

Full Length Research Paper

Assessment of the trend and risk factors of under-five diarrhea morbidity and mortality in two selected communities in the West-Mamprusi District

Bashiru Mahama

Department of Environmental Health and Sanitation, College of Nursing and Midwifery-Nalerigu, Ghana.

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Diarrhea episodes among children under five years with its devastating consequences have been a concern to stakeholders in child survival strategy programs. Mothers are key in the prevention of diarrhea among children since they are the care givers. The main aim of this paper is to assess the trend and risk factors of under-five diarrheal disease in the study areas. Descriptive research design was employed for the study. A snowball sampling method was used to select 60 respondents for these study (this include 30 respondents each from a study area) and 19 health professionals were also contacted for the study. Data was analyzed using SPSS and Microsoft Excel and presented descriptively. The findings showed the causes of diarrhea as; contaminated food and poor food hygiene practices (96.7%), lack of personal hygiene (93.3%), poor sanitation (91.7%), and lack of maternal care (86.3%). Findings from expert's survey showed that; lack of personal hygiene practices, poor food hygiene practices, contaminated food, and poor sanitation with each representing 100% respectively were some of the common determinants for the diarrheal morbidity and mortality. It is recommended that, the District Health Administration initiate health promotion and education programs to sensitize mothers' on food hygiene practices.

Key words: Diarrhea episode, children under-five morbidity and mortality.

INTRODUCTION

Globally, diarrhea is the second leading cause of death of children under five, with approximately 760,000 of these children dying annually (WHO, 2015). Every year, nearly 760,000 under-5 children continue to die from diarrheal disease, and the majority of these deaths have been identified as being avoidable (Ramanaiah et al., 2015).

The fight against diarrheal diseases in under-5 children was the subject of several international interventions as well as regional and national interventions in low and middle-income countries (Rahman et al., 2014). Indeed, diarrhea diseases remain linked largely to living conditions such as; poverty, lack of hygiene, lack of

*Corresponding author. E-mail: bashirumahama1@gmail.com.

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good drinking water, malnutrition, maternal education and others. The results of earlier studies have also shown that lack of sanitation, availability and supply of good drinking water and lack of proper sanitation and hygiene, generally are expected to increase the risk of diarrheal morbidity and mortality in infants (Gebru et al., 2014).

Diarrhea rates in Ghana are reported to be high. It is estimated that 113,786 cases of diarrhea were recorded in Ghana for children under-five years in 2011. Approximately 2,318 diarrhea cases reported had severe dehydration with 354 deaths within the 2011 year period. The fight against diarrheal diseases in under-5 children was the subject of several international interventions as well as regional and national interventions in low and middle-income countries (Rahman et al., 2014).

None the less, Ghana Demographic and Health Survey (GDHS) in 2008 estimated diarrhea prevalence among children under the age of five to be 19.8%. Diarrhea kills 10,000 children under -5 years annually and the disease is contracted through ingestion of contaminated and unsafe water which results in frequent passing of stool and vomiting and thus causes dehydration within a very short time (Environment News Ghana and Ghana News - SpyGhana.com, 2013). The Northern Region of Ghana has been classified as one of the poverty stricken regions of Ghana. Indeed, diarrheal diseases remain linked largely to living conditions, poverty, lack of hygiene, and lack of drinking water in households and in the neighborhood despite several interventions by various stakeholders. The Northern region still has a higher under-five mortality rates from 154 per 1000 live births in 2003 and 137 per 1000 live births in 2008 (GDHS, 2008). In 2013 fiscal year (West Mamprusi District Assembly composite budget, 2013); reported diarrhea to be among the top ten diseases in the district. However, there is no published study that has examined trends and risk factors for diarrhea morbidity and mortality in children under-five in the West Mamprusi District of the Northern Region of Ghana over a five years' period; hence there is little or no evidence of diarrhea reported cases in the district to enhance decision-making on diarrhea outcomes. Therefore identifying the causes of diarrhea in children under-five is very crucial for the effective implementation of child health intervention programs for policy formulation and the general assessment of resource requirements and intervention prioritization in the district.

METHODOLOGY, STUDY AREA, DATA COLLECTION AND ANALYSIS

The areas under study are Janga and kparigu, these two communities are suburbs of the West Mamprusi District in the Northern Region of Ghana. Janga and kparigu are both low-income communities in the District which have majority of their population being farmers and the few others being fisher folks. Consent for this research study was obtained from the West-Mamprusi district

Health Directorate. At all levels, officials were contacted and permission from administrators and participants was secured. A descriptive research design was employed for the study through the use of structured questionnaires. A sample size of 60 respondents was used for the study. Thirty respondents were drawn from each study area. Health professionals' views on the risks factors/determinants of diarrhea were also sought from 10 health professionals from the Janga polyclinic and 9 from the PPAG facility at Kparigu which together made up nineteen health professionals contacted for the study. Snowball sampling technique was used for the study from which participants were drawn. A questionnaire comprises of closed and open-ended questions for the respondents. The questionnaire was designed with the focus on key themes like; profile of household mothers with children under five; knowledge and awareness of diarrhea; causes and symptoms of diarrhea; immediate actions taken by mothers whose children have experience diarrhea; source, hand washing and how it is done at critical times; storage and treatment of drinking water; availability of household toilet facility; participation in health education programs and others.

DATA ANALYSIS

Data were sorted and compiled in order to ensure accuracy and completeness. The data were then coded and analyzed by using descriptive statistics with SPSS Statistics Software Version 20.0 and Microsoft Excel.

ETHICAL CLEARANCE

Consent for this study was obtained from the West-Mamprusi district Health Directorate. At all levels, officials were contacted and confidentiality assured.

RESULTS

Table 1 presents the educational background and the occupational status of the study respondents. Most of them did not have any formal education (31.7%), followed by SHS (23.3%), JHS (21.7%). Also a few number of the respondents had tertiary and primary education (10%), with the least being technical/vocation (3.3%) respectively. It is believed that women's education has an influence in their health and decision making regarding their health as well as their children as most of the respondents agreed. Respondent's occupational status showed that; most of the study participants were self-employed (61.7%) and some were unemployed (25%) as indicated in Table 1. In view of this, the majority that was self-employed and unemployed may have ample time to care for the health needs of their children.

Awareness/knowledge of diarrhea

Regarding respondent's knowledge and awareness of diarrhea, majority (98.3%) indicated they were aware of the diarrhea. The study further revealed that, almost all

Table 1. Educational background of respondents and occupation.

Response	N (%)
None (No formal education)	19(31.7)
Primary	6(10.0)
JHS	13(21.7)
SHS	14(23.3)
Tertiary	6(10.0)
Technical/Vocation	2(3.3)
Total	60 (100)
Occupation of respondents	
	N (%)
Government workers	5(8.3)
Self employed	37(61.7)
Private sector employment	3(5.0)
unemployed	15(25.0)
Total	60(100)

Table 2. Causes of diarrhea from the view point of households mothers.

Response	N (%)
Malnutrition	39(65)
Lack of maternal education	50(86.3)
Lack of maternal care	28(46.7)
Lack of personal hygiene practice	56(93.3)
Contaminated food	58(96.7)
Poor sanitation	55(91.7)
Infection with certain organisms	11(18.7)
Immunodeficiency with certain disease	2(3.3)
Poor food hygiene practice	58(96.7)

respondent (90%) have knowledge on diarrhea. The response from the majority reflects that of as passing frequent, loose, watery stools three or more times in a day.

Causes of diarrhea

The result shown on Table 2 indicate the views of respondents on the causes of diarrhea in the study area. Majority of the respondents concluded that, under-five diarrhea is generally caused by contaminated food (96.7%) and poor food hygiene practice (93.3%). It is generally believed by the respondents that, lack of maternal education (86.3%), malnutrition (65), lack of maternal care (46.7%), are all major determinants responsible for the cause of diarrhea in the area. Under-five diarrhea diseases have a link between

immunodeficiency for certain diseases such as HIV and hepatitis and infections with organisms e.g. viruses and bacteria etc. the responses representing the views of respondents are not quite convincing. This means that parents attitude generally will result to transmission of diarrhea disease to their children and that could possibly be responsible for the increasing rate of morbidity in the area.

Signs and symptoms of diarrhea

Table 3 presents the signs and symptoms of diarrhea. majority of the respondents who participated in the survey indicated; abdominal pain (90%), presence of fever (83.3%), passing three/more unformed stools in a day (56.7%), presence of vomiting (73.3%) as major signs and symptoms of diarrhea. This therefore indicates

Table 3. Signs/symptoms of diarrhea.

Response	N (%)
Blood or mucus in stool	34 (56.7)
Three or more unformed stools within a day	47 (78.3)
Presence of fever	50 (83.3)
Urine output plus its color	1 (1.7)
Presence of vomiting	44 (73.3)
Duration of illness	2 (3.3)
Abdominal pain	54 (90)
Nausea	7 (11.7)

Table 4. Immediate actions taken for a children experiencing diarrhea.

Response	N (%)
Giving ORS	14(23.3)
Taking him/her to the hospital	33(55.0)
Taking him/her to the drug/pharmacy shop	13(21.7)
Total	60(100)

Table 5. Hand washing at critical times.

Response	N (%)
Before preparing child's food	23(38.3)
After cleaning child's defecation	57(95)
After personal defecation	58(96.7)
After personal urination	7(11.7)
Before feeding child	5(8.5)

that mothers had a little knowledge about diarrhea.

Action taken for a child experiencing diarrhea

Mothers were asked of the treatment measures sought for their children experiencing diarrhea. Amongst the mothers interviewed, majority take their children to a near-by health facility (55%). Quite an appreciable number of respondents also resort to the use of ORS (23.3%) and others also consult the pharmacy shop/drug shop (21.7%). The majority that resorted to hospitals as remedies for their children experiencing diarrhea were aware of the problems it is associated with (Table 4).

Critical time of washing hands

Participants were also asked to ascertain how hand washing is done at critical times. It was revealed

that, majority of respondents wash their hands only after cleaning child's defecation (95%) and personal defecation (96.7%) followed by a significant percentage that include washing hands before preparing child's food (38.3%), and others such as; personal urination and before breastfeeding child as indicated in the Table 5. Mothers only wash practice hand washing after either defecation or cleaning child's defecation and responses could prove they may be ignorant of other activities such as urination, before cooking and others.

Sources and storage of drinking water

Furthermore, study participants were also questioned on their source and storage for drinking water. Majority of the respondents revealed their source of water as open wells (61.7%), while some indicated borehole (35.0%) and a few others revealed their source as tap water (3.3%). The reasons assign to the use of well water was

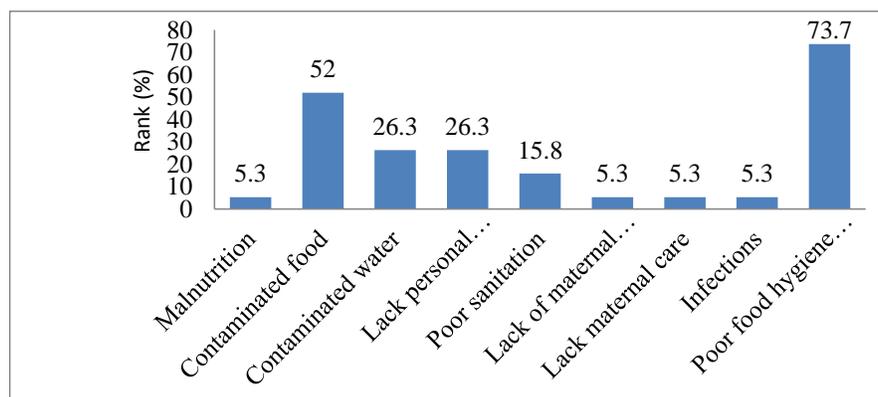


Figure 1. Health professionals ranking of the causes of diarrheal disease.

that, wells are readily available and every household at least has a well and it is therefore easier to get access to water without paying even though they agreed it was not protected. With regards to respondents' attitude towards storage of drinking water, a high percentage representing the majority (98.3%) agreed they store their drinking water. Most of the respondents stored their drinking water in pots (38.3%). A good number of the respondents prefer storing their water in metal drums and rubber containers (31%). Some respondents also store their water in barrels (13.3%) whilst other stored their water in jerry cans (8%). Water stored by respondents is used for common activities such as; drinking, cooking, and bathing etc. Most of the respondents indicated storage containers such as pots and metal drums were out dated and could lead to contamination. In view of this, drinking water should be stored separately and also adequately protected from contamination. They were also of the belief that, when water is properly protected could help in preventing contamination and hence reduce water related sickness.

Availability of household toilet facility

The study also revealed that, most of the respondents did not have household toilet facilities (55%). This means that, other ways such as; open defecation etc. were resorted to when the need arises and could lead to diarrhea. Therefore there should be extensive education on the need to have toilet facility at home by health authorities.

Participation in health promotion/education programs

The responses of household mothers to whether they have had any health education programs, showed most

of the respondents (51.7%) had health education and could explain some measures for the prevention of diarrhea. Some of the measures explained were that; cleaning and weeding around the environment could reduce the risk of getting diarrhea; boiling leftover food; personal hygiene and drinking good water were all measures to prevent diarrhea. It is interesting to note that, a mother aged 55 years lamented that; children nowadays get sick because of certain attitude and behavior of mothers such as; good hygiene practices. She further explained that; lamented that; "My late mother use to boil leftover food for us when we were children and we never experience things like diarrhea". This means that, initiating and intensifying more of these programs could have a great impact on behavioral change of mothers that could lead to diseases. This will also help reduce the burden of diarrhea morbidity and mortality in the area.

Figure 1 reveals health professionals ranking on the risk factors of diarrhea in order of highest to the least based on their severity. Overall, poor food hygiene practices (73.2%) and contaminated food (52%) has been ranked as the major risk factors of the diarrhea in the area. It is generally believed by respondents that good hygiene practices and food source could prevent diarrhea.

Trend of diarrhea

Figures 2 and 3 indicate the trend of diarrhea cases over a four year period in the study areas. The trend has shown a steady decline in both under-five and general diarrheal cases in 2011 and 2012, whilst in 2013 and 2014 there is a considerable increase in both cases. The overall trend increases and this could be attributed to several factors that cause diarrheal diseases in the area. It is important that all health professionals and other

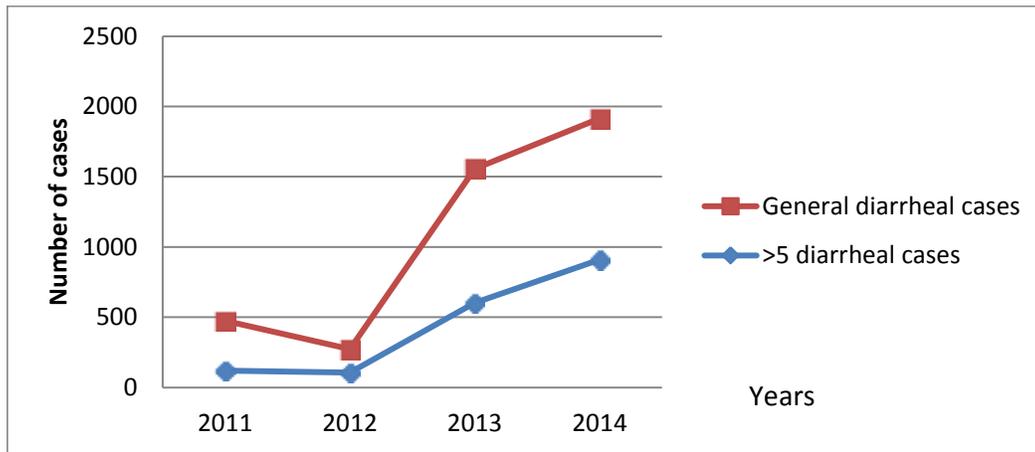


Figure 2. Diarrhea cases in the Janga polyclinic.

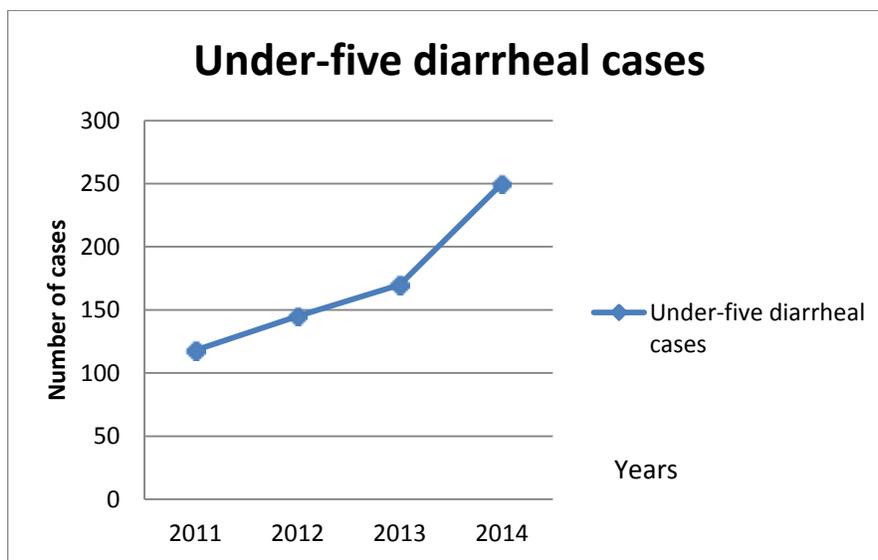


Figure 3. Trend of confirmed diarrheal cases at the Kparigu PPAG facility over the years.

stakeholders come together to promote an effective health campaign. This will result to attitudinal and behavioral change and will help reduce the burden of morbidity as well as mortality in the area.

The trend on Figure 2 indicate a steady decline in both under-five and general diarrheal cases in 2011 and 2012, whilst in 2013 and 2014 there is a considerable increase in both cases. The overall trend increases and this could be attributed to several factors that cause diarrheal diseases in the area. It is important that all health professionals and other stakeholders come together to promote an effective health campaign. This will result to attitudinal and behavioral change and will help reduce the

burden of morbidity as well as mortality in the area. An in depth analysis of the figure confirms that the disease is prevalent in the study area even though there has not been a steady increase over the years as compared to the Janga poly clinic Figure 4. Environmental and behavioral factors that aggravate the occurrence of the disease may be disregarded by mothers. Health authorities in this regard should intensify health education programs for the people to be aware of the causes and danger involve in the disease. Findings confirm that mortality from diarrheal has fallen substantially over the years. This means that better health interventions are being put in place to arrest the situation.

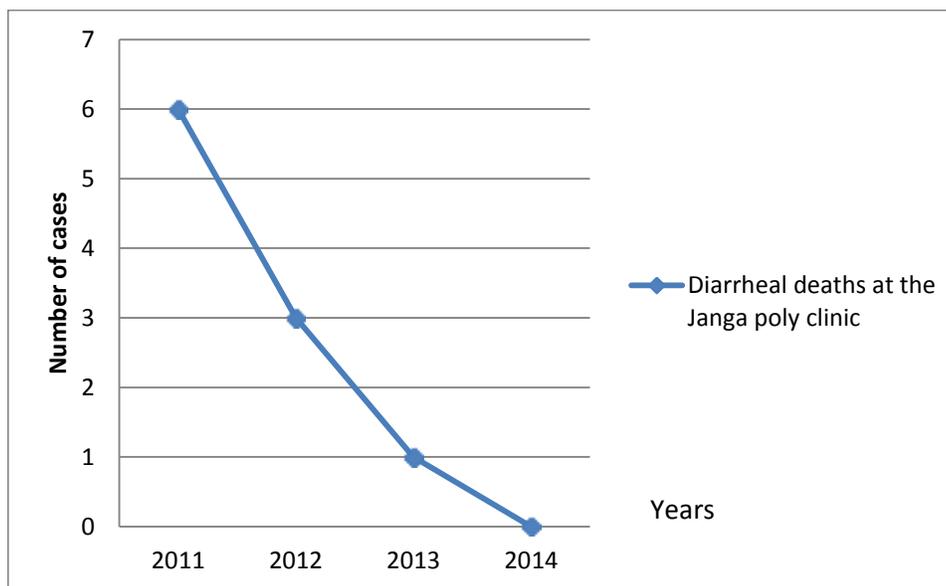


Figure 4. Trend of confirmed diarrhea deaths at the Janga polyclinic.

DISCUSSION

Findings from the study revealed that, most household mothers do not have any formal education (31.7%), SHS (23.3%), JHS (21.7%). Also a few number of the respondents had tertiary and primary education (10%), with the least being technical/vocation (3.3%) respectively. It is believed that women's education has an influence in their health and decision making regarding their health as well as their children. This agrees with a study that was conducted by Mihrete et al. (2014) to identify the determinants of childhood diarrhea among under-five children in northwest Ethiopia which found that education was significantly associated with child diarrhea.

The results of the current study is similar to a study by Gibru et al. (2014), which found that children whose mothers cannot read and write were more likely to have diarrhea. Mother's education level provides knowledge on hygienic practices, child feeding and additional sanitation practices, which in turn are critical factors of childhood diarrhea. The study revealed the occupational status of household mothers as; self-employed (61.7%), unemployed (25%) and others. The current study find a significant association between mother work status and under 5 diarrhea which was in line with a study by Mihrete et al. (2014) that found a positive association between working mothers and the risk for childhood diarrhea. Working mother do not have enough time to take care of her child since she spends most of her time at work which might increase the risk of the child to have diarrhea whereas, non-working mothers spend more time at home taking care of the child thus reducing the child

risk of experiencing diarrhea.

Furthermore, the study revealed that, causes of diarrhea were; contaminated food and poor food hygiene practices (96.7%), lack of personal hygiene (93.3%), poor sanitation (91.7%), and lack of maternal care (86.3%). This is directly in line with the health professionals' survey which also showed that; lack of personal hygiene practices, poor food hygiene practices, contaminated food, and poor sanitation with each representing 100% respectively as the common risk factors for diarrhea morbidity and mortality in the study area. This was also observed by (UNICEF/WHO, 2013) that, in every 20 s a child dies as a result of poor sanitation and 80% of diseases in developing countries are caused by poor sanitation. This is further supported by a research in 2012 that; a total of 842,000 diarrheal deaths resulted from poor water, sanitation and hygiene (Mills and Cumming, 2016). Others causes of under-five diarrhea from the study were; lack of maternal education (86.3%), malnutrition (68%), lack of maternal care (46.7%). It was also found that, under-five diarrhea has a link between immunodeficiency for certain diseases such as HIV and hepatitis and infections with organisms e.g. viruses and bacteria etc.

Regarding type of treatment household mothers sought to treat their children experiencing diarrhea, it was revealed that; most mothers took their children to the near-by health facility (55%). Some resorted to the use of ORS (23.3%) and others also consulted the pharmacy shop/drug shop (21.7%). More so, drinking water source for households were mostly open wells (61.7%), borehole (35%) and tap water. Again, the storage place of water

for mothers was pots (38.3%). metal drums, rubber containers (31%), barrels (13.3%) whilst (8%) store their water in jerry cans. This was in line with Mengistie et al. (2013) where diarrhea was significantly associated with domestic water supply from unimproved sources among children under five in eastern Ethiopia. The majority that depends on open wells which were mostly unprotected were more at risk of their children experiencing diarrhea. Most of the storage containers such as pots and metal drums were not covered and could lead to contamination. In contrast, Gebru et al. (2014) did not find any significant association between water source and childhood diarrhea.

Findings again revealed that hand washing was done; after cleaning child's defecation (95%) and personal defecation (96.7%) followed by a significant percentage that include washing hands before preparing child's food (38.3%), and others such as; personal urination and before breastfeeding child. A proper hand washing with soap and running water could reduce the burden of diarrhea if adhere to. It has been proven that many of these deaths could be prevented through hand washing with soap which alone can reduce diarrhea by up to 50%, yet only 20% of Ghanaians wash their hands with soap (UNICEF Ghana; 2015-2016).

Regarding household toilets, it was revealed that, (55%) households did not have toilet facilities. This is in clear support of Watkins (2006) that; about 2.6 billion people, which are about 50% of the developing world's populations, do not have access to basic toilet facilities and it would lead to infections e.g. diarrhea etc.

Finally, some of the respondents (51.7%) have had health education and could explained state measures to reduce the risk of exposure to diarrhea as; cleaning and weeding; boiling leftover food; personal hygiene and drinking good water etc. It is interesting to note that, a mother aged 55 years lamented that, "children will always get diarrhea in this community, some of us as mothers do not maintain good hygiene practices e.g. taking good care of leftover foods. "My late mother use to boil leftover food for us to eat when we were children and we never experience things like diarrhea".

LIMITATIONS

Data used in this study were basically from the use of a structured questionnaire regarding risk factors of diarrhea. Moreover, data from the District Health Directorate (DHD) was used to establish the trend of diarrhea in the selected communities. These questions relied on the mother's assessment of the risk factors of diarrhea instead of much data from the DHD. Thus, the trend established here is not as current data on diarrhea cases from 2015-2017 were lacking. Another limitation was recall bias. Mothers might have forgotten or being

bias in responding to the questionnaires during the interview leading to misreporting.

CONCLUSION AND RECOMMENDATION

Findings have confirmed that mortality from diarrhea has fallen considerably yet morbidity has remained a serious issue over the years. It is difficult to establish the contributory factors that resulted to the considerable reduction in under-five mortality rate perhaps; it might be due to the integration of several factors including the promotion of oral rehydration therapy or use, health education and promotion programs. It is recommended that, the District Health Administration initiate health promotion and education programs to sensitize mothers' on food hygiene practices.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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