

Effectiveness of the new water source intervention in reducing diarrheal diseases in Ghindae community, Eritrea

¹Abraham Kebedom, ¹Tadesse Teclebirhan, ¹Prof. Jacob Mufunda and ¹Prof. Andemariam Gebremicheal

Institutional affiliation
Orotta School of Medicine, PO Box 10549, Asmara, Eritrea

Correspondence to be sent to akebedom@yahoo.com

Abstract

Background: Diarrheal diseases are an important cause of morbidity and mortality in developing countries particularly in children. In Ghindae, a town 45 km from Asmara the capital city of Eritrea, diarrheal diseases were the commonest disease among all age groups. Based on findings from operational research, the old water supply of the town was believed to be the main source of the disease. A new water supply system was built for the community.

Objective: The objective of this study was to evaluate the effectiveness of the new water supply system intervention in reducing diarrheal diseases in Ghindae community.

Methods: Retrospective study was done base on the records of the Hospital.

Results: The incidence of diarrhea decreased by 15% after the introduction of a new water distribution system. The decrease was 44% for giardiasis and 25% for amoebiasis. There was no change in the bloody diarrhea disease burden.

Conclusion: The incidence of diarrhea was still unacceptably high in spite of the revamping of the water system, an observation which calls upon other contributory factors such as point use contamination and socio-economic status.

Introduction

Diarrheal diseases are the major cause of morbidity and mortality among children in many developing countries, particularly in sub-Saharan Africa ¹. One of the contributory factors predisposing children to diarrhea is the water and sanitation contamination vicious cycle². In Eritrea, diarrhoeal disease is one of the most frequent causes of illness and a major contributor to mortality among children. A report based on data from health management system in Eritrea clearly demonstrated that diarrhea was a major public health problem which needed attention³.

There are many factors that contribute to diarrheal diseases but water contributes most. If minimum standards for water safety are not maintained from its source to the level of consumption, it could be a source of wide spread diseases, manifested by gastrointestinal symptoms mainly diarrhea. Some of these diarrheal diseases are ameobiasis, gardiasis, bloody diarrhea, shigellosis, salmonellosis, hepatitis A, and rotavirus. These diarrheal diseases are very common in the Ghindae community⁴, small town with a population of 20,000 people, located on the main road of Eritrea's capital city Asmara and port city Massawa.

Diarrheal diseases such as ameobiasis and gardiasis constitute third and fourth among the top ten burden diseases of Ghindea hospital in 2006 and 2007.^{4,5} According to the information from Ghindae, the diarrheal diseases were so common between 2000 and 2003. In 2003 an investigation was done by the Human Resource Development of the MOH State of Eritrea reproved that the water was heavily contaminated. During that time the source of water was a dam (surface water).

In 2004, a new underground source of water was built and was in use during the time of the study. The old water distribution system was completely replaced. The water was pumped from⁴ drills found in the bed of Mai Adkemom (local river), to a reservoir from where a new pipe system collected and delivered the water for human consumption.⁵

Despite the improvement in the source of water of the town diarrheal diseases such as ameobiasis gardiasis and bloody diarrhea appear to be common health problems in the community among the first five top ten burden diseases in Ghindea hospital in 2007.⁴

The objective of this study was to evaluate the effectiveness of the new water supply system intervention and related factors in reducing diarrheal diseases in the community and to determine the trend in the prevalence of diarrheal diseases in Ghindea hospital.

Methods and materials used

A retrospective study was done on the data available in the sub-zoba. Data was collected from the statistical office related to the diarrheal diseases since 2000- 2007. All the data was on the record of the hospital, they keep recording all the prevalent diseases in the sub-zoba.

Results

Medical records of all children with diarrhoeal diseases between 2000 and 2008 were retrieved. The overall number children with all formas of diarrhea fluctuated during the period of study with the highest in 2000 followed by 2004 and 2003 but tended to decrease from 2005 until 2007. The cases

with bloody diarrhea were highest in 2003 and 2004 and then decreased to remain constant at a lower level thereafter. Both cases from amoebiasis and giardiasis significantly decreased after 2004. Cases of diarrhea without dehydration increased after 2004 and continued to fluctuate at higher levels. The trend for diarrhea with dehydration was non specific with no defined pattern (Table 1).

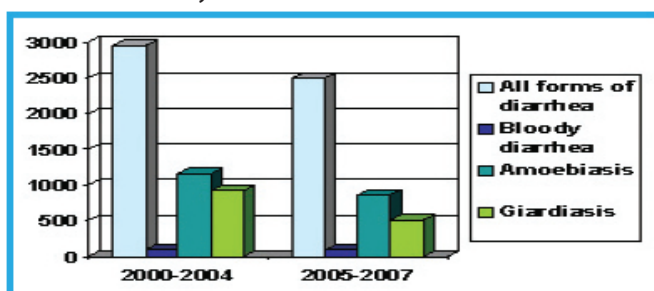
Year	2000	2001	2002	2003	2004	2005	2006	2007
All forms of diarrhea	3250	2617	2795	3031	3053	2509	2432	2551
Bloody diarrhea	17	9	61	132	252	117	52	92
Ameobiasis	1113	1024	1357	1355	973	809	870	917
Giardiasis	1304	1029	880	796	609	510	539	490
Diarrhea with dehydration	782	271	437	599	388	278	462	282
Diarrhea with out dehydration	-	-	40	129	822	724	483	622

The number of cases was analysed with reference to the timing of the introduction of the new water systems. When the data was disaggregated according to causative agent, it was found that all forms of diarrheal diseases decreased by 15%. Amoebiasis decreased by 25% whereas giardiasis decreased by 44% with bloody diarrhea remaining essentially unchanged (Table 2).

Table 2: Trends of selected diarrhoea diseases before/after new water system

Per iod	All forms of diarrhea		Bloody diarrhea		Amoebiasis		Giardiasis	
	Total	Ann ual Mean	Total	Ann ual Mean	Total	Ann ual Mean	Total	Ann ual Mean
2000-2004	14746	2949	471	94	5822	1164	4618	924
2005-2007	7492	2500 (15%)	261	87 (7%)	2596	865 (25%)	1539	513 (44%)

Figure 1: Trends of selected diarrhoea diseases before/after new water system



In 2007, after the introduction of the new water system, diarrhea with out dehydration, ameobiasis and giardiasis were respectively ranked 2nd, 4th and 6th most prevalent diseases among the children under 5 years of age presenting to the OPD in Ghindae hospital. The ranking for children older than 5 years of age was the same except giardiasis which was ranked 5th instead of 6th. Among inpatients, amoebiasis was ranked 3rd for all age groups.

Discussion

This study was done to evaluate the effectiveness of the new water supply system in reducing the diarrheal disease in Ghindae. After the introduction of a new water distribution system, the incidence of diarrheal diseases decreased by 15%. The decrease was 44% for giardiasis and 25% for amoebiasis. There was no change in the bloody diarrhea disease burden.

The etiological agents of diarrhea in the setting of Ghindae are different from reports from other studies where diarrhegenic Escherichia Coli has dominated among the cases. In addition rotavirus has played an important role in the diarrhea disease burden in other studies⁷. The different socioeconomic status of communities and environmental factors may provide some explanations for the different diversity of etiological agents for diarrhea in Eritrea⁸.

This study showed that the new water system have contributed to the reduction of the diarrheal diseases but it was not that much significant to say that confidently that the old water supply system was the sole source of the diarrheal diseases. Metanalytical studies on eltiology of diarrheal diseases have incriminated point use contamination as a realistic factor in transmission of diarrhea in some settings^{2,6}. The persistence of diarrhea may be an indicator of need for point of use chemical treatment of water for human consumption.

Safe water is one of essential components or needs for healthy living, along with adequate sanitation and proper nutrition⁹. Since 2000 all, these forms of diarrheal diseases were increasing until 2004. From 2004 these diseases were decreasing a lit bit but not to the level of expected in reduction of the diarrheal diseases, because it was believed that the old contaminated source of water was the main cause. One possible explanation for the minimal change in the prevalence of these diarrheal diseases is that the water source Mai Adkemom (the local river) crosses through the town and is used frequently for drinking purposes when there is shortage of the main source of water. More over the tax for the truck water is high (7-9) nacfa per Barrel, and 50 cents for a 20-liter gallon of water and some families prefer to bring water from that river and other wells due to their poor economical situation.⁵

It was also a usual habit for the small children to wash, swim and drink from that river. The fact that these diseases were not only transmitted through water could explain partly as the river was used for garden purposes and ameobiasis and giardiasis can be spread through improperly washed and undercooked

green vegetables. However, the effect of these gardens of green vegetables was minimal, as it did not contribute much to the markets of Ghindea. This study also showed that environmental and socioeconomic factors are also very important determinants in causing diarrheal disease.

Conclusion

The trends of diarrheal diseases generally were increasing until 2004 and it were decreasing but not to the minimal level. The intervention was found to effective but not as much as expected. Diarrheal diseases remain common health problems in the Ghindea community. From this study, it can be concluded that it is necessary to study and investigate the different sources of water for their safety and look for other source of contamination and it is necessary to study the environmental and socioeconomic factors of the community.

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