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**WATER, SANITATION AND HYGIENE SERVICES BEYOND 2015:
IMPROVING ACCESS AND SUSTAINABILITY**

Effect of eliminating open defecation on diarrhoeal morbidity: an ecological study of Nambale sub-County, Kenya

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BRIEFING PAPER 2083

Kenya launched a program to eradicate open defecation (OD) in rural areas by 2013 using the community led total sanitation (CLTS) methodology. By 2014, only two out of 265 sub-Counties had been declared open defecation free (ODF). Nambale sub-County was the first to be declared ODF in 2012. This study looked at the impact of eliminating OD on diarrhoea morbidity among children less than 5 years of age. Mean monthly diarrhoea cases declined from 208 a year before elimination of OD, to 149 a year after elimination of OD, and 92 two years after elimination of OD. This is a reduction of 28.4% after first year and 38.3% after second year of becoming OD. Number of diarrhoeal cases reduced significantly after eliminating OD ($t(3.2) = 14.1$ sig 0.006 95% CI (30-148)). This study recommends that the remaining sub-Counties strive to attain and sustain ODF status.

Introduction

Poor sanitation is estimated to cost Kenya, US\$ 324 million each year. This is equal to US\$8 per capita or 0.9% of the national gross domestic product. An estimated 5.6 million Kenyans defecate in the open (Republic of Kenya, 2011). According to World Bank open defecation (OD) costs Kenya US\$ 88 million per year. The poorest quintile is 270 times more likely to practice open defecation than the richest (WSP, 2012).

Lack of sanitation is a major risk factor contributing significantly to infant mortality with a child dying every two and a half minutes from preventable diarrhea diseases. The vulnerable sections of the population are more adversely affected by lack of sanitation. This includes the disabled, women and school going girls. Women are predisposed to gender based violence as they go in search of sanitary facilities and girls tend to be absent from school when they are menstruating due to lack of gender friendly sanitation in schools. An association has been demonstrated between open defecation and stunting in India, with a 10% increase in open defecation leading to a 0.7% increase in both stunting and severe stunting (Spears et al. 2013). Water, sanitation and hygiene (WASH) interventions in developing countries have been shown to reduce diarrhoea diseases. A meta-analysis found an impact on diarrhoea disease reduction with relative risk ranging from 0.63-0.75 (Fewtrell et al. 2005).

Kenya launched the open defecation free rural Kenya campaign in 2011. The overall goal was to eradicate open defecation from rural Kenya by end of 2013. This intervention was spearheaded by the division of environmental health in the ministry of health as well as key non-governmental organizations. The community led total sanitation (CLTS) approach was implemented in a bid to attain open defecation free status. Kenya has 265 sub-Counties. Out of these only two have been certified open defecation free. These are Nambale and Nyando. The latter was certified in 2013 and the former in 2012. This study sought to explore the impact of being declared open defecation free on reported diarrhoea morbidity among infants in Nambale sub-County. Nambale is located in the western part of Kenya and forms part of Busia County. Nambale sub-County has a population of 94,637 according to the 2009 National census. The average population density stands at 451.4 people per square kilometer. More than a half the population, 54% live

below poverty line (Nambale constituency Development Fund, 2013). Nambale sub-County has 156 villages. These villages were certified open defecation free after implementation of CLTS.

Methodology

Data on diarrhoeal morbidity was accessed from the Kenya Health Information System. This is run by the division of health information, Ministry of Health Kenya. The division has health information and records officers working in health facilities. They get various reports generated by health facilities, collate and upload them into this website. Nambale has eight health facilities. Each facility submits monthly data on workload which is uploaded into the Kenya Health Information System. The study utilized data for the whole sub-County.

To access this data, I logged into the website and clicked on the services section and selected the reports option. From this, the data set reports option was selected. The study utilized the outpatient summary dataset for children under 5 years old, commonly called MOH 705 A. Each monthly report was downloaded in the form of excel sheets and monthly diarrhoea morbidity extracted. The study utilized datasets for 3 years. This was for one year before elimination of open defecation, one year after elimination of open defecation and two years after elimination of open defecation. This was from June 2011 to June 2014. These data was transferred from MS Excel and analyzed for descriptive using SPSS version 16. Ethical approval was not necessary as the study utilized data sets available on a public website.

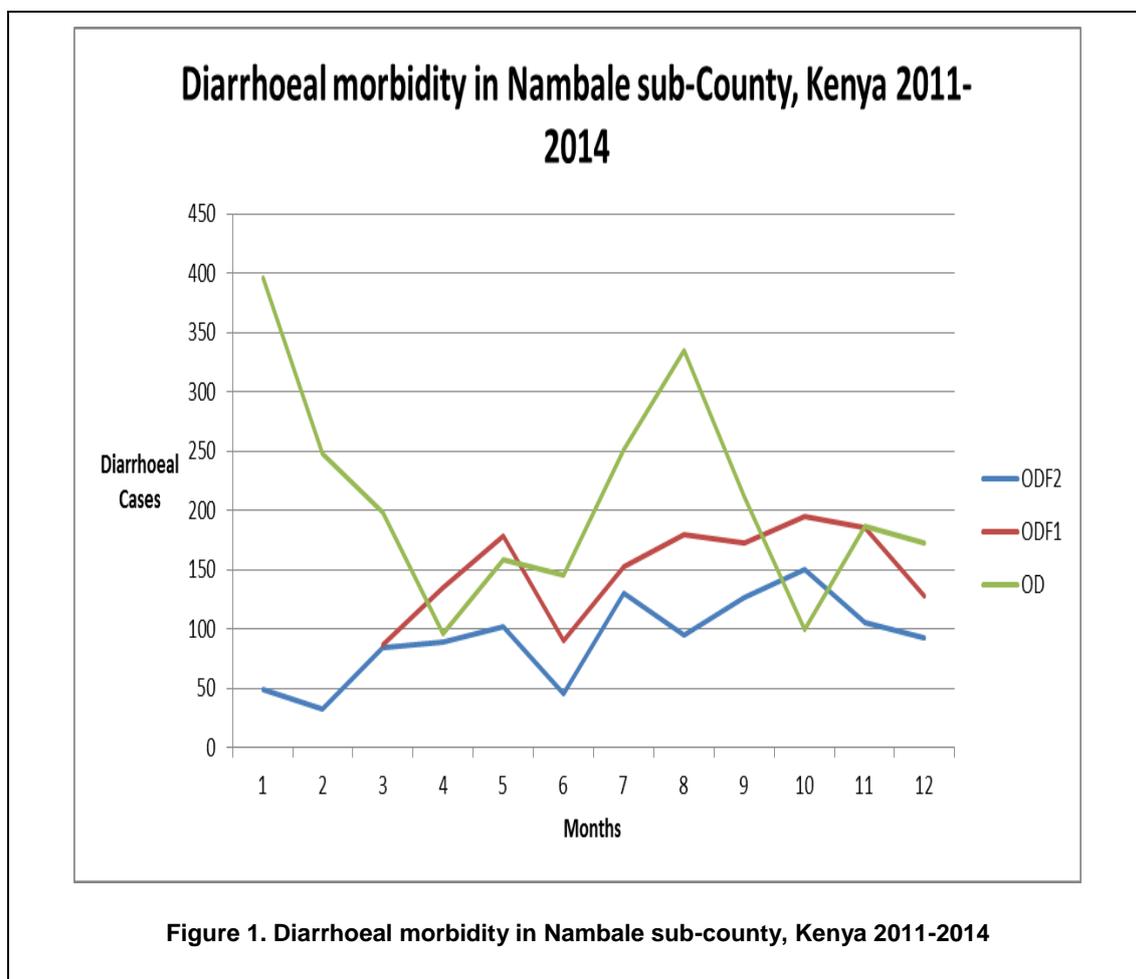


Figure 1. Diarrhoeal morbidity in Nambale sub-county, Kenya 2011-2014

OD – One year before open defecation free status was achieved
 ODF1- One year after open defecation free status was achieved
 ODF2- Two years after open defecation free status was achieved

Results

Mean monthly diarrhoeal cases a year before open defecation were eliminated was 208. One year after elimination of open defecation, the mean monthly diarrhoea cases were 149, and 92 two years after elimination of open defecation. Diarrhoea cases declined by 28.4% one year after being declared OD and 38.3% two years after being declared OD. Number of diarrhoeal cases reduced significantly after eliminating OD ($t(3.2) = 14.1$ sig 0.006 95% CI (30-148)).

According to the graph, diarrhoea cases declined sharply one year after elimination of open defecation (ODF 1) compared to one year before elimination of open defecation (OD). Diarrhoea cases declined further in the second year after elimination of open defecation (ODF 2).

The study cannot control for any potential confounding e.g. water improvement. Improvements in potable water supply may have been minimal. The Nambale Constituency Strategic Plan 2013-2018 states there is need to prioritize provision of potable water to the residents. Implementation of CLTS also leads to improved hygiene e.g. as a result of promoting hand washing in schools and homesteads.

Discussion and conclusion

Eliminating open defecation via implementing CLTS may have led to a significant decline in diarrhoea cases reported among children in Nambale sub-County. This sub-County not only attained open defecation free status but also sustained this status. Provision and proper use of latrines coupled with hygienic behaviours like hand washing may have led to a significant decline in diarrhoea cases ($p = 0.006$). Elimination of open defecation may also have led to a decline in environment enteropathy improving the nutritional status of the children. An evaluation of CLTS in Ethiopia found that latrine coverage was 79.4% in CLTS villages compared to 59.1% in non-CLTS villages. Two weeks prevalence of diarrhoea was the same in both CLTS and non-CLTS villages (Beyene et al. 2014). In Mali, a randomised control trial found that CLTS almost doubled latrine coverage (65% vs. 35%) and reduced OD rates by 71% among adults, 49% among older children and 51% among children under 5 years. The risk of loose or watery stool was reduced by 24% among children not being breastfed exclusively. Children under 5 years in CLTS villages were taller and less likely to be stunted (Pickering et al. 2014). The authors concluded that CLTS prevented diarrhoea and reduced environmental enteropathy through reduced environmental faecal contamination.

In Kenya, sanitation was devolved to county governments as from March 2013. In some counties sanitation has been placed in the ministry of health; while in others it has been placed in the ministry of water. As a result of this, sanitation may end up not being given the necessary attention e.g. in terms of funding. World Bank estimates current sanitation investment in Kenya to be 0.1- 0.5% of the Gross Domestic Product (GDP). There is need to increase investment in sanitation as Kenya lags behind in attaining the sanitation related millennium goals. It is hoped that these results will be used to lobby policy makers at the county level to allocate funds for sanitation, with more emphasis on CLTS. A key limitation of an ecological study is that it uses population based data and in this case it's unable to directly link diarrhoea and elimination of open defecation in an individual child.

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References

- Beyene H, Deressa W (2014) *Effect of Community Led Total Sanitation Intervention on Diarrhoeal Diseases and other Hygienic Behaviours in Households, Southern Ethiopia*. Proceedings from UNC Water Institute Water and Health Conference, 2014. Accessed at: <http://whconference.unc.edu/files/2014/10/abstract-book.pdf>
- Fewtrell L, Kaufman RB, Kay D, Enanoria W, Haller L, Colford JM (2005) *Water, sanitation, and hygiene interventions to reduce diarrhoea in less developed countries: a systematic review and meta-analysis*. The Lancet Infectious Diseases, Vol 5(1):42-52.
- Kenya Health Information System. Accessed at: <https://hiskenya.org>.
- Nambale Constituency Development Fund (2013). *Nambale Strategic Plan 2013-2018*. Accessed at: http://www.nambaleconstituency.co.ke/sites/default/files/nambale_constituency_strategic_plan.pdf
- Pickering A, Alzua ML, Djabbbaari H (2014) *Impact of a Community Led Total Sanitation (CLTS) Intervention on Sanitation Access, Hygiene Behaviour and Child Health in Rural Mali: Evidence from*

- a Cluster Randomized Control Trial*. Proceedings from UNC Water Institute Water and Health Conference, 2014. Accessed at: <http://whconference.unc.edu/files/2014/10/abstract-book.pdf>
- Republic of Kenya (2011) *Realizing Open Defecation Free (ODF) Rural Kenya*. Ministry of Health: Nairobi.
- Spears D, Ghosh A, Cumming O (2013) *Open Defecation and Childhood Stunting in India: An Ecological Analysis of New Data from 112 Districts*. PLoS ONE 8(9): e73784. doi:10.1371/journal.pone.0073784.
- Water and Sanitation Program (2012) *Economic Impacts of Poor Sanitation in Africa*. Accessed at: <http://www.wsp.org/sites/wsp.org/files/publications/WSP-ESI-Kenya-brochure.pdf>.
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