

Prevalence of Waterborne Diseases in Sudoorpashchim Province

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ABSTRACT

Introduction: Unsafe drinking water, poor sanitation, and lack of personal hygiene are the major causes of waterborne diseases. Water-induced health problem includes typhoid, acute gastroenteritis, diarrhea, dysentery, and hepatitis. In the Sudoorpashchim province, people suffer from these water-related diseases, and the frequency of the problem is intense in the summer. The objective of this study was to determine the frequency of waterborne diseases in Sudoorpashchim province, far western region of Nepal.

Methods: The data was collected from the provincial health directorate at Dipayal and analysed using the Origin 2010 software

Results: The findings reveal that the prevalence of waterborne diseases gradually decreased as compared to last four to five years and attended 5.6% in FY 2019/2020, signifying an improvement in the personal hygiene of the people.

Conclusions: The prevalence of waterborne diseases sharply decreased in the FY 2019/2020, indicate the rectification in the personal hygiene of people.

Key Words: Hand wash; Personal hygiene; Safe drinking water

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DOI: 10.3126/mjsbh.v21i1.34122

Submitted on: 2021-01-07

Accepted on: 2022-03-24



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INTRODUCTION

Access to safe drinking water, proper sanitation, and hygienic practices are the fundamental requirements for good health.¹ But, most of the people in Nepal are still behind the access to safe drinking water and personal hygienic practices like in many other resource limited countries.² In Nepal, 81% of households in the urban areas of the Terai region and 32.9% in the urban hills have access to a piped water supply.³ Nevertheless, this supplied water is not reliably safe, as most water supply systems across the country do not have access to basic water treatment facilities.⁴ This has resulted in frequent reports of faecal contamination in drinking water and outbreaks of waterborne diseases. Waterborne diseases such as diarrhea, typhoid, dysentery, and cholera are still major public health threats in Nepal. The reasons may be due to contaminated water, poor sanitation, and unhygienic living conditions.⁵ According to the National Demographic Health Survey, 8% of children below five years of age suffer from diarrheal diseases.⁶ Annually, about 3,500 children in Nepal,⁷ and two million children in the world die due to waterborne diseases.⁸

In Sudoorpashchim province, the far western region of Nepal, people depend on groundwaters and natural sources for domestic usages, industrial applications, and irrigation in agriculture fields. The far western region is rich in water resources but there is always a problem of safe drinking water supply for domestic and other uses. According to the Central Bureau of Statistics (CBS), public water supply is available only to 27,897 households, whereas 96,610 tribes still use privately-owned water supply systems. Similarly, the number of protected water sources is 567, and unprotected sources available across the region are 1,986 in number.⁹

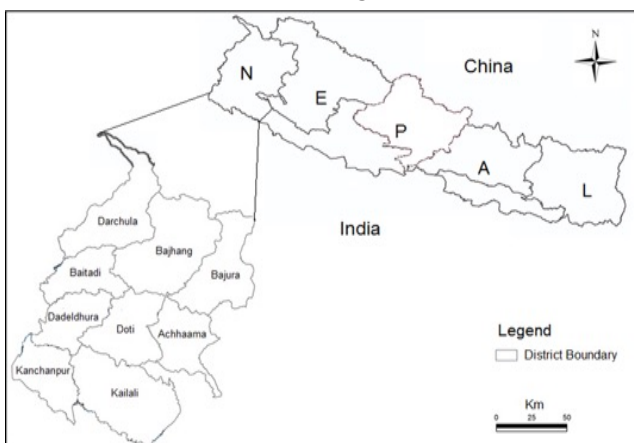


Figure 1. Figure showing the Sudoorpashchim province

The study area covers the entire Sudoorpashchim province (Figure 1). The population of the province, according to the 2011 census was 2,55,2517, with an average population density of 130 persons / km^{2.9} The area of the Sudoorpashchim province is 19,874 km². The objective of this study was to find out the prevalence of waterborne diseases in Sudoorpashchim province.

METHODS

In the present study, secondary data was utilized. The data collected from the fiscal year 2015/2016 to 2019/2020 were used for the study and the source of the data was the provincial directorate, Dipayal. Data analysis was carried out using the Origin Lab 2010.

RESULTS

The data on water-borne diseases collected from FY 2015/2016 to 2019/2020 are presented in table 1.

As shown in table 1, most of the waterborne diseases in Sudoorpashchim province are typhoid, AGE, amoebic dysentery, bacillary dysentery, presumed non-infectious diarrhea, cholera, intestinal worms, jaundice, hepatitis-A, hepatitis-E, and volume depletion (Dehydration). Among the diseases, the presumed non-infectious diarrhea is highly prevalent and gradually increased the number of cases from the FY 2015/016 to 2018/019. But, the frequency of disease again reduced by 5.6% in 2019 / 2020 Similarly, hepatitis-A and hepatitis-E cases were minimum during the period.

Table 2. COVID-19 cases in Sudoorpashchim province¹⁰

District	Active cases	Deaths	Total positive cases
Achham	100	1	1017
Baitadi	69	0	397
Bajhang	89	2	479
Bajura	9	2	453
Dadeldhura	16	0	332
Darchula	31	0	77
Doti	130	0	1064
Kailali	510	7	2204
Kanchanpur	37	0	761
Total	991	12	6484

Source: Health Directorate, Dipayal.¹⁰

Table 1. Cases of waterborne diseases in Sudoorpashchim province

Diseases	Fiscal Year				
	2015/016	2016/017	2017/018	2018/019	2019/020
Typhoid (enteric fever)	50,381	50,911	45,961	42,218	40,776
Acute gastro-enteritis (AGE)	26,394	28,498	29,604	28,486	25,353
Amoebic dysentery	48,361	44,291	38,455	36,704	32,131
Bacillary dysentery	23,154	20,929	19,612	17,812	16,158
Presumed non-infectious diarrhea	52,288	56,063	61,494	64,575	62,328
Cholera	898	542	1,112	388	322
Intestinal worms	30,194	27,571	23,573	25,829	26,802
Jaundice	5,034	4,863	4,273	4,690	4,848
Hepatitis-A	242	105	29	74	59
Hepatitis-E	95	35	30	13	101
Volume depletion (dehydration)	4,328	3,675	3,887	3,979	3,966
Total cases	2,41,369	2,37,483	2,28,030	2,24,768	2,12,844

Source: Health Directorate, Dipayal.¹⁰

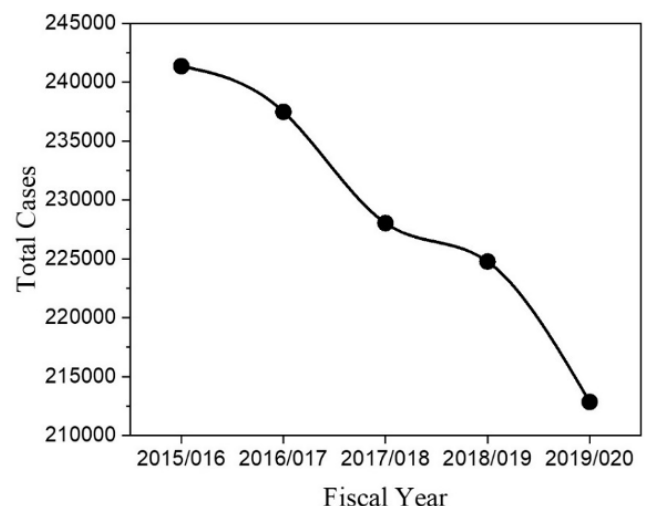
The total number of water-induced health cases gradually reduced from FY 2015 / 016 to 2016 / 017, and the reduction was significant during FY 2019 / 2020 (Figure 2). As shown in table, the waterborne diseases reduced to 1.6% during FY 2015 / 2016 to 2016 / 2017, and the reduction was 3.9% and 1.4% in FY 2017 / 2018, 2018 / 2019 respectively. In FY 2019 / 2020, the prevalence of the diseases reduced to 5.6%. The trend of the water-induced epidemic in the region during FY 2015 / 2016 to 2019 / 2020 is in reducing order and remarkably decreased in FY 2019 / 2020.

In addition to waterborne diseases, the COVID-19 pandemic appeared in 2020 and spread worldwide massively. The outbreak of COVID-19 in Nepal also increased rapidly at the community level and affected many people. In the Sudoorpashchim province alone, there were 991 active cases of COVID-19 by the end of September 2020, and the total deaths due to the pandemic were 12 (Table 2). Similarly, the total number of COVID-19 positive cases was 6484.

DISCUSSION

The results reveal that the waterborne diseases in Sudoorpashchim province are common and occurs

frequently (Figure 2). The frequency of the diseases generally clustered during the rainy season. A guide to DHS statistics supports our finding, where the cases of waterborne diseases in the province were 12.07%, 10.94% and 6.22% in the years 2006, 2011 and 2016, respectively.¹¹ The reason for such high prevalence of water-induced health threats is due to the lack of safe drinking water and inadequate personal hygienic

Figure 2. Prevalence of waterborne disease in Sudoorpashchim

practices. According to the Department of Water Supply and Sanitation (DWSS), 87.4% of people have access to safe drinking water and 96.6% of sanitation coverage in the entire province.¹² However, the ground reality is different than the data presented for water supply and sanitation. Most of the people in the Terai region use groundwater sources without pre-treatment. Similarly, in the hilly areas, people depend on natural sources for drinking water and other domestic applications. The drinking water systems available across the region have not accessed proper water treatment facilities. Concerning sanitation and personal hygiene, people are mostly unaware of the importance of sanitation and few others underestimate it. Similarly, garbage disposal in an open field and open defecation practices still exist in most rural areas. Such practices increase the risk of waterborne diseases. Faecal matters and the leachate released from garbage eventually reach water bodies and contaminate by making it unacceptable for different applications. Organic matter has a relationship with coliform contamination in water and is considered an important water quality indicator related to human health.¹³ The WHO drinking water quality guidelines have recommended *Escherichia coli* (*E. coli*) as indicator organisms for the potential presence of fecal contamination and waterborne pathogens in water.¹⁴ Microbial quality assessed for water samples collected from household water storage containers and the points of sources in rural communities in the hilly area of western Nepal showed *E. coli* in 81% of the stored drinking water.¹⁵

In addition to microbial contaminants, chemicals also make the water unacceptable for drinking and other domestic applications. Chemicals such as arsenic and toxic heavy metals are carcinogenic and if accessed the human body through drinking water or any other routes can cause health problems. A study carried out for the assessment of groundwater quality in the Kailali district of Sudoorpashchim province reveals the presence of iron, lead, copper, cadmium, aluminium, and faecal contaminants (*E. coli* and total coliform) beyond the national drinking water quality guidelines.¹⁶ Iron is commonly found in groundwater and is considered an essential metal required in recommended amount by all living organisms.¹⁷ Nevertheless, excess iron causes toxicological problems in terms of accidental acute exposures and chronic iron overload. Ingestion of iron in an excess amount (> 0.5 g) causes severe toxicity in human physiological systems leading to liver, heart, and lung diseases as well as diabetes mellitus, hormonal

abnormalities and dysfunctional immune system.¹⁸ High concentration of iron makes water unusable due to discoloration, metallic taste, unpleasant smell, turbidity, staining of laundry and plumbing fixtures.¹⁹ Moreover, the growth of iron bacteria in iron containing water causes corrosion in water supply pipes and produce bad smell and unpleasant tastes in water.¹⁹ Copper is toxic to the aquatic environment at some elevated concentrations and the toxicity of cadmium is due to its carcinogenic and mutagenic nature.^{20,21} Intake of an excessively large dose of Cu and trace amounts of Cd leads to detrimental effects in the human physiological systems.²² The water containing chemicals and microorganisms is not acceptable for drinking and other purposes, but people unknowingly use contaminated water for household applications. The general perception of people about water quality in rural areas is that if the water is clean, it is pure, and there is no harm in drinking it. Similarly, the personal hygiene also plays a vital role in the transmission and prevalence of waterborne epidemics. To improve the personal hygiene; good hygienic practices such as proper handwash before cooking, eating, feeding children, and after defecation should be promoted.

In the far western region, the frequency of such diseases is gradually decreasing even after the limited supply of safe drinking water and proper sanitation.¹⁰ The reason behind the decrement in the cases of waterborne diseases may be due to public consciousness about the health hazard of waterborne epidemics. The reduction in the prevalence of water-related epidemics has further decreased in FY 2019 / 2020. The reason for the decrement may be due to the changed personal hygienic behaviour of people after the COVID-19 pandemic. After COVID-19, people were alert and conscious about sanitation, which has shown a positive impact on waterborne diseases as well. The data presented in Table 2 is evidence of the COVID-19 pandemic across the region. During the pandemic, people were wide awake about personal hygiene and reduced the cases of waterborne diseases.

CONCLUSIONS

The study undertaken to find out the prevalence of waterborne diseases in Sudoorpashchim province has shown that the average water-induced health cases have reduced about 3% from FY 2015 / 2016 to 2018 / 2019. In FY 2019 / 2020, the reduction in the number of waterborne diseases decreased sharply (5.6%), indicating an improvement in the personal hygiene of

people.

ACKNOWLEDGEMENTS

The authors (Narendra Raj Pant and Hem Raj Joshi)

are grateful to the provincial directorate for providing the data for this study. Mr. Kanchan Thapa, central department of population studies at Tribhuvan university is thankful for necessary feedback during manuscript preparation.

To cite this article: Pant NR, Pant KB, Joshi HR. Prevalence of Waterborne Diseases in Sudoorpashchim Province. *MJSBH*,2022;21(1):98-103.

Conflict of Interest: None declared

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