments. Current SDG funding strategies are insufficient, particularly in the water sector, because the strategy identifies financial shortages but provides no clear guidance on how to close them. Furthermore, a comprehensive and sustainable plan is necessary to drive the development of the water sector. Besides domestic mobilization, Dhaka WASA will have to undertake more development projects in the water sector, requiring the strengthening of ties with development partners and the ensuring of effective utilization of foreign aid in this sector. The achievement of SDG 6, SDG 11, and SDG 17 will enable Dhaka to become an economically and socially sustainable city by fulfilling the relevant goals of the SDGs, as well as the development of the water sector.

Chapter Seven: Conclusion

This chapter summarizes this report's research findings and includes an outline of the report, a review of the findings, and suggestions for future research.

7.1 Summary of Key Findings

The findings of the global, country and city-level research are largely consistent, leading to three basic conclusions. First, foreign aid in the water supply is found to be a positive and significant effect on individual health outcomes in developing countries. Second, foreign aid in water supply in Bangladesh appears to have a favorable effect on the socio-economic outcomes, although it has a negative impact on basic handwash facilities with soap and water. Finally, foreign aid was found to be an effective, strong, and positive financial source on access to water in Dhaka to meet SDG.

Foreign aid is essential since Dhaka's domestic water sector funding is insufficient to meet residents' demands and achieve set SDGs by 2030. This report seeks to make a descriptive contribution in determining the effect of foreign aid by linking it with SDG goals and highlighting the relevance of these policies, with a particular focus on Dhaka's water supply. This study examines all available funding options and concludes that further long-term infrastructure projects are needed to meet the SDGs by 2030 and meet the potential water demands of Dhaka residents. As a result, in the coming years, Bangladesh will have to depend on foreign assistance.

7.2 Connection to the literature

My findings are similar to those of some previous studies, such as Wayland (2017), which found a highly statistically significant relation between water aid and under-5 mortality of aid recipient countries suggesting that the amount of water aid received has an impact on reducing child mortality.

Likewise, Ndikumana (2017) discovered that foreign aid in the wash sector improves water, sanitation, health, and education through which human development is accelerated. Inconsistent with Botting et al. (2010) results, however, water aid does not appear to have an impact on the health sector in developing countries suggesting that these health outcomes were excluded from the benefits of water aid projects in those countries. Likewise, Hopewell & Graham (2014) found no significant association between ODA allocated for water and sanitation (large systems) and water supply and sanitation between 2000-2010 for 31 cities in Sub-Sahara Africa. The use of most recent data and the exclusion of the sanitation sector may explain the discrepancy between their results and my research.

In the instance of my second goal, I was unable to locate any research on the influence of foreign aid on the water sector in Bangladesh. The majority of research has focused on the impact of total foreign aid. However, there is considerable grey literature on this subject, such as ADB and World Bank publications on the importance of foreign aid in Bangladesh's water sector and its good impact on social and economic growth (Joseph, G., et.al.,2018) (Sharma & Alialo, 2017). In Bangladesh, improved water infrastructure is critical for basic human development outcomes such as improved health, nutrition, education, and economic development. As a result, the World Bank encouraged

Bangladesh to invest immediately with the assistance of development partners and the private sector to close the budget gap and meet SDG targets which is entirely consistent with my findings and recommendations. Corresponding with my findings, the recent assessments of the impact and effectiveness of water aid on the socio-economic sector, for example, Gopalan and Rajan (2016) and Endicumana and Pickbourne (2017), experimentally show that water aid has a positive and significant impact on improving socio-economic outcomes. Moreover, the results of this study, similar to those of Wayland (2013) and Bain et al (2015), find a positive and statistically significant relationship between foreign aid and GDP in the water sector. On the contrary, the results of the study are largely inconsistent with those of Khatun et. al.,(2019) who found foreign aid was not statistically significant with GDP per capita, though they found health aid was a significant factor for health outcomes in Bangladesh. Furthermore, despite my results in infant mortality being the opposite of the results of Botting et al. (2010), we have both had significant results with the help of water.

The research on Dhaka water supply in the context of aid is limited. It could be that a researcher is having difficulty accessing data. Mannan (2009)'s study on water supply financing in Dhaka urged Dhaka WASA to boost its participation in the private sector to reduce its dependency on foreign aid and raise water utilities through a revenue management model known as Program for Performance Improvement (PPI). However, this PPI concept is designed to enhance revenue generation regardless of the impact on low-income citizens and is implicitly pushing for a rise in the cost of water for households. This is incompatible with my objective because Mannan (2009)'s approach contributes to an increase in revenue collection while remaining suspicious of paying capital costs and attaining SDG targets.

The World Bank discovered that in Dhaka's water sector, alternative domestic financing sources such as output-based aid (OBA) programs, blended finance, and social security funds have spanned the gap between small and large-scale finance. However, The World Bank concludes that assistance is still required to solve the issue of producing bankable projects that can be funded (Joseph, G., et.al.,2018)

The influence of overall foreign aid in supporting SDGs in Bangladesh is examined in a recent study by Khatun et al., (2019). Despite finding no statistically significant link between foreign aid and economic growth, Khatun et al., (2019) stress foreign aid is still an important source of funding due to Bangladesh's lack of social sector resources for implementing SDGs and suggests improving foreign aid utilization efficiency. The discrepancies in results could be due to flaws in the methodology used and/ the indicator of the independent variable.

7.3 Impact of investment in Dhaka's water on other SDGs

As discussed in section 2.5, water is inextricable linked with other SDGs. Moreover, my results find that the improvement of water helps to develop other sectors. This section discusses how ensuring sufficient access to clean water for the Dhaka people affects the achievement of other ambitious goals proposed for the post-2015 based on my all findings and results. Table 10 shows the impact of Dhaka's improved water supply on other SDGs.

Table 10: Impact of Dhaka’s water in achieving the other SDGs

Goal 1: No Poverty	Water contributes to poverty reduction in Dhaka by reducing diseases and contributing economic growth.
Goal 2: Zero Hunger	Clean water helps maintain food nutrition and alleviate drought, which has a lasting effect on slum dwellers.
Goal 3: Good Health and Well-being	Clean water improves health by reducing mortality and increasing life expectancy.
Goal 4: Quality Education	Investment in water supply found to be positive significant impact on primary school enrollment, implying that it plays a role in Dhaka’s educational progress.
Goal 5: Gender Equality	In Dhaka's slums, having access to water decreases the burden of home tasks and allows girls to participate in productive jobs.
Goal 6: Clean Water and Sanitation	Investment in water supply found to be positive significant impact on access to water,, implying that it plays a role in Dhaka’s WASH.
Goal 7: Clean energy	Significant amount of water helps to process biofuel which increases energy in Dhaka
Goal 8: Economic Growth	Water contributes to Dhaka’s economic growth by reducing poverty and improving education.
Goal 9: Infrastructure	Investment in water infrastructure in Dhaka

	contributes to this goal
Goal 10: Reduced inequality	Water access and productive use are crucial strategies for improving the lives of the impoverished and slum dwellers in Dhaka.
Goal 11: Sustainable cities	Dhaka can achieve the criteria of a sustainable city by ensuring safe, reliable, and affordable water and sanitation.
Goal 12: Responsible Consumption and Production	Without securing pure and sufficient water supply, sewerage treatment plant for Dhaka cannot be invested easily.
Goal 13: Climate Action	Adequate water supply ensures hydrological cycle which affects on climate change in Dhaka
Goal 14: Life Below Water	This goal is applicable for coastal, sea, ocean and marine areas.
Goal 15: Life on Land	Investment in rain water management increases Dhaka's biodiversity.
Goal 16: Peace and justice	Investment in transboundary river water quality and implementing surface water treatment plant promotes peaceful societies. Moreover, improving health, education, and well-being by gaining access to safe and sufficient water promotes justice for the people of Dhaka, particularly the slum dwellers.
Goal 17: Global Partnership	Dhaka's water is enhancing global partnership to achieve SDG.

The Table 10 shows that the relationship between all other SDGs and Dhaka's water supply has been examined, as well as how investing in Dhaka's water contributes to the achievement of other objectives. With the exception of SDG-14: Life below Water, the investment in Dhaka's water supply assists in the achievement of all SDG targets. Because SDG 14 is relevant to coastal and marine locations. Since, my work focuses on urban areas, investments in water supply can assist achieve the remaining 16 goals, with the exception of SDG 14. Figure 3 shows SDGs relation with Dhaka's water.

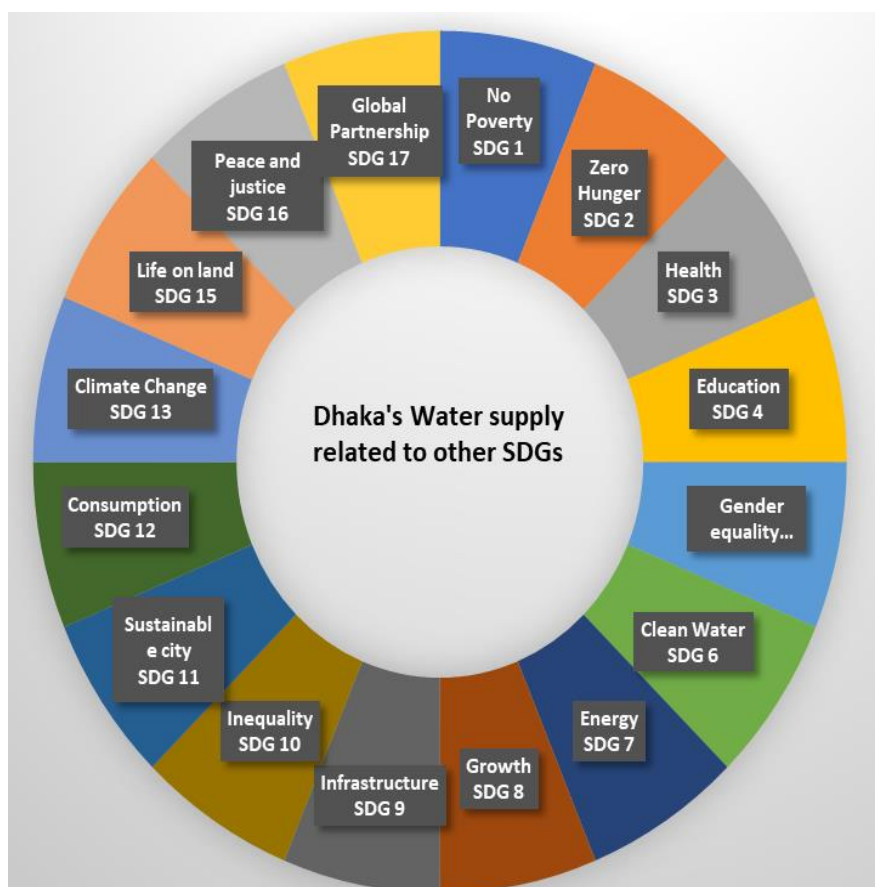


Figure 3: SDGs related to Dhaka's Water

7.4 Interpretations

Our findings paint a consistent picture of what occurred over time. I investigated how foreign aid in the water supply sector influenced health outcomes in developing countries between the last five years of the MDG and the first five years of the SDG. My assumption based on the theories was that foreign aid could have a potentially positive effect on health outcomes in developing countries, and as expected, foreign aid in the water supply sector was found to be highly significant and to have a very beneficial effect on under-5 mortality, infant mortality, and life expectancy at birth. It suggests that investing foreign aid in the water supply sector is understood to be an effective source for health outcomes in developing countries. In section 4.3, I established a substantial relationship between clean, safe water supply and good health, and the ongoing Covid-19 pandemic has highlighted its importance even more. Therefore, this result indicates that foreign aid improves water supply which leads to reduced child mortality and increase life expectancy. However, I discovered a connection for only three determinants of health outcomes and due to data restrictions, I was unable to consider numerous other indicators that measure health outcomes. Although three components cannot cover the entire picture of the health sector, the results can assist developing nations in meeting the SDGs 3. Despite scheduled progress globally, sub-Saharan Africa and South Asia still lag in reducing child mortality. Diarrhea and malnutrition are among the causes of four out of every five deaths of children under the age of five in this region (UN,2021). That means we're still far away from the 2030 goal. Government's inefficiency, low regulatory quality, and higher rural population are all potential restrictions, that reduce the influence of water aid on child mortality as discovered by Wayland (2018). According to a recent study (Acheampong et al.,2019), boosting access to clean water sources has been found

as a top priority for attaining SDG 3.2 by reducing under-5 and infant mortality. As my results and theories find that foreign aid investment in the water sector improves the health sector in developing countries significantly. Therefore, more foreign aid needs to be allocated to address these backward aspects of the health sector.

To answer the second study's questions, the relationship between foreign aid in water supply and Bangladesh's social and economic sectors has been explored, and the findings show that while foreign aid investment in Bangladesh's water supply has a positive significant effect on GDP, female labor, net primary enrollment, and access to drinking water, the relation was significant but negative on handwashing facilities, including soap and water

Water aid has been found to be a highly significant factor in access to water. Investing foreign aid in water infrastructure increases the accessibility of water. However, According to UNICEF, 68.3 million Bangladeshi people still lack access to safe drinking water (UNICEF, 2021). Compared to other areas, investment in water is lower than in the most geographically problematic places (VNR, 2020). As a result, to meet SDG 6.1, adequate foreign aid needs to be allocated in the water supply sector.

Foreign aid in the water supply is significant and positive in terms of net primary enrollment and female labor participation. It can be explained that foreign aid investment in water supply infrastructure reduces the time to fetch water and contributes to women's empowerment by giving women the opportunity to work in the market for example Ready-Made-Garments, where women comprise the majority of employees. Moreover, it minimizes the spread of water-borne diseases resulting in lowering the number of girls and boys dropping out of school while also increasing school enrolment. As a result, investing foreign aid in water infrastructure enhances the country's economic growth, child health, and education, which supports the investment-saving, infrastructure-growth,

and social human development strategy.

In contrast, this analysis only finds a negative impact and statistically significant of water aid on hand-washing facilities with water and soap. Adequate access to water is the most significant contribution to proper hygiene and handwashing with soap and water is the most cost-effective preventive intervention for reducing diarrheal disease. Proper hand-washing occurs when both water and soap (or other local cleaning materials) and hygiene stations are available. The failure of a development partner-funded handwashing project could be due to a lack of promotion of soap-based handwashing and inadequate physical infrastructure for handwashing which can be explained by Social-Cognitive Theory. Moreover, the ineffectiveness of water aid in social outcomes may be due to a lack of statistical power or may be due to faster population growth than providing more services.

Finally, this study finds foreign aid in the water supply as the highly significant and positive determinant for GDP per capita, which means in Bangladesh, foreign aid in water supply contributes significantly to economic growth and development, mostly through capital accumulation and infrastructure development, as well as human and social development. Foreign aid appears to have the potential to support economic growth in Bangladesh by raising the proportion of investment in GDP through investment projects in productive and economic areas such as water. This is appropriate because Bangladesh as a developing country frequently lacks the local savings necessary to fund good programs. The empirical results are consistent with the evidence from earlier studies and human social development approaches that show that foreign aid is important in improving social development outcomes.

Despite beneficial effects, foreign aid in the water sector does not always produce the intended consequences, and it promotes donor dependency (Mbiha&Kingu, 2015). So, as a case, in the next stage, I attempted to assess other possible alternative sources of financing for Dhaka's water supply besides foreign aid.

Analyzing the answers to the third question of this study on Dhaka's water service, this research explores all financial sources and determines that the role of foreign aid in the development of water supply services in Dhaka is immense, at least in the short term. The water sector in Dhaka is heavily reliant on foreign assistance for funding, and without it, there is no existing alternative. Simultaneously, the Dhaka water sector will need to depend on foreign assistance for a few more years to enforce the SDGs and meet the city's potential needs.

Ensuring 100 percent clean and safe water for the citizens of Dhaka, and assisting in achieving all set goals, including SDG 6 and 11, has taken on national policy relevance. Studies specifically involving the assessment of the effect of foreign aid on water supply for a megacity in a developing country and the consequent involvement in meeting SDG targets are harder to find in literature. This analysis finds that domestic resource mobilization is insufficient to achieve adequate water supply and SDGs by 2030 by Dhaka WASA due to insufficient tariffs, low revenue collection, and system losses. As a result, donor funding has played a significant role in the growth of the water sector.

Furthermore, despite significant improvements in Dhaka's water service, DWASA still needs to address a few essential challenges, including expanding water infrastructure, promoting hygiene, assuring water quality, and ensuring access to water for all, particularly slum dwellers. The SDGs' core objective is to combat many dimensions of poverty, and in order to do so, everyone in society must have access to adequate health,

education, income, and water. The government's capacity to mobilize domestic resources for Dhaka's water is found to be low in this study to achieve the SDGs. As a result, foreign aid in the water supply sector will continue to be a significant source of funding for Dhaka's achievement of SDGs 6 and 11.

Finally, Bangladesh's national plans fully support my thesis that more foreign aid mobilization is needed to develop Dhaka's water infrastructure, and, in order to do so, strong coordination with donors is required. This study concludes, consistent with the 8YP and Delta Plan 2100, that the government cannot rely on foreign aid indefinitely and must carefully plan to lessen its reliance on it and promote domestic resource mobilization.

7.5 Limitations and Future Research

There are some shortcomings in this study that should be acknowledged. To narrow the field, this research only studies the water supply in Dhaka where sanitation is excluded. However, most literature works on the water and sanitation sector determine that foreign aid is allocated separately, and segregate data is available in OECD. Similarly, in developing countries, foreign aid contributes to much-needed areas such as education, health, and agriculture, but this study focuses only on the impact of foreign aid on the water supply, as it is fundamental to SDG implementation and related to other SDGs.

Due to unavailable data for all developing countries between 2010 and 2017, I had to limit my analysis to those countries which have available data while leaving off those which do not. Moreover, this study excludes some explanatory variables that are likely to be significantly relevant in Bangladesh's socioeconomic context. I was unable to

incorporate these factors due to data constraints, as doing so would have significantly reduced our sample size. Future research could try to alleviate this by selecting and implementing more appropriate instrumented variables.

The Economic Relations Division (ERD), which is responsible for mobilizing foreign aid for Bangladesh, did not have segregation data that focused exclusively on the water supply sector on their flow book. Dhaka WASA's annual report did not provide separate information on the expenditure of foreign-aided projects in the water supply. If the disaggregated data of foreign aid disbursement in the water supply can be separated, the results of the evaluation of their efficacy in the Dhaka water supply will be more conclusive and credible. This will be an intriguing research topic in the future.

The results do not account for the role of Dhaka's water projects implemented using Non-Governmental Organizations (NGOs) funding due to the inability of access to data. Given Dhaka WASA's over-reliance on foreign funding in the water sector, this omission is unlikely to affect the study's findings, but it would be feasible to offer a more accurate picture of the use of foreign aid in the water sector. This point should be explored and investigated further in the future.

It is also difficult to find literature studies specifically focused on water aid for a megacity in a developing country. All of these constraints, which are due to a lack of data, highlight the need for programs to collect and make data linked to development financing available in order to improve the program's efficacy.

The literature on the impact of foreign aid at the sectoral level (health, education, and water) is mostly devoid of a solid theoretical framework for identifying causal relationships between the variables of interest. Even if this study tries to lay the

groundwork for a theoretical understanding of the mechanisms of efficacy between foreign aid and access to water, more research is needed.

Due to the Covid-19 pandemic, this study had to rely on secondary data; however, a more credible analysis based on primary data can be conducted in the future, providing a comprehensive picture of the water sector in Dhaka.

In addition, the increase in Covid-19 infections and deaths in Bangladesh and touching my loved ones caused a serious deterioration in my mental health which severely affected my writing progress.

7.6 Recommendation

Based on the findings of this study, some recommendations have been proposed in order to ensure foreign aid is effective in Dhaka's water development:

- The analysis finds a strong correlation between the usage of aid in the water sector and health outcomes. The effective healthcare sector faces a new challenge as cities expand, rural-urban migration increases, and the urban population grows. In urban environments, especially among slum dwellers, a lack of appropriate clean water has a negative impact on health. As a result, more foreign-aid projects are needed to be implemented in those places to improve health by making water accessible to everyone.
- In this study, foreign aid is determined to be an important catalyst for Bangladesh's economic progress. However, as a result of graduation to LDC, foreign aid is becoming more expensive for Bangladesh, and the government must develop its aid absorption capacity at a considerably faster rate than in

former years. The total cost of the project will be lower and there will be less interest if the foreign-aided project is implemented quickly.

- This study has examined existing financing sources for Dhaka WASA and found foreign aid most appropriate. However, it has been also explored that concessional financing is limited. Therefore, foreign aid needs to be used in a more catalytic way to facilitate more private finance.
- In order to make aid to the water sector effective, policy solutions need to focus not only on the allocation of foreign aid in the water sector but also on efforts to strengthen the institutional capacity of Dhaka WASA which needs to be strengthened in the implementation and management of the foreign aided project.
- Dhaka WASA has been found to be falling short of expectations in terms of service delivery. Lack of accountability could be one of the reasons behind this. As a result, an entity could be placed under the jurisdiction of a Ministry or a City Corporation instead of being autonomous.
- This study examines the strategies plans and finds that the majority of Delta plan's projects will be funded by GCF. Moreover, strong internal feedback and foreign aid with technical assistance will also be required as a climate-risk country. As a result, to reach the SDG target, Bangladesh will need to take technical and diplomatic measures to consolidate the entire amount of GCF.
- Indeed, the investment in infrastructure and expansion of Dhaka's water supply services does not guarantee that slum residents and the underprivileged in the city will have easy access to it. Therefore, a considerable amount of Dhaka WASA's overall budget can be allocated to slum projects in order to provide them with convenient access during expansion.
- Steps must be taken to identify and overcome every impediment in the sector in order to boost the funding of development partners in the sectors and attract

private sector investment following the basic needs of the people of Dhaka.

- According to the findings, foreign aid in the water supply can play a significant role in achieving the SDGs when it comes to capital expenditure. To reduce the dependency of groundwater on Dhaka WASA groundwater projects like the Sayedabad water treatment plant, rainwater harvesting, which are also compatible with SDG, should be built right away to ensure long-term sustainability. To secure sufficient funding, the government needs to include these in its policy and convey the issues to bilateral and multilateral forums.
- According to this study, there is a link between foreign aid in the water supply and net primary school enrollment. So, in order to enhance school enrollment and to stop school dropouts, the foreign aid investment should focus more on access to water for slum people.
- It is required to boost promotional activities, availability to appropriate soap, community awareness, and hygiene knowledge among uneducated poor people in order to make the handwashing project effective. Water projects must guarantee that sufficient funds are allocated to maintain the physical infrastructure, for example, WASH blocks in school as well as to execute effective promotional efforts.
- Economic Relations Division (ERD), Bangladesh Bureau Statistics (BBS) and Dhaka WASA need to provide publicly available annual segregated data on foreign aid disbursement in Dhaka's water supply.

7.7 Conclusion

In conclusion, the findings show that foreign aid plays a favorable influence in achieving water, health, education, and other goals set by the SDGs. Without a better water supply, development in many other areas of the SDGs, such as health, education, and poverty alleviation, will lag. These areas can benefit from major foreign aid investment in the water supply, with the overarching goal of increasing water resources and, as a result, ensuring sustainable socio-economic development and fulfilling the SDGs.

Bangladesh is officially set to become a developing country in 2026 and has made great strides in its economy. While Dhaka WASA claims that the city's water supply has vastly improved in recent years (DWASA Annual Report, 2020), the latest research and news indicate the exact opposite. Nevertheless, to address Dhaka's ongoing water supply problems, much larger long-term infrastructure development, such as a water treatment plant, is still needed, which cannot be met by domestic financing only. Even if this strategy is possible, the interest on domestic loans will be much higher.

The literature review, the explanation of the theories, the statistical results, and the findings of the national plans all support the view that it is wiser to fill the budget deficit with low-interest foreign debt (concessional loan) than with a high-interest domestic loan. As there is still a need for large infrastructure and capacity-building projects for water development in Dhaka, once these requirements are met, reliance on foreign loans will have to be gradually reduced, as described in the Delta Plan's 100-year plan.

According to the findings, it is clear that it is possible to reduce Bangladesh's debt burden by taking a low-interest foreign loan instead of a high-interest domestic loan

which will result in greater productivity. To provide more funding for internal economic development, the government should step up its efforts to mobilize more funds from external sources. Despite a large amount of foreign aid invested in Dhaka's metropolitan water sector and the implementation of foreign aid projects, the city's water management has yet to reach a satisfactory level. This is because foreign aid is not used properly and effectively. Therefore, continuing to mobilize foreign aid in the water sector even after LDC graduation, and using innovative mechanisms to make this fund effective to overcome the current and future water crisis and quality problems in Dhaka.

A combination of inadequate foreign funds and inefficient use of those funds has resulted in a policy and institutional structure that is unlikely to be sensitive in Dhaka's access to clean water. A multitude of social, cultural, economic, and demographic factors influence how people use water services. To ensure improved water quality and achieve set SDGs by 2030, an effective combination of policy changes, institutional change, donor behavior, and active citizen participation is required. Thus, increasing allocation and successfully utilizing foreign aid for water projects in Dhaka can not only greatly accelerate the progress of a rapidly rising economy, but also expedite to meet other sustainable development targets, including SDG on access to water.

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Appendix A1

List of lower middle countries classified by World Bank (World Bank,2020)

1. Angola	2. Haiti	3. Philippines
4. Algeria	5. India	6. Samoa
7. Bangladesh	8. Indonesia	9. São Tomé and Príncipe
10. Belize	11. Iran	12. Senegal
13. Benin	14. Kenya	15. Solomon Islands
16. Bhutan	17. Kiribati	18. Sri Lanka
19. Bolivia	20. Kyrgyz Republic	21. Tanzania
22. Cabo Verde	23. Lao PDR	24. Tajikistan
25. Cambodia	26. Lesotho	27. Timor-Leste
28. Cameroon	29. Mauritania	30. Tunisia
31. Comoros	32. Micronesia, Fed.	33. Ukraine
34. Congo	35. Mongolia	36. Uzbekistan
37. Côte d'Ivoire	38. Morocco	39. Vanuatu

40. Djibouti	41. Myanmar	42. Vietnam
43. Egypt	44. Nepal	45. West Bank and Gaza
46. El Salvador	47. Nicaragua	48. Zambia
49. Eswatini	50. Nigeria	51. Zimbabwe
52. Ghana	53. Papua New Guinea	54. Pakistan
55. Honduras		

Appendix A2

Definition and sources of outcome variables

Variable	Definition	Source
Infant Mortality (per 1000 live births)	The number of infants dying every 1,000 live births in a given year before reaching age one	World Bank
Under-five mortality (per 1000 live births)	The probability of under-five mortality rate, meaning the probability of a child out of every 1000 live births dying before reaching age five if subject to age specific mortality rates of the given year	World Bank
Life expectancy at birth, total (years)	Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.	World Bank
GDP per capita (current US\$)	Gross domestic product in current U.S. dollar divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products.	World Bank
Net primary enrollment rate	Measured by dividing the number of primary students enrolled who are of the official age group for a given level of education by the population for	DPE (APSC, 2019)

	the same age group and multiplying the result by 100	
Labor force, female (as a % of total labor force)	A percentage of the total amount of women engaged in the labour force, which involves people from 15 and above, providing labour during a given period for the production of goods and services.	World Bank
People with basic hand washing facilities including soap and water (as a % of population)	The proportion of people living in households that have a soap and water hand-washing facility available on the premises. Hand-washing facilities can be fixed or mobile and include tippy-taps, tap water sinks, tap buckets, and hand-washing jugs or basins.	World Bank
People using at least basic drinking water services (as a % of population)	The percentage of people using both basic water services and safely managed water services where basic water is described as drinking water from an improved source, given that collection time is not more than 30 minutes for a round trip, and safely managed water is drinking water from an improved source that is accessible on-premises, available when required, and free of faecal and priority chemical contamination.	World Bank