

IMPACT OF COVID-19 ON WATER AND SANITATION SECTOR.

Submitted by:

Animesh kumar Basak

ID:182-47-811

MD.Bapparaj Hosssain

ID:182-47-733

MD.Sohanur Rahman

ID:182-47-734

Amit Golder

ID:182-47-768

A Thesis Submitted to the Department of Civil Engineering, Daffodil International
University in Partial Fulfillment of the Requirements for the Degree of

Bachelor of Science in Civil Engineering



Department of Civil Engineering, Daffodil International University

August, 2021

Certificate

The thesis titled **“Impact of COVID-19 water and sanitation sector”** submitted by Animesh kumar Basak (ID: 182-47-811), MD.Bapparaj Hosssain(ID: 182-47-733), MD.Sohanur Rahman (ID: 182-47-734), Amit Golder(ID: 182-47-768) been excepted satisfactory in partial fulfillments of the requirement for the degree of Bachelor of Science in Civil Engineering on August, 2021.



Supervisor:

Ms. Romana Sails


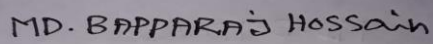


Assistant Professor,

Department of Civil Engineering,

Daffodil International University.

DECLARATION

This is hereby to certify that, the research work has been performed under the supervision and guidance of Ms. Romana Saila, Assistant Professor, Department of Civil Engineering, Daffodil International University, Dhaka. In addition with this work has not been submitted anywhere else for any other purpose except for publication.

Name	Signature
1.Animesh kumar Basak ID:182-47-811	
2.MD.Bapparaj Hosssain ID:182-47-733	
3.MD.Sohanur Rahman ID:182-47-734	
4.Amit Golder ID:182-47-768	



Romana Saila
Assistant Professor
Department of Civil Engineering
Daffodil International University

ABSTRACT

The Covid-19 pandemic affects the lives of millions of people, radically changing their habits in just a few days. In many countries, the control system set by the national government restricts the movement of the entire community, makes it impossible to attend school, university and workplace no longer allow travel or normal social life. The lifestyle of the population, climate, water scarcity and water price affect the demand for beverages and its daily pattern. To analyze the impact of restrictions on water demand, data on the instantaneous flow of the three cities during the lockdown analyzed the important role of user habits and the negligible impact of daily water demand. Here is how much water people are using and how much they are doing.

After doing this survey, I saw that the people of our country are now much more clean and aware of the effects of Corona than before. We surveyed in three districts and found that in Bogra, Naogaon and Khulna district, Khulna district is more affected by corona. There was drinking water crisis.

ACKNOWLEDGEMENTS

I would like to thank my supervisor Assistant Professor, Romana Saira for her advice and guidance through the process of this research. I cannot but thank the Assistant Professor & head of the department Dr Mohammad Hannan Mahmud Khan, for his kind help. I am very grateful my teachers who had taught me in throughout my entire Bachelor journey.

Last but not the list, my family was very supportive to accomplish my research.

I am truly grateful to each of them.

CONTENTS

Topic Name	Page Number
CHAPTAR- I INTRODUCTION	
1.1 General	01
1.2 Research Objectives	03
1.3 Research Questions	03
CHAPTAR- II 'LITERATURE REVIEW'	
2.1 Impact - Perception:	04
2.2 The Possible Impact of water:	06
CHAPTAR- III 'METHODOLOGY'	
3.1 Study Design	08
3.2. Data: Survey Questionnaire	09
CHAPTAR- IV 'RESULTS & DISCUSSION'	
4.1 Result	10
4.2 Discussion	16
CHAPTAR- V 'CONCLUSION & RECOMMENDATRION'	
5.1 Conclusion	18
REFERENCES	20

LIST OF TABLES

Table Number	Caption of Figure	Page Number
Table 4.1.1	Summary of data collected from Watervsurvey in Bogra, Naugaon & Khulna.	11

LIST OF FIGURES

Figure Number	Caption of Figure	Page Number
Figure-2.1	Pictures of Sanitization Process in Naogaon Raninagar upazila office.	06
Figure 2.2	Bad impact of Covid-19 on water sanitization process.	07
Figure-3.1	Bogra, Naogaon & Khulna (Location of cities which under survey) in Bangladesh.	08
Figure 4.1	Survey result of change in cleaning process because of Covid-19	12
Figure 4.2	Survey result of use of soap because of Covid-19 Pandemic.	13
Figure 4.3	Survey result of use of water because of Covid-19 Pandemic.	14
Figure 4.4	Survey result of effect of Covid-19 Pandemic on drinking water.	15
Figure 4.5	Survey result of effect of protection equipments from Covid-19 Pandemic.	16

Chapter 1

INTRODUCTION

1.1 General Introduction

The spread of Covid 19 shocked the world since early 2020, creating a state of emergency and forcing the nation to take drastic measures to control it. Several studies have highlighted the perceptions of risk aversion, especially as the government continues to take restrictive measures to address the spread of covid 19 in order to maintain security. These measures address both personal and social issues, such as the prohibition to go out of the house to stop sporting events and activities other than the main activities (grocery shopping or drug supply).

With the outbreak of novel coronavirus declared a pandemic and an international public health

emergency by the World Health Organization (WHO) the entire world is working to address it. It

is a rapidly evolving and emerging situation. In 5 months after the first emergence of the virus

in December 2019 nearly two million people in 185 countries around the globe have been

identified as confirmed cases of coronavirus disease 2019 (COVID-19) . Researchers across the

world are working hard to understand better the biology of nCoV and the epidemiology of the

novel coronavirus disease-19 (COVID-19). The estimated basic reproductive number of the virus is significantly higher.

This has made health risks irresistible compared to many other infectious diseases, leading to serious complications even in countries with the most advanced healthcare systems. People over the age of 60 are more likely to be affected by the disease than younger people.

Vaccines or antiviral drugs have not been approved for this disease, so measures to control the spread of the virus are the most effective way to control the disease and maintain distance.

Billions of people around the world are taking preventive measures at home to reduce the spread of the virus, such as remote office activities, international travel bans, mandatory lockdowns and social distance.

Bangladesh is a low middle income country and one of the most densely populated areas in the world. In this research paper we briefly outline the current situation of covid 19 in Bangladesh and make some recommendations on how this country can cope with the epidemic.

This study provides a brief overview of the problems that people face with water during covid-19, how water affects daily life and how it affects business.

1.2 Research Objectives

Repeated hand washing with water, use of soap and sanitizer are the main tools to protect against this global epidemic. These protective materials had a detrimental effect on the human environment. The main purpose of this study was to observe the effects of water and sanitation on humans during the Corona period. So by doing this survey we have found out how people were aware about sanitation in Bangladesh during corona period and how sanitation and water affected people in Bangladesh during Corona period.

1.3 Research Question

Question 1: Do you think coronavirus has any effect on our drinking water and drinking water?

Question 2: .Are you much cleaner than before because of the effects of coronavirus?

Question 3: Do you think the use of soap has increased more than before after reading the effects of coronavirus?

Question 4: Do you think water use has increased or decreased due to the effects of coronavirus?

Question 5: There are products to prevent coronavirus, they are good or bad for everyone's body?

Chapter 2

LITERATURE REVIEW

2.1 Impact – Perception

The COVID-19 crisis we are facing today intensifies the already existing challenges. Worldwide, we are called to rethink our lifestyles towards environmentally responsible behaviours. More than ever, water is a crucial resource to address the difficulties of this unprecedented situation. A simple gesture such as washing our hands to limit the transmission of the virus requires water. Health facilities rely on safe water to comply with hygiene recommendations. These vital needs seem already secured in many developed countries, but for millions of people, it remains out of reach. The use of water to save our lives and in our daily work is immense. But everything has an amount. Everything changes after the corona effect of our country. Which has not been seen in the last few years. After reading the effects of coronavirus, people did not understand what they should do. But the WHO gives some guidelines that the guidelines have an impact on water use. The people of the country are increasing their use of water and they are starting to keep their houses and clothes cleaner than before. The effect of which is that they repeatedly wash their hands over the water and use sanitizer. People used to be out all day and this is the time when they start spending time at home and that increases the water consumption in the house. Immediate responses to tackle the pandemic were primarily focused on Health aspects, but availability and access to water is at least as important. Authorities recommended washing hands more frequently to prevent the spread of the virus. Knowing that a single handwashing consumes about 2 litres of water, the result of this recommendation increases pressure on water supplies. 9 to 12 additional litres are required per day and per person in order to apply the sanitary measures. The lockdown situation had a significant impact on the water consumption. Overuse of water has already led to water shortage and scarcity in

many countries. , Itali, India and Jarmany countries are among the most affected. Water is also vital for industries. The agriculture and food sector is one of the most at risk, as agriculture accounts for 70% of freshwater withdrawals worldwide. Immediate solutions are needed to increase the resources, especially in the Mediterranean, the Middle East and Central Asia areas. Water in hospitals and health facilities has been a key component in tackling this pandemic. Not only in providing care for patients but also in preventing the infection risk for caregivers by applying hygiene and sanitation recommendations. Health-care facilities should ensure hygiene measures and adequate infrastructures to do so. We understand the determinant role of drinking water and wastewater surveillance systems in protecting public health. Availability of safe water is essential to limit the spread of the virus. Financing mechanisms The COVID-19 pandemic is not only affecting human lives, but also jeopardising the economic situation in all countries and for the most vulnerable and marginalized people in society. Human and economic costs are likely to be larger for Fragile, Conflict, and Violence affected countries and lower and middle-income countries, which generally have limited coverage and capacity of water supply and sanitation systems, lower health care capacity, larger informal sectors, shallower financial markets, limited fiscal space, and poorer governance. As such, for all interventions, it is important to target affected countries home to about two-thirds of the world's extreme poor. Although it is still early and complex to determine the economic costs of the pandemic, the costs of inaction will be disastrous. In this regard and as an immediate response to the Covid-19 crisis, several countries around the world have taken initiatives to ensure that WASH remains a key priority. will ensure that services are available to all, especially the poor and most vulnerable communities.

2.2 The Possible Impact of water

In order to avoid the effects of Corona in Bangladesh, one has to wash one's hands with water repeatedly to reveal it through the media. Repeated hand washing is not the only way to protect you from the corona virus. Many diseases can be protected from germs by washing these hands. The people of our country were not fully experienced in cleanliness but because of this effect people now know a lot about cleanliness. It has been seen that the amount of hand washing in the office workplaces has increased a lot in our country. There is a separate hand washing place in each workplace.



Figure-2.1: Pictures of Sanitization Process in Naogaon Raninagar upazila office.

2.3 The Negative Impact of water

After experiencing the effects of coronavirus, everyone started using face mask and sanitizers to avoid coronavirus. But the people of our country, after using the product, throw it in the drain, in the street and in the pond. Due to which the environment and water are being polluted and the drainage is being obstructed.



Figure 2.2: Bad impact of Covid-19 on water sanitization process.

Chapter 3

METHODOLOGY

3.1 Study Design

We have online surveyed Bogra-Naogaon and Khulna districts in three districts of Bangladesh. From this survey we have seen the effect of corona on water. The information we have received takes into account the behavior of successful people which will help to make the people of the country more aware.



Figure-3.1: Bogra, Naogaon & Khulna (Location of cities which under survey) in Bangladesh

3.2 Data: Survey Questionnaire

In July 2021, we conducted an online survey. The situation was so bad for Covid 19 that it was impossible to conduct a direct survey with the decision to conduct an online survey. we searched for information from 106 people via Google, Facebook and email.

However, the survey consisted of the following sections:

01. The first part relates to the general information (name, age) of the participants.

02. The second part deals with the use of Covid-1 of water.

03. The third section highlights how much clearer it is than before.

All participants were informed of the confidentiality of their responses as well as the purpose of conducting this investigative survey.

Chapter 4

RESULTS & DISCUSSION

4.1 Result

In this survey we notice that human behavior habits activities etc. We surveyed three cities and found the results. From the survey we can see how people behaved during the lockdown, what problems they faced, what habits changed in their daily lives for Covid 19.

Table 4.1.1 Summary of data collected from Watersurvey in Tangail, Gopalgong & Chittagong.

Name	Age	Do you no any information about corona virus	Do you think corona virus has any effect on your drinking water and drinking water	Are much cleane than before because of the effects of corona virus	Do you think the use of soap has increased more than before after reading the effects of corona virus	Do you think water used has increased decreased duo to the effect of coronavirus	There are products to prevent coronavirus they are good or bad for everyones body	Do you think the use of extra antiseptic is not destroying beneficial beateria of aquatic beateria instead of coronavirus	Do you think the use of soap has increased more than before after reading the effects of coronavirus
Raja	23	Yes	Yes	Yes	Yes	Yes	benefits	Being destroyed	Yes
Alip golder	21	Yes		Yes	No	Yes	Harm	Not Being destroyed	Yes
Asif	24	No	No	No	Yes	No	Does nothing for the environmen	Being destroyed	Yes
Motaleb khan	27	No	Yes	Yes	No	Yes	benefits	Normal conditon	Yes
Md rana	23	Yes	No	No	No	No	benefits	Not Being destroyed	Yes
Sabuj	24	No	Yes	No	Yes	Yes	Harm	Being destroyed	Yes
Raj	20	Yes	No	Yes	Yes	Yes	benefits	Normal conditon	Yes
Samiran mondol	25	yes	yes	No	yes	No	Does nothing for the environmen	Being destroyed	Yes
Bayzeed	22	yes	No	yes	yes	yes	Harm	Normal conditon	Yes
Antor chowdhry	21	No	yes	No	yes	yes	benefits	Not Being destroyed	Yes
Dipto	27	yes	No	yes	No	yes	Harm	Normal conditon	Yes
Shabab israk pyias	28	yes	yes	yes	No	No	Harm	Being destroyed	Yes
Md mannaf hossain	19	yes	No	yes	yes	yes	benefits	Not Being destroyed	Yes
Shanker	18	No	yes	No	yes	No	Does nothing for the environmen	Being destroyed	Yes
Atikur rahman	26	yes	No	yes	No	yes	Harm	Not Being destroyed	Yes
Matiur	20	yes	yes	yes	yes	No	benefits	Normal conditon	Yes
Md raju sardar	24	No	No	No	No	yes	Does nothing for the environmen	Being destroyed	Yes
Md shamim hosen	21	No	yes	No	yes	No	benefits	Not Being destroyed	Yes
Khairul basar	27	yes	yes	yes	yes	yes	benefits	Normal conditon	Yes

5. Are you much cleaner than before because of the effects of coronavirus? (করোনাভাইরাস এর প্রভাব পড়ার ফলে আপনি কি আগের চেয়ে অনেক বেশি পরিষ্কার-পরিচ্ছন্ন থাকছেন?)



80 / 101 correct responses

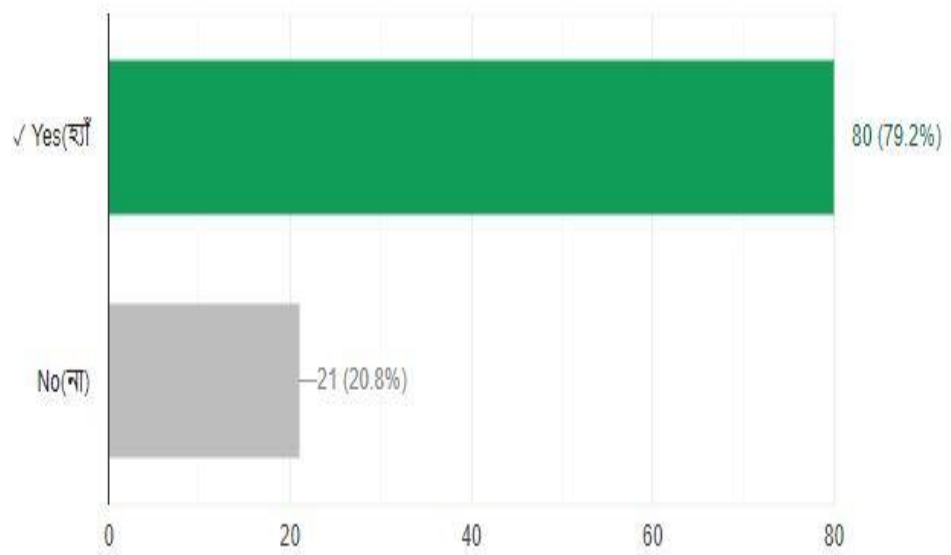


Figure 4.1: Survey result of change in cleaning process because of Covid-19

People in our country didn't think much about cleanliness but after the advent of Coronavirus, people have changed a lot about cleanliness. This is also very good for healthy life. A survey of 106 people found that 80 people were much cleaner than before.

6. Do you think the use of soap has increased more than before after reading the effects of coronavirus? (করোনাভাইরাস এর প্রভাব পড়ার পরে সাবানের ব্যবহার কি আগের চেয়ে বেশি বেড়ে গেছে আপনার কি মনে হয়?)

67 / 100 correct responses

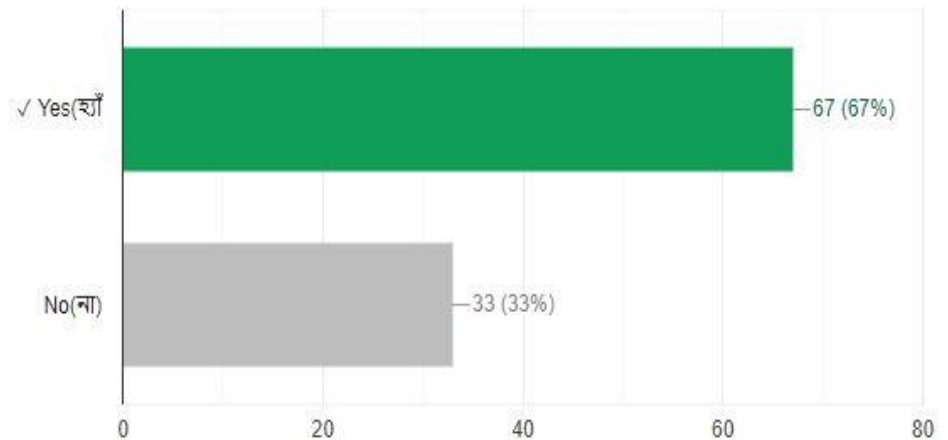


Figure 4.2: Survey result of use of soap because of Covid-19 Pandemic.

People have increased their use of soap than before and now they wash their hands again and again. They wash their hands with soap before meals and after using the toilet. They now wash clothes with soap every day. Our survey of 106 people reported 67% increase in soap use. This is very good for defending the pandemic.

7. Do you think water use has increased or decreased due to the effects of coronavirus?
(করোনাভাইরাস এর প্রভাবের কারণে পানির ব্যবহার আগের থেকে বেড়েছে?)



71 / 100 correct responses

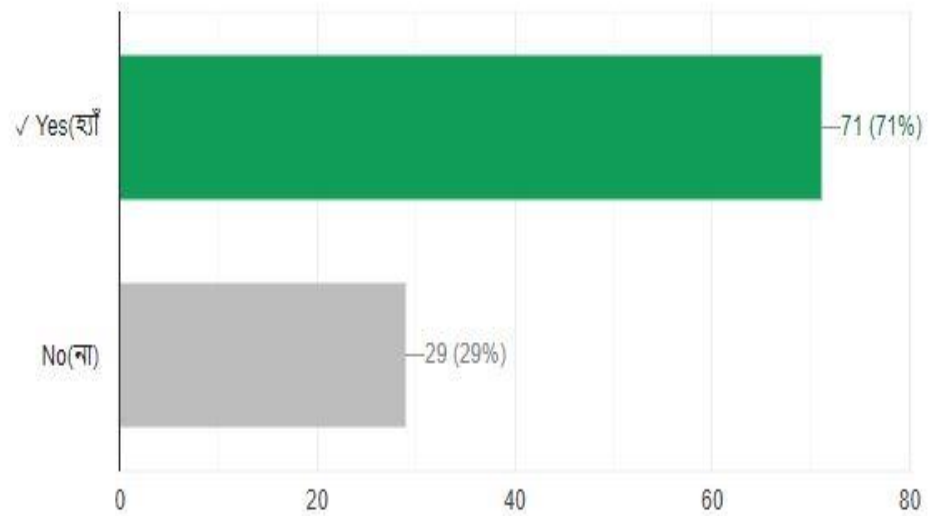


Figure 4.3: Survey result of use of water because of Covid-19 Pandemic.

Earlier people used less water but after the advent of coronavirus the use of water has increased. They now wash a lot of clothes and clean the house with water. Our survey found that 61% of 106 people had increased their water use.

4.6. Do you think coronavirus has any effect on our drinking water and drinking water??
(আপনার কি মনে হয় করোনাভাইরাস আমাদের ব্যবহার্য পানি এবং খাবার পানির উপর কোন প্রভাব ফেলছে?)



59 / 100 correct responses

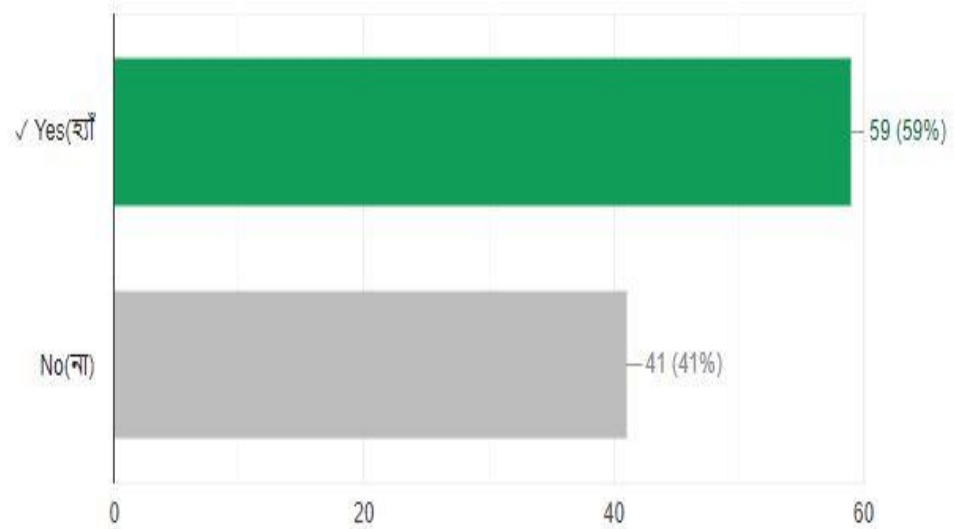


Figure 4.4: Survey result of effect of Covid-19 Pandemic on drinking water.

Corona virus
Coronavirus has no direct effect on water as it spreads through the air. but
Coronavirus has a major impact on water. There has been a major change in the way
people use water in their daily lives. Our survey report found that 59% out of 106 people
said their water was affected by the corona virus.

8. There are products to prevent coronavirus, they are good or bad for everyone's body (করোনাভাইরাস প্রতিরোধে পণ্য গুলো রয়েছে সেগুলো সবার শরীরের জন্য কি উপকার না অপকার?)

15 / 100 correct responses

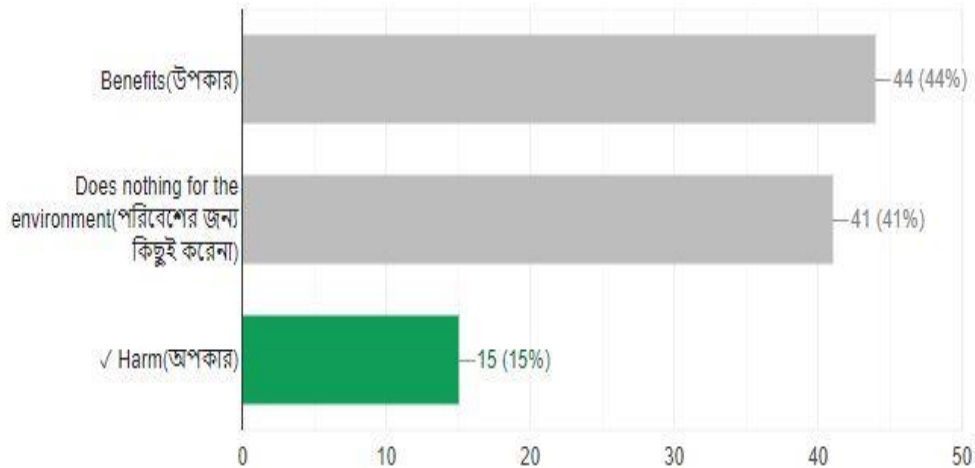


Figure 4.5: Survey result of effect of protection equipments from Covid-19 Pandemic.

We all try to prevent coronavirus but we don't think there is any harm in using these resistant products. However, our survey report found that 15% out of 106 people said it was harmful, 41% people said it did no harm to the environment and 44% people said it was good for us to use it.

4.2 DISCUSSION

Although the immediate effects of COVID-19 in the water sector are at its constructive stage, its effects in the sector are already being felt. This is evident from the change in water demand and the challenges underlying water supply. Reports show that per capita water use has increased, resulting in a 20% increase in overall residential water demand during the lockdown period from March 2020 to June 2020. After the

implementation of this restriction in Bangladesh, the use of water at different times of the day has been observed. Changes in spending patterns have been attributed to school closures and non-essential activities, increased housework, and other social restrictions imposed by the government. Bangladesh's records also show a 15% increase in water demand among domestic consumers and a 17% decrease for non-domestic consumers during the peak period of the epidemic.

Again the difference in water demand between domestic and non-domestic consumers was attributed to the number of customers who had to stay at home due to lockdown restrictions, including small businesses had to operate from home and some had limited site work and operations. As a result, activities such as washing, cooking, flushing, hand washing, gardening and pool filling became common during the implementation of the lockdown restrictions, which directly contributed to the increase in domestic water use.

In addition, the suspension of water charges by some countries or municipalities as a strategy to dissuade consumers from the effects of COVID-19 on private finances reduces the revenue collection of water companies when an epidemic starts. Other challenges in the water sector include disposal of sanitary ware such as face masks, medical supplies and other personal protective equipment made of plastic, as well as liquid and solid waste management.

Chapter 5

CONCLUSION

Covid 19 is a disease that has caused a lot of disasters all over the world. Due to the widespread spread of this disease, different countries have taken different steps to fight this disease. This disease has spread in many ways in our country.

Strictly and in different ways with the consent of all, the disease has been very effective. Various health workers have taken various steps to raise awareness among the people about the survival of Covid 19. After being used in different ways, the water goes into the water in different ways and the water is polluted in many ways. Most people do not know that the products that are corona, especially in the water, have been observed in many ways. The percentage of people who have corona effects on water say that they are not particularly harmed by the water, they understand that they can be harmed in any other way because they do not see the effects of corona in water or do not understand that they are using them. Any harm is that they think these are their normal. It was done online by four members of our group. We surveyed it online. It was conducted in Naogaon, Bogra, Khulna district. The survey was conducted. The survey came here. They want to be aware of the impact Corona has had on the country or the people. In order to survive the epidemic, everyone has to use everything consciously and in such a way that these reactions do not fall on his body in any way and if he works consciously, I think it will be possible to save everyone from this disease quickly and use everything regularly. It is possible to survive the epidemic. This water is used a lot in Covid 19, especially water. It is impossible for us to survive without a lot of good water. If it is contaminated then we will all be infected. It is impossible to walk even for a minute without water and we used it for various purposes with water so we have to take care that the water is not contaminated in any way. If we all move consciously and use everything according to the rules, it is possible to avoid this kind of disease and the whole country and the whole world will recover soon.

REFERENCES

- [1] World Health Organization and others(2020), "COVID-19 weekly epidemiological update, 3 November 2020", in World Health Organization.
- [2] Tang, Julian W and Marr, Linsey C and Li, Yuguo and Dancer, Stephanie J (2021), "Covid-19 has redefined airborne transmission" in British Medical Journal Publishing Group.
- [3] World Health Organization and others(2020), "Water, sanitation, hygiene and waste management for COVID-19: technical brief, 03 March 2020", World Health Organization.
- [4] Lau, Joseph TF and Tsui, Hiyi and Lau, Mason and Yang, Xilin (2004), "SARS transmission, risk factors, and prevention in Hong Kong", Centers for Disease Control and Prevention, 10(3), 587.
- [5] Wang, XW and Li, J and Guo, T and Zhen, B and Kong, Q and Yi, B and Li, Z and Song, N and Jin, M and Xiao, W and others(2005), "Concentration and detection of SARS coronavirus in sewage from Xiao Tang Shan Hospital and the 309th Hospital of the Chinese People's Liberation Army", IWA Publishing, 52(8), 213-221.
- [6] World Health Organization and others (2020), " Water, sanitation, hygiene, and waste management for SARS-CoV-2, the virus that causes COVID-19: interim guidance, 29 July 2020", World Health Organization.
- [7] Risebro, Helen L and Doria, Miguel F and Andersson, Yvonne and Medema, Gertjan and Osborn, Keith and Schlosser, Olivier and Hunter, Paul R (2007), "Fault tree analysis of the causes of waterborne outbreaks", IWA Publishing, 5(S1), 1-18.

[8] Rivera Valenzuela, Mart{\i}n Gerardo (2021), "Las redes organizativas en el sector agua potable y saneamiento y su contribuci{\o}n al desarrollo humano sostenible en Honduras", Tegucigalpa, Honduras.

[9] Mallapaty, Smriti (2020), "How sewage could reveal true scale of coronavirus outbreak", Nature Publishing Group, 580(7802), 176-177.

[10] de Fran{\c}ca Doria, Miguel and Segurado, Patricia and Korc, Marcelo and Heller, Leo and Jimenez Cisneros, Blanca and Hunter, Paul.R and Forde, Martin (2021), "Preliminary Assessment of COVID-19 Implications for the Water and Sanitation Sector in Latin America and the Caribbean", International Journal of Environmental Research and Public Health, 18(21), 11703.

[11] Hutton, Guy and Haller, Laurence and Water, Sanitation and World Health Organization and others (2004), "Evaluation of the costs and benefits of water and sanitation improvements at the global level", World Health Organization.

[12] Quispe-Coica, Alejandro and P{\e}rez-Foguet, Agust{\i} (2020), " Preprocessing alternatives for compositional data related to water, sanitation and hygiene", Elsevier, 743, 140519.

[13] Prevenci{\o}n, OMS (2020), "control de infecciones durante la atenci{\o}n sanitaria de casos en los que se sospecha una infecci{\o}n por el nuevo coronavirus (nCoV) Orientaciones provisionales", Ginebra: OMS.

[14] Pal, Subodh Chandra and Saha, Asish and Chowdhuri, Indrajit and Roy, Paramita and Chakraborty, Rabin and Shit, Manisa (2021), "Threats of unplanned movement of migrant workers for sudden spurt of COVID-19 pandemic in India", Elsevier, 109, 103035.

[15] Guan, Wei-jie and Liang, Wen-hua and Zhao, Yi and Liang, Heng-wei and Chen, Zi-sheng and Li, Yi-min and Liu, Xiao-qing and Chen, Ru-chong and Tang, Chun-li and Wang, Tao and others (2020), "Comorbidity and its impact on 1590 patients with COVID-19 in China: a nationwide analysis", *Eur Respiratory Soc*, 55, 5.

[16] Asians Still Most Likely to Wear Face Masks Due to COVID-19. (2020, April 21). Statista. (K. Buchholz, Editor) Retrieved from <https://www.statista.com/https://www.statista.com/chart/21452/share-of-people-wearing-face-masks-percountry-covid-19>

[17] Prakash, A. K. (2020, July 07). IMPACT OF COVID-19 ON ENVIRONMENT AND SOCIETY. *Journal of Global Biosciences*, v 9(5), p. 7352-7363.