

Sanitation and Diarrheal Morbidity: Evidence from Afghanistan

Manzoor Ahmad Malik¹, Saddam Naaz Akhtar^{2,*}



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ABSTRACT

Background: Lack of sanitation facilities and inadequate water is key to many diseases' outcomes, mainly diarrhea. These factors affect the health status of a country and result in increased mortality and morbidity pattern, particularly among the vulnerable population like children and women. Thus, the study assesses the linkages between diarrheal diseases and sanitation in Afghanistan affected since long by political instability, which has derailed the country's health system. **Methods:** We used the 2015 Afghanistan Demographic and Health Survey to assess the linkages between sanitation and diarrheal diseases among under-five children. Bivariate and multivariate analyses have been used to carry out the study. The logistic model was used to evaluate the risk factors that lead to diarrheal outcomes. **Results:** Our findings from the results showed that the prevalence of diarrhea among under-five children in Afghanistan was 29%. Pashai is the most affected, with 36% among ethnicities, whereas eastern Afghanistan is the most affected region with a prevalence of (38%). Open defecated Population (OR: 1.17, p<0.001), Tap water (OR: 1.31, p<0.001), Well water (OR: 1.24, p<0.001), and Sharing toilet (OR: 1.15, p<0.001) are significantly associated with childhood diarrhea. **Conclusions:** A significant impact has been found with inadequate sanitation, shared toilet facility, clean water, and other elements with childhood diarrhea in Afghanistan. The region-wise difference has also been found to be very high across the regions. Thus, it has been found that a lack of such factors has a more significant impact on children's health and needs a particular focus from a policy purpose.

Key words: Sanitation, Diarrhea, Afghanistan, Morbidity, Child health

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INTRODUCTION

Morbidity patterns resulting from pneumonia, diarrhea, fever, and acute respiratory infection are vital in increasing the risk of mortality among under-five children^{1,2}. Diarrheal diseases constitute a significant problem among under-five children worldwide after pneumonia^{3,4}. Children in the developing world are positively affected by diarrheal diseases, which can be preventable and eradicated by possible interventions^{5,6}. Previous studies have shown that children in developing countries are ten times more likely to die before five years than children in the developing world^{7,8}. Empirical studies reflect this fact that one-fourth of these deaths among children result in south Asia among the under-five children, and Afghanistan is one of the most affected countries in the region⁹⁻¹³. According to the 2015 Afghanistan Demographic and Health Survey (AfDHS) report, around one in every 18 children die before completing the age five in Afghanistan, and these deaths mostly occur in the very first year of birth among children¹⁴. The risk factors to these deaths are manifold and result from both demand and supply-side factors. Other things include the lack of spending in the health care system and socio-behavioral and contextual factors.

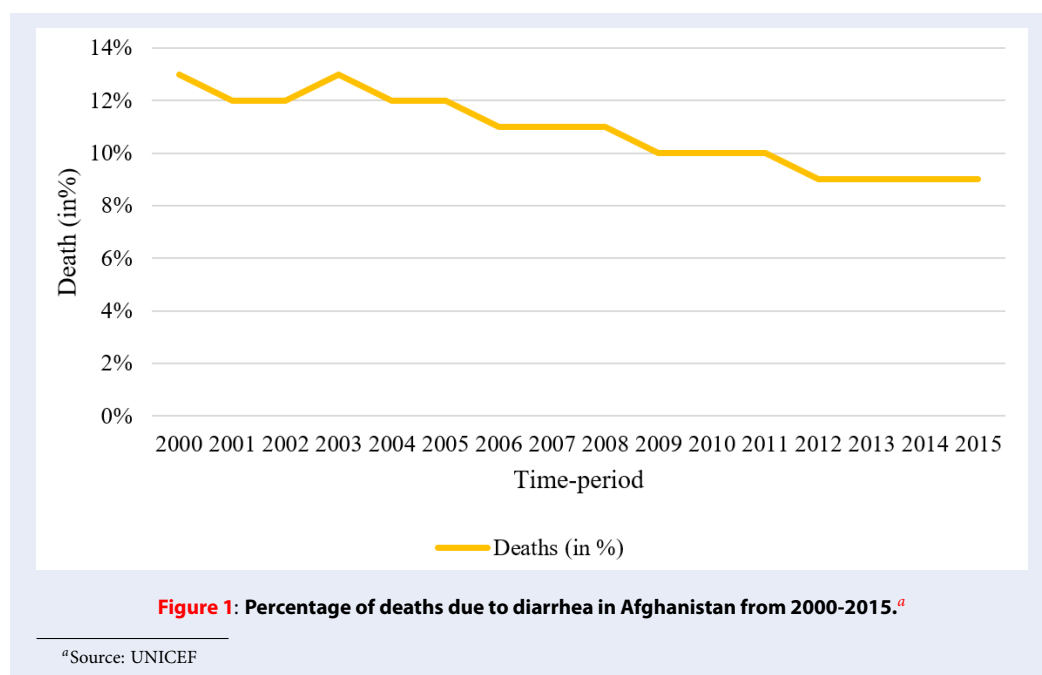
Diarrhea is the second leading cause of deaths, accounting for nearly one in every nine deaths worldwide¹⁵. It is one of the largest reasons for the disease burden in Afghanistan after pneumonia¹⁶.

The above figure **Figure 1** shows the percentage of deaths due to diarrhea in Afghanistan since 2000 based on UNICEF data, and the results show that although there is a decline in diarrheal deaths, it still accounts for nearly 9% of deaths. A recent survey of 2015 AfDHS showed that around 29% of children have an acute diarrheal disease in Afghanistan. Therefore, the present study explores the possible factors that affect the greater prevalence of diarrhea among under-five children based on the recent round of 2015 AfDHS.

THEORETICAL CONTEXT

According to UNICEF, around 2.4 billion people lack adequate sanitation facilities globally, and approximately 663 million people do not have access to improved water⁵. However, the SDG have aimed at improving the conditions of health, particularly of children and women. Nevertheless, these challenges persist and affect a grander scale through morbidity and

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mortality patterns among under-five children, particularly in developing countries. Children at younger ages are at greater risk of water-borne diseases like diarrhea, affecting their health and well-being and putting them at greater risk. Around 800,000 children die yearly due to conditions resulting from the lack of sanitation facilities cured¹⁵. Diarrhea has become one of the leading causes of morbidity and mortality among children¹⁷. Though the diseases have attributed to many factors, some closely associated reasons are inadequate water and lack of sanitation facilities¹⁸. These factors affect the burden of diarrheal deaths and contribute to a greater prevalence of acute diarrheal diseases¹⁹. A study has found that socio-demographic factors have played an essential role among Congo children. Other factors, such as open defecation, unhygienic practices, and unimproved water, have shown a significant effect on a child's health²⁰. Numerous studies in this context have found that households having inadequate sanitation facilities have a more substantial impact on the incidence of diarrheal outcomes^{21,22}. A study²³ showed that drinking water availability is an essential factor and lack of it results in a greater incidence of childhood diarrheal deaths. A report on Sustainable Development Goals in 2017 also reflected that higher risk for infectious diseases like diarrhea is mainly due to the lack of safe water sanitation and other hygiene services²⁴. Increased risk of diarrhea is also due to sanitation facilities' proximity to homes, the sharing of sanitation facilities, and poor hygiene²⁵.

Diarrheal deaths account for nearly 1.87 million deaths annually, resulting in numerous factors but primarily due to unsafe water and inadequate sanitation^{7,9}. Better sanitation facilities are essential to reduce diarrheal morbidity²⁶. Studies clearly show that sanitation infrastructure is most effective, reducing diarrheal incidence by about 20% while as clean water by 11%²⁷. It has been observed that interventions in providing better access to clean water and toilet facilities lower the risk of diarrhea reduction ranging from 27% to 53% among the children aged below five years²⁸. Improved sanitation and hygiene are essential to avert the impact of diarrheal deaths²⁹. However, a better standard of living conditions can also reduce the burden of diarrhea among under-five children³⁰. Thus, targeting the measures that can reduce the levels of inadequate sanitation and lack of access to clean water can lower the morbidity patterns resulting from diarrhea among children aged below five, particularly in a developing world³¹.

Furthermore, hygiene improvement effectively reduces diarrhea and is a critical element of child health and nutritional promotion³²⁻³⁴. Though the evidence is strong despite this, there has been little sound evidence published so far on to what extent the availability and utilization of latrines and better water facilities can reduce diarrheal prevalence^{35,36} and the country like Afghanistan has least explored. Therefore, this study tried to examine the linkages between diarrhea and its possible association with sanitation and inadequate water facilities.

CONCEPTUAL DEFINITIONS

Diarrhea is defined as the passage of three or more liquid stools within 24 hours²⁶. Diarrhea can last for several days, but according to this study, acute diarrhea is the condition where a child suffers from diarrhea for less than 14 days since this leads to severe dehydration and loss of fluids resulting in diarrheal deaths. According to WHO, other causes like septic bacterial infections also account for more diarrheal deaths. Whereas medically, it is defined as a symptom of infection in the intestinal tract, resulting in bacterial, viral, and parasitic organisms were resulting in unimproved water, inadequate sanitation, and poor hygiene.

Sanitation is critical to promote not just human health but also socio-demographic conditions like food security, women empowerment, girl education, social security, and reduction in morbidity and mortality. It just not reduces intestinal and vector-borne diseases but also has a significant impact on diarrhea²⁸. In simple words, sanitation means the provision of facilities and services for the safe disposal of human urine and feces. Sanitation refers to the maintenance of hygienic conditions through services such as garbage collection and wastewater disposal. The study uses various measures to measure sanitation access, such as lack of adequate water, toilet facility, access to water, and toilet-sharing facilities.

MATERIAL — METHODS

The data of the study has taken from Afghanistan Demographic and Health Survey (AfDHS) conducted in 2015-16. AfDHS surveys consist of data on a wide range of public health topics, including anthropometric, demographic, socio-economic, family planning, and domestic violence issues. The AfDHS (2015-16) provides up-to-date information on the respondents' socio-demographic characteristics between the ages of 15-49 from randomly selected households. AfDHS is a national sample survey that provides up-to-date information on fertility levels; marriage; fertility preferences; awareness and use of family planning methods; child feeding practices; nutrition, adult, and childhood mortality; awareness and attitudes regarding HIV/AIDS; women's empowerment; and domestic violence.

STUDY PARTICIPANTS

The total sample for this analysis was 30303 children aged 0-59 months, who had complete morbidity data and were living with their mothers at the survey time. The AfDHS collected data on morbidity such as diarrhea, which is defined as passing three or more liquid,

watery or loose stools per day. The data was collected based on a survey question to mothers, whether any of their children below five years of age had diarrhea during the preceding weeks in the survey.

The outcome variable was the prevalence of diarrhea during the two weeks. This question was asked to Mothers whether or not their child suffered from diarrhea during the past two weeks. The leading independent variables are proxies of indicators like sanitation facility, drinking water, and other socio-demographic variables like age of the child, sex residence, and region.

Bivariate and Multivariate analysis was carried out in the paper to study the association between sanitation and diarrhea. We used a logistic model with a dependent variable categorized into a binary outcome variable as diarrhea and regress it with other closely associated risk factors.

RESULTS

Figure 2 shows the prevalence of diarrhea by regions. Diarrheal prevalence has found to be higher in the Eastern region (39%) of Afghanistan, followed by West (31%) and North (30%) regions. In contrast, lower prevalence is in the Southern region of Afghanistan (23%). Here, the prevalence rate has been computed by regions, and the values were significant at one percent level of significance for all the regions.

Figure 3 shows the prevalence of diarrhea by ethnic groups, which has the highest among the Pashai (35%), followed by Uzbeks (33%). The lowest prevalence was found to be among the Balochs, which was just 15%. Here, the prevalence rate has been computed by ethnic groups, and the values were significant at one percent level of significance for all the ethnic groups.

Table 1 shows the prevalence of diarrhea and demographic and socio-economic characteristics prevalence of diarrhea is higher among the children aged 6-12 and 13 to 24 months. Similarly, we see prevalence higher among female children than male children. We found that diarrhea among children was found to be higher among working women. In contrast, children of adolescent mothers have a 2% higher prevalence of diarrhea than the children of adult mothers. Those households' children who are defecating in the open area are having a higher prevalence of diarrhea. Similarly, the prevalence of diarrhea is also higher among those households' children who are sharing toilets.

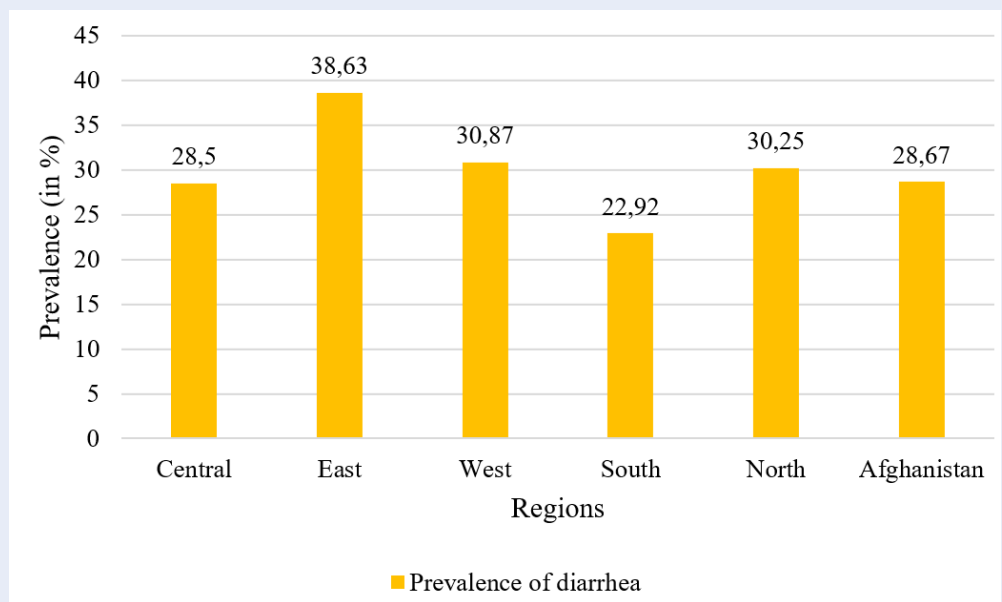


Figure 2: Prevalence of diarrhea by regions in Afghanistan in 2015.^a

^aSource: AFDHS-2015

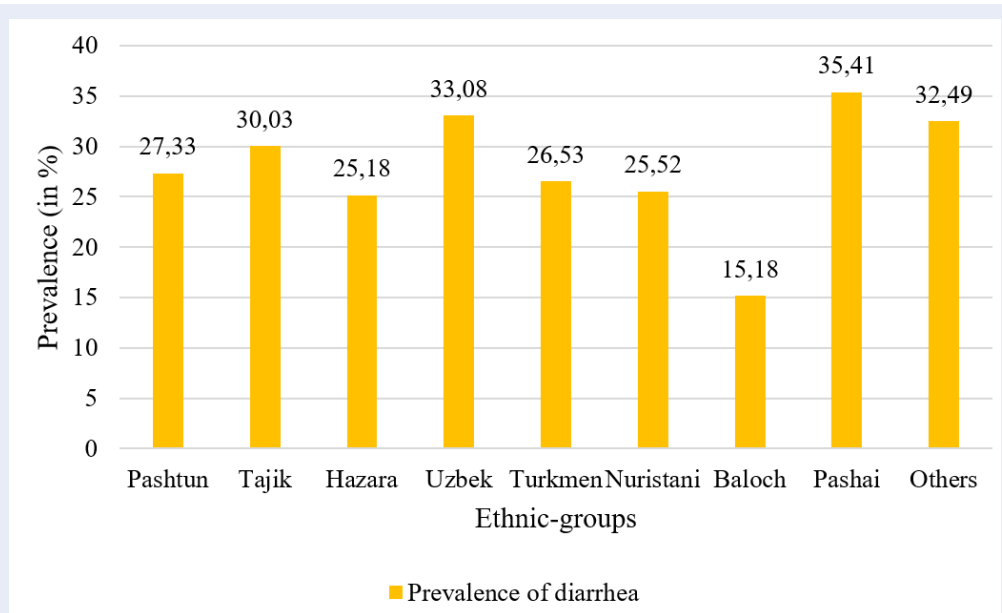


Figure 3: Prevalence of diarrhea by ethnic-groups in Afghanistan in the year 2015.^a

^aSource: AFDHS-2015

Table 1: Prevalence of Diarrhea with Background Characteristics AfDHS-2015

Background characteristics	Prevalence of Diarrhea (%)	Sample distribution
Child age		
< 6	20.83	3095
6-12'	34.61	2720
13-24'	37.92	5708
25-36'	32.16	6598
49+	19.11	5902
Child sex		
Male	29.49	15605
Female	27.8	14699
Birth order		
< 2	28.85	11159
3-5'	27.86	11640
6+	29.64	7505
Mother's education		
Education	28.47	25261
Primary	32.1	2429
Secondary	29.6	2130
Higher	17.77	484
Mother's working status		
No	28.28	26925
Yes	32.31	3244
Mother's age at first birth		
Adolescent Mothers	29.67	17612
Adult Mothers	27.27	12692
Place of residence		
Urban	32.01	7040
Rural	27.65	23264
Sources of drinking water		
Piped water	25.34	1898
Tap water	30.61	4918
Well water	29.05	13716
Unimproved water	27.8	9771
Time taken to Water		
Premises	27.64	13625
Out of Premises	29.68	16393
Toilet facility		
Open Defecated	30.1	4016
Non-Open Defecated	28.45	26288
Toilet sharing facility		
No	28.08	25416
Yes	31.73	4888
Breast feeding		
Never breast feeding	28.67	507
Ever breast feeding	28.6	29797
Regions		
Central	28.50	6021
East	38.63	1742
West	30.87	4426
South	22.92	7470
North	30.25	10646
Afghanistan	28.67	30304

Sources: Authors' calculation from AfDHS-2015.

Table 2 studies the association of diarrhea and various determinants of sanitation and water and some vital demographic factors. We found that age is closely associated with diarrhea, particularly from 6 to 18 months (OR = 2.26 & 2.45; $p < 0.001$). Similarly, female children are 6% less likely to have diarrhea than males (OR = 0.94; $p < 0.001$). Our results showed that children belonging to households defecating in the open are 17 times more likely to have diarrheal diseases than those that do not (OR = 1.17; $p < 0.001$). Similarly, we can see that children belonging to households sharing toilets are at greater risk of diarrheal diseases (OR = 1.15; $p < 0.001$). Simultaneously, it has been found that those using tap water are at greater risk of having diarrheal diseases followed by well water (OR = 1.31 & 1.24 $p < 0.001$). Similarly, those taking another form of water are also at a greater risk of having any diarrheal diseases with an odds ratio of 1.12 at a 10% significance level.

DISCUSSION

Child health is an important issue to be addressed around the globe. Deteriorating child health also has long-run consequences on the health system apart from its socio-economic adversities. Child health is affected by various diseases ranging from diarrhea to acute respiratory infections due to vulnerability and less immune systems of children at an early age than the other population groups³⁷. Furthermore, the lack of better access to sanitation and clean water results in children's greater vulnerability at a lower age and puts them at higher risk. It has been found that nearly 90% of diarrheal deaths occur among children in developing countries³⁸⁻⁴⁰. Studies show that low-income countries are not just affected by deficient water system but by higher open defecation levels and lack access to adequate drinking water^{7,41}.

Afghanistan is one of the most affected regions globally due to conflict, and the health system is one of the poorest. While it is evident that higher rates of diarrhea prevail due to multiple risk factors ranging from socio-demographic to economic factors^{42,43}. Nevertheless, our study focused mainly on the aspects related to sanitation and water-hygiene. While examining a few behavioral factors like age, sex of the selected population, we found their impact very much consistent with the earlier studies⁴³⁻⁴⁷. To address this paper's key purpose, we studied the factors like open defecation, shared toilet facility, access to drinking water, and drinking water sources in Afghanistan. The results showed a significant association between diarrhea with these essential factors. It has been found that piped water supplied to households was a key risk

factor with greater odds of affecting Afghanistan's diarrheal diseases. Studies have clearly shown that the sanitation facility has correlated with diarrheal morbidity, incredibly open defecation⁴⁸⁻⁵³. While examining the linkages between open defecation and diarrhea, our result was consistent with the earlier findings.

Various factors are related to diarrheal diseases, remarkably low domestic sanitation water quality, service level, and hygiene³⁰. Afghanistan is one of the world's affected regions globally, both in terms of health standards of living. It has the highest IMR poverty rates and other socio-demographic indicators^{54,55}. The diarrheal disease still claims the lives of 26 children each day across the country, accounting for nearly 12% of deaths in Afghanistan⁵⁶. So, understanding these contextual factors associated with diarrheal diseases in the country is critical. These identified factors have a significant impact due to externality effects and need a particular focus, particularly at the regional level, as indicated by our study. Further studies can be conducted to estimate the burden of these factors on morbidity patterns. Since it is already clear from the above that poor sanitation like open defecation, shared toilet facility, and lack of access to drinking water leave children more susceptible to infections that cause diarrhea.

CONCLUSIONS

The study tried to examine the linkages between sanitation and diarrhea in Afghanistan based on the DHS survey conducted in 2015. Our study is consistent with many other studies while examining the associations between open defecation and diarrheal diseases. We also found that a lack of water and toilet has a significant impact on children's health. Diarrhea has been closely associated with lack of access to proper drinking water and inadequate sanitation facilities. Thus, to reduce the burden of diarrheal diseases, it is essential to focus on the sanitation facilities apart from providing access to clean and purified water. An inclusive policy approach can enhance health challenges and give positive externalities in terms of public health challenges. Afghanistan needs to focus on bettering sanitation and water hygiene facilities so that the more significant burden of diarrheal diseases can be averted to improve child health.

ABBREVIATIONS

AfDHS: Afghanistan Demographic and Health Survey

CSO: Central Statistics Organization

OR: Odds Ratio

Table 2: Association of diarrhea with key contextual factors in Afghanistan-2015

Background characteristics	Odds Ratio	Confidence Interval	
		Lower limit	Upper limit
Child age			
< 6°	2.26***	2.00	2.56
6-12'	2.45***	2.20	2.73
13-24'	2.05***	1.85	2.29
25-36'	1.61***	1.45	1.80
49+	1.09	0.97	1.22
Child sex			
Male°			
Female	0.94**	0.89	0.99
Birth order			
< 2°			
3-5'	1.03	0.97	1.10
6+	1.06*	1.00	1.14
Place of residence			
Rural°			
Urban	0.86***	0.81	0.93
Sources of drinking water			
Piped water°			
Tap water	1.31***	1.14	1.52
Well water	1.24***	1.09	1.42
Unimproved water	1.12*	0.98	1.29
Time taken to water			
Premises°			
Out of Premises	1.05	0.99	1.11
Toilet facility			
Open Defecated°			
Non-Open Defecated	1.17***	1.09	1.27
Toilet sharing facility			
No°			
Yes	1.15***	1.07	1.25
Regions			
Central°			
East	1.72***	1.55	1.92
West	1.09*	1.00	1.20
South	0.58***	0.54	0.63
North	0.96	0.90	1.04

Notes: °: reference category; *p < 0.1; ** p < 0.05; *** p < 0.01; Sources: Authors' calculation from AfDHS-2015.

SDG: Sustainable development Goals

UNDP: United Nations Development Programme

UNICEF: United Nations International Children's Emergency Fund

USAID: United States Agency for International Development

WHO: World Health Organization

AUTHORS' CONTRIBUTIONS

All authors equally contributed in this work. All authors read and approved the final manuscript.

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CONFLICT OF INTEREST

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