

Burden of Diarrheal Disease among under Five Children in Ethiopia, 2000-2016: Findings from the Global Health Estimates 2016

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Abstract

Introduction: Globally diarrhea among under five children remains one of the high burden diseases particularly in developing countries. Ethiopia is one of the sub-Saharan countries highly under five mortality due to diarrhea. Ethiopia has made remarkable progress in reducing child mortality over the last two decades. However, the under-5 mortality and morbidity rate related to diarrhea still magnificently a burden.

Objective: This study aimed to assess the burden of diarrheal for under five children in terms of death and Disability-Adjusted Life Years lost (DALY) between 2000 and 2016.

Patients and methods: The research used data from Global Health Estimate 2016; that originally collected the information through vital registration, verbal autopsy, surveys, reports, published scientific articles, Global Burden of Disease study (GBD 2016) and modeling. The magnitude of Diarrheal disease death was estimated 14,894 under five children in 2016. Death from diarrheal disease has also contributed to 38.4% (14894/38777) of deaths from infectious and parasitic diseases and 7.96% (14894/187,065) of the total death reported by the same year. Meanwhile, YLD, YLL and DALYs for under five children were 61,709 and 1408.4 thousand respectively in 2016. The magnitude of deaths due to diarrheal disease was declined by 76.7% from the 2000's record of 49,021 deaths within 16 years. In 2016, Mortality due to Diarrheal disease was highest among males. Of the 14,894 diarrheal disease related mortalities, more than 1405 deaths were among males.

Conclusion: Even if the burden of diarrhea for under five mortality is sharply declining in Ethiopia; but, it still remained one of the public health problems and second leading cause of morbidity. Therefore, strengthening hand washing practice and accessing prevention program is important to eliminate death within the target period.

Keywords: Diarrhea burden; Mortality; Under five children

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Introduction

Diarrhea is mostly characterized by increasing in bowel movement frequency and liquidity of the stool [1]. Different scientific groups and health organizations define it in different ways such as: "the passage of loose unformed stools" or "three looser-than normal stools in a 24-h period" other emphasis on the consistency of stools rather than the number [2]. However, Diarrhea is objectively defined as passing a stool volume greater than 200 ml or weight 200g per 24 hours [3].

Most people who develop diarrhea may experience self-limiting with approximately one day of disability without further medical

complications [4]. The possible complications of an acute diarrheal illness include dehydration, metabolic acidosis, impaired consciousness, convulsions, circulatory shock, and prerenal azotemia [5]. Finally, chronically also three complications of enteric infection including reactive arthritis (ReA), Guillain-Barré syndrome (GBS) and post-infectious irritable bowel syndrome (PI-IBS) may developed [6].

Globally in 2017, there were estimated 440,521 diarrheal diseases related deaths among children under the age of five. However, the morbidity rise by 2 million from the 2016 report, whereas mortality is declined. Nearly 58.2% of all under five mortalities due to diarrheal disease occurred in Africa. The sub-

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Saharan Africa region was the most affected are contributing for the higher share of diarrheal disease cases and deaths.

In Ethiopia, According to Ethiopia Demographic and Health Surveys (EDHS) of 2016, 12% of children under age five had diarrhea [7]. Factors associated like age of maternal and children, availability toilette and sanitary facilities, poor hand hygienic practices, flies infestations, lack of clean water and regular eating of street food are determinant factors for the high prevalence of diarrheal disease among under five children in Ethiopia [8-11].

Despite the emphasis given by the Ethiopian ministry of health and the respective regional health offices to improve child health still, many children are dying due to easily preventable and treatable diarrheal disease in Ethiopia. It is the second most leading causes of morbidity and mortality in children under the age of five. Therefore, this study aimed to measure the burden of diarrheal disease among under five children in Ethiopia between 2000 and 16 by using Evidence from Global Health Estimate 2018 report (https://www.who.int/healthinfo/global_burden_disease/en/), which will contribute to improve the health status of the population.

Patients and Methods

Overview

The world health organization by institute for health matrices (IME) estimated the GBD from 1990 to 2016. These data bases were freely available online for research purpose for 333 diseases and injuries and 84 risk factors. This research is assesses the burden of diarrheal disease among under five children in Ethiopia, which is the least developed country in Africa. Ethiopia is home of 13 million children- approximately 16 per cent of the total population of 96 million.

Sources of data

This finding major source of data was world health organization Global Health Estimate database which available for years 2000, 2005, 2010, 2015 and 2016 estimated the burden of diseases, injuries, and risk factors for 204 countries and territories and selected subnational locations. The data were collected by tool of Service Availability and Readiness Assessment (SARA), civil registration and vital statistics (CRVS) and house hold survey.

Operational definition

All-cause under-5 mortality: The probability (expressed as the rate per 1,000 live births) that children born alive will die before reaching the age of 5 years.

Life expectancy: Average number of years a person from a specific cohort is projected to live from a given point in time.

The years of life lost from mortality (YLLs): The number of cause-specific deaths multiplied by a loss function specifying the years lost for deaths as a function of the age at which death occurs.

Years lived with disability (YLDs): Years of life lived with any short-term or long-term health loss.

Disability-adjusted life year (DALYs): The sum of years lost due to premature death (YLLs) and years lived with disability (YLDs).

Statistical analysis and interpretation

This study analyses the burden of diarrheal disease among under five children in Ethiopia from data on global burden disease and global health estimate. These WHO GHE, DALY estimates from year 2000 onwards, consistent with and incorporating UN agency, interagency and WHO estimates for population, births, all-cause deaths and specific causes of death, as well as GBD 2016 analyses for YLDs. YLL were estimated using standard GBD methods whereby each death is multiplied by the normative standard life expectancy at each age. YLD were also estimated using sequel prevalence and disability weights derived from population-based surveys. For most sequels, the GBD 2016 study used a Bayesian meta-regression method, Dis Mod-MR 2.1, designed to address key limitations in descriptive epidemiological data, including missing data, inconsistency, and large methodological variation between data sources [12-15].

Results

Burden of diarrheal disease in ethiopia

The magnitude of Diarrheal disease death was estimated 14,894 under five children in 2016. Death from diarrheal disease has also contributed to 38.4% (14894/38777) of deaths from infectious and parasitic diseases and 7.96% (14894/187,065) of the total death reported by the same year. Meanwhile, YLD, YLL and DALYs for under five children were 61,709 and 1408.4 thousand respectively in 2016.

Trends of diarrheal disease from 2000 to 2016 in Ethiopia

The magnitude of deaths due to diarrheal disease was declined by 76.7% from the 2000's record of 49,021 deaths within 16 years. The proportion deaths from diarrheal disease were decrease from 41% to 38.4% from parasitic disease and 15.4% to 7.96% in total death report from 2000 to 2016 respectively among under five children.

From 2000 to 2016 age standard DALYs decrease by 75.9% through these 16 years. The proportion of diarrheal disease YLD and DALYs attributable for infectious and parasitic disease were the same. Whereas, the proportion of total DALYs and YLDs attributed by diarrheal disease decreased from 2000 to 2016 almost by half.

The sex speck rate

In 2016, Mortality due to Diarrheal disease was highest among males. Of the 14,894 diarrheal disease related mortalities, more than 1405 deaths were among males. Similarly, the age-standardized DALY rate due diarrheal disease among females and males was 6.4 per 100,000 and 7.68/100,000, respectively. The Years Lived with Disability due to diarrheal disease was 31,900 years in males and 29,800 years for female. Also, the DALYs due to diarrheal disease were 768,810 in male and 639,560 in female.

Comparison with the Africa and global estimate

Diarrheal disease had contributed about 7.4% (652,800/8,845,000), in Africa and 2.4% (1,382,000/56,847,000) of global mortality.

Discussion

This study assessed the burden of diarrheal disease among under five children in Ethiopia from 2000 to 2016 evidenced from the Global Burden of Disease. The burden was assessed in terms of mortality and disability-adjusted life years which allows direct comparison over time, as well as sex group. Despite a decreasing trend in mortality still the third leading cause of death in Ethiopia.

In Ethiopia an estimated 14, 894 deaths among under five children were reported due to diarrheal disease in 2016. Thus, death from diarrheal disease has contributed to 7.9% of the total number of deaths from all causes estimated to have occurred in the year 2016. Although diarrheal related death incidence in children younger than 5 years decreased in the country during the last 16 years from 49,021 to 14, 894, it decreased with slower mortality rate contrast with other African and Asian country. This finding suggests that the primary drivers of change in diarrheal mortality have been ones that preferentially reduce the risk of dying from the disease rather than those that reduce the risk of infection. Interventions to prevent diarrheal mortality should be targeted to the unique characteristics of different countries and regions. Our estimates regarding the number of children that need to be treated to prevent a diarrheal death facilitate the necessary discussion about targeted intervention implementation. For example, promotion of a hand washing campaign in central Europe, eastern Europe, or central Asia would require reaching at least 60 000 more individuals than would promotion of intervention strategies for wasting, unsafe water, or oral rehydration.

The performance of Ethiopia in reducing the burden of diarrheal disease among under five children and reversing these epidemics is remarkable particularly since 2010. Several factors could have helped Ethiopia to achieve the MDG targets. First, has introduction of the health extension program in 2003 targeted at improving accessibility and provision of most healthcare services to save the life of the newborn and reduce maternal mortalities through healthcare service's utilization [16,17].

Second, the increase of urbanization in Ethiopia would have created an opportunity to get safe water, education, and access of health care. Third, the contribution of development partners to fight under five deaths has been also vital in fighting death due to diarrheal in Ethiopia [18,19].

In 2016, the age-standardized DALY rate due diarrheal disease among females and males was 6.4 per 100,000 and 7.68/100,000, respectively. The Years Lived with Disability due to diarrheal disease was 31,900 years in males and 29,800 years for female. Also, the DALYs due to diarrheal disease were 768,810 in male and 639,560 in female.

Indicating that, Diarrheal disease had contributed about 7.4% (652,800/8,845,000), in Africa and 2.4% (1,382,000/56,847,000) of global mortality. In most African countries diarrheal is the major cause of mortality and morbidity. The role of malaria related DALY in these countries was higher than what has been reported in Ethiopia.

The findings of this analysis have important policy consequences

for the design and implementation of the health system. The report indicated that Ethiopia still need extensive effort to achieve sustainable development goal on decreasing under five mortality due to diarrheal with necessary to promote sanitation situations for communities. Even though, these results are particularly significant indicate male a little bit higher burden of death than female but it indicate creation of prevention programs against children's diseases for the Ministry of Health, health insurance companies, and partners. Diarrheal among under five children are a global problem that is occurring in high-, middle-, and low-income countries. However, it is more likely to occur in marginalized communities, often driven by poverty and lack of education and job opportunities. Through improving outreach programs and expanding the community service delivery network, coverage will be increased in all segments of the population. Structural factors that cause differential provision of health care resources by community-based primary care interventions using community health workers and volunteers who have, in the past, effectively contributed to narrowing the gap in inequality and increasing access need to be addressed.

The findings of this study might suffer from the fact that it is secondary data based on records; the reliability of the recorded data couldn't be ascertained and potential bias associated with estimation is there. Some methodological problems may have encountered in this research. Most of the data was originally estimated from model predictions and data source for the model was either reports of vital registration or sample survey that could again affect the reliability of the data. Moreover, the forecasted values from the trend may change through time due to change in intervention programs; this may affect the reliability of the estimate.

Conclusion and Recommendation

The burden of diarrheal among under five children is remarkably declining in the last two decades in Ethiopia. However, with a higher level of mortality and DALY, among under five children due to diarrheal still remained one of the public health problems. Therefore, the government of Ethiopia should implement strategies should be strengthened to further reduce the incidence and burden of diarrheal mortality and morbidity among under five children particularly among male in gender during the implementation periods of sustainable development goal (SDG) and decreasing under five mortality program that are undertaking by the government.

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Author-s Contributions

All authors have made substantial intellectual contributions to conception, design, acquisition, analysis, and interpretation of data of this study. They also have been involved in drafting the manuscript, approved the final manuscript, and agreed to be accountable for all aspects of the work.

Disclosure Statement

The authors declare no conflict of interest with anybody.

Ethics and Consent

N/A

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Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

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