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Effect of Health Education Intervention On Diarrhea Prevention Practices Among Mothers of Under-5 Children in Abia State, Nigeria

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ABSTRACT: *Delayed response to the onset of diarrhea in infants caused by poor sanitation and delay in responding to signs and symptoms can be fatal, as evidenced by mortality in children attributable to diarrhea, occasioned by inadequate understanding of the dangers and consequences involved due to poor knowledge of far-reaching consequences, inadequate prevention and skills to manage the condition as it develops. This study evaluated the effect of a health education intervention on diarrhea prevention practices among mothers with children under the age of five in Aba, Abia State, Nigeria. This study employed a quasi-experimental research design. From population of 350 under-5 mothers in the Local government, a sample size of 60 was determined using power formula. Systematic sampling was used to select the mothers. The health education intervention involved a control and experimental group. The duration of program was one hour weekly didactic intervention for six weeks. A structured validated questionnaire was used to collect data at baseline, at 6th and 12th week post intervention. The Cronbach's alpha reliability coefficients for the constructs ranged from 0.75 to 0.87. The mother's prevention practices were measured on a 27-point rating scale. Data collected were analyzed using descriptive and inferential statistics at α = 0.05 level of significance.Findings showed that between the baseline and the post-immediate there was a significant difference in the mean prevention score in the experimental group (from 19.03±5.91 to 22.20±3.67 at p< 0.05. However, there was no significant difference (p >0.05) in the mean prevention score of the control group (from20.13 ± 4.89 to 20.8 ± 3.41). In conclusion, the health education intervention was effective increasing the mother's prevention and home management practices of diarrhea. It is recommended that matrons and nurses in charge of antenatal and postnatal clinics should teach mothers about prevention andhome management of diarrhea.*

KEYWORDS: Abia, Diarrhea, Prevention, Mothers, Under-five children, Health Education

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INTRODUCTION

Poor management of diarrhea appears to be widespread in various communities in Nigeria's including Abia state. Delayed response to the onset of diarrhea in infant caused by poor sanitation and delay in responding to signs and symptoms can be fatal, as evidenced by mortality in children attributed to diarrhea, occasioned by inadequate understanding of the dangers and consequences involved due to poor knowledge of far-reaching consequences, inadequate personal dispositions and skills to manage the condition as it develops.In urban dwellers, previous studies have shown some evidence of irrational use of antibiotics and other treatments, including herbal remedies, during episodes of diarrhea (Tobin et al., 2014). Another study in a rural community in the south-south region of Nigeria also found that many mothers were unaware of diarrhea control best practices (Sarmiento et al., 2016). Asiegbu et al., (2017) reported poor perception and inadequate practices among mothers of under five children in Ebonyi state.

Nigeria is among the top five countries withq under-5 mortality deaths at 0.9 million as at year 2019 (UNICEF, 2020). The use of contaminated drinking water and poor sanitation facilities lead to increased vulnerability to waterborne diseases, including diarrhea, which kills more than 70,000 children under the age of five each year in Nigeria (UNIECEF,2020). Seventy-three percent of the burden of diarrheal and enteric diseases is associated with poor access to adequate water, sanitation and hygiene (WASH) and is disproportionately borne by the poorest children (UNIEF, 2020).

Onyearugha, et al., (2020) reported a prevalence of 11.2 % and mortality of 22% in Abia state. This high mortality rate due to diarrhea could undermine the achievement of the Sustainable Development Goals (SDGs) of reducing child mortality to 25 deaths per 1000 live births or less by 2030 if not controlled (United Nation, 2017). Research across different parts of Nigeria have shown that each child under the age of five could have as many as 4-7 episodes of diarrhea yearly (Dairo, et al., 2017; Grenov et al., 2019). In Abia state, there is erratic supply of portable water, poor sanitation facilities in most of the houses, and has the highest prevalence of diarrhea diseases among all the communities in southeast, from the health facility records(Onyearugha et al., 2020). In addition Ukegbu, & Ukegbu, (2010) reported that mothers of under five in Abia state had poor perception of diarrhea and they lacked accurate knowledge about the specific causes of childhood diarrhea, as they associated it with divergent causes. Although almost all the mothers were aware of oral rehydration solution/salt sugar solution (ORS/SSS) less than half gave ORS/SSS to their under-fives and only 40.9% knew how to prepare ORS/SSS correctly. More recently, Onuoha, (2018) reported poor knowledge and perception of diarrhea among mothers in Abia State.

Inadequate knowledge, misperceptions by mothers and their misguided approach to treatment and prevention result in high levels of severe dehydration and and limited educational intervention in Abia State suggests the need for this study in order to help inform health policies that will promote

the control of diarrhea disease among under-fives. Hence, this study will investigate the effect of health education intervention on diarrhea prevention among mothers of Under-5 children in Abia State, Nigeria.

METHODS

Research Design: The study employed a quasi-experimental design composing of one experimental group and one control group to evaluate the effect of health education intervention on diarrhea prevention and home management among mothers of Under-5 Children in Abia State, Nigeria.

Sample size

The sample size used for the study was based on the standard normal distribution formula by Jekel, (1996) was used. The prevalence of 50% was assumed for diarrhea prevention and management practices since it is not known. The total number of participants after adding 10% attrition will be 22+2.2= 24.2≈ 24. However, sample size was increased to 30 participants. The total number of participants that will be considered for the study will be 30. The multi-stage sampling technique was used to select mothers of under-5 children Abia South Senatorial district.

Instrument: A semi-structured, interviewer-administered questionnaire was used to collect data on the socio-demographic characteristics of mothers with under-5 children, their knowledge of diarrheal, their perception toward diarrheal, and their diarrheal prevention practices. The same instrument was used at the baseline, immediately following intervention, and at the 12th week follow-up period.

Section A: this section includes 7 items requiring the participants' bio-data (age, level of education, parity status, occupation, family size, and husband's occupation).
Section B: This section of the instrument include nineteen multiple-choice questions designed to assess respondents' knowledge of the concepts of childhood diarrheal, causes of childhood diarrheal, signs and symptoms of childhood diarrheal, modes of transmission, dangers, and preventive measures for childhood diarrheal. In scoring the multiple-choice questions, each correct response will receive one point, while each incorrect response will receive zero point. The maximum number of points available in this section is 19. Participants who score less than 50% are considered to have poor knowledge, while those who score 50% or higher are considered to have good knowledge.
Section C: This section investigated participant's perception using a 24 item questions on a likert scale using Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) respectively. The maximum obtainable point in this section is 24. Each correct response receives one point, while each incorrect response receives zero points. A score of less than 50% indicates poor perception, while a score of 50% or higher indicates good perception.

Section D: This section includes nine preventive practiceitems, each constructed question measured on 18 point rating scale of Never, Rarely, Sometime, and Always. All measured the respondent answer to each statement of the preventive practice. The "Sometime" and "Always"are for practices that have occurred, while "Never" and "Rarely" are for action or behavior that the individual does not engage in. The highest possible score in this section is 18. Each correct response receives one point, while each incorrect response receives zero points. A score of less than 50% indicates poor preventive practice, while a score of 50% or higher indicates good preventive practice.
Section E: This section includessixteen (16) home management of diarrhea items, each with a dichotomous response of "Yes" or "No", multiple choice questions. Home management was measured on a 9 point rating scale. Each correct response is assigned one point, while the incorrect are assigned zero.

Data Collection Procedure
The data collection exercise was carried out using the instrument designed for the study. The procedure was in three (3) phases: baseline data, immediate post-intervention, (at the end of the 6^{th} week) and at 12^{th} week follow-up. Three research assistants were trained to collect data in the course of the research period.

Baseline Data Collection: The baseline data collection in the study served as a measure to obtain data for both independent and dependent variables before the intervention. This enabled the researcher to compare the data with that of the immediate post intervention and the 6^{th} week follow-up period. The researcher ensured that certain information gathered in the course of the baseline data collection was used to strengthen the content of a health education intervention on diarrhea. Baseline data was collected from 30 mothers of under-5 children from across two groups of experimental and control.

Interventions: The training sections were anchored by the researcher and research assistants, it lasted for 6 weeks and it comprises of 4 modules. The training was done for 120 minutes per section for 6 weeks. The researcher and research assistants were available throughout the training procedure.

Immediate Post Intervention Data Collection: The immediate post intervention data was collected from mothers of under-5 children that are in the experimental group. The data collected at the 6^{th} week post intervention was used to determine the effectiveness of the program on knowledge, perception and preventive practices of diarrhea.

Impact Evaluation: At the 12^{th} week post intervention, the last phase of data collection was conducted. The data collected was used to measure the impact of the interventions and determine their sustainability outcome. The data that was collected was subjected to the same statistical methods at the baseline, immediate post intervention as well as the outcome intervention.

Method of Data Analysis

The data obtained was screened, by the way of discarding incomplete questionnaires and ensuring that the participants respond correctly and in case where no response is given, this will be treated as missing data. The data collated, entered and coded using IBM Statistical Product and Service Solutions (SPSS) version 23. Descriptive (means, standard deviation standard error) and inferential (paired t-test, ANOVA) statistics was used for the data analysis and the result was presented in frequency counts and percentages. A statistical level of significance for the inferential statistics will be set at $p < 0.05$.

RESULTS

At immediate-post intervention the mean knowledge score of the experimental group was 12.62 ±2.80 while the mean knowledge score for the control group was 10.47 ± 2.57. Only 3.3% of the participants in the experimental group had low level of knowledge of diarrhea while only 10% of the control group had high level of knowledge of diarrhea (See, Table 1).

Table 1: Immediate-Post Intervention Level of Knowledge of Participants for the Experimental and Control Group

Variables	Maximum Points on Scale of Measure	Category	Experimental group		Control group	
			N = 30		N=30	
			F	%	F	%
Level of Knowledge	19	Poor (0-6)	1	3.3	2	6.7
		Fair (7-13)	16	53.3	25	83.3
		Good (14-19)	13	43.3	3	10.0
Mean±SD			12.63 ± 2.80		10.46 ± 2.57	

Comparison of the Participants Level of Knowledge of Diarrhea between Baseline and Immediate-post Intervention

The mean knowledge score of the experimental group increased from 10.46 ± 1.79 at baseline to 12.63 ± 2.80 at immediate-post intervention, while the control group has no increase in the mean knowledge. The change in the participants' level of knowledge of diarrhea between the baseline and the immediate-post intervention computed by paired T-Test showed that the variation observed in the mean scores of the control and experimental groups was significant (t= 3.04.; *p*=0.003) (See, Table 2). The experimental group had an effect size of 0.94 (See, Table 3) while the control had no effect size since there was no change in the level of knowledge between the baseline and the immediate-post intervention period (See, Table 2).

Table 2: T- Test Evaluating the Impact of the Intervention on Respondents Level of Knowledge of Diarrhea by Comparing the Baseline and the Immediate Post

Variable	Paired Differences							p-value
		$\bar{X}$	S.D	S.E	95%CI			
	Group				Lower	Upper		
							T	**Df**
Baseline Knowledge – Immediate Post Intervention Knowledge	EG	2.16	3.61	0.65	0.81	3.51	3.28	29	0.003
	CG								

Table 3: Impact Evaluation of Participants' Level of Knowledge of Diarrhea for Control Group

Variable	Maximum points on Scale of Measure	Baseline N = 30		Post Intervention N =30		*ES (95% CI)	p-value
		$\bar{x}$(SE)	±SD	$\bar{x}$(SE)	±SD		
Knowledge	19	10.46(0.46)	2.57	10.46 (0.46)	2.57	0.00(-6.34 to 1.64)	1.00

***ES: effect size computed from Cohen d, NA= Not computed*

Table 4. Impact Evaluation of Participants' Level of Knowledge of Diarrhea for Experimental Group

Variable	Maximum points on Scale of Measure	Baseline N = 30		Post Intervention N =30		*ES (95% CI)	p-value
		$\bar{x}$(SE)	±SD	$\bar{x}$(SE)	±SD		
Knowledge	17	10.47 (0.32)	1.79	12.63 (0.51)	2.80	0.94(0.350 to 1.52)	0.001

***ES: effect size computed from Cohen d*

Participants Perception of Diarrhea at Immediate Post Intervention

At immediate-post intervention the perception mean score of the experimental group was 27.462 ± 4.26 while the mean perception score for the control group was 25.90 ± 2.88. Majority (73.3%)

of the participants in the experimental group had positive perception of diarrhea while 3% of the control group had poor perception of diarrhea (See, Table 5).

Comparison of the Participants Perception of Diarrhea between Baseline and Immediate-post Intervention

The mothers' perceived susceptibility of their children to diarrhea infection measure on a 12-point scale at immediate post intervention revealed that experimental group had a mean score of 8.10 (S.E= 0.32) with SD of 1.76 and the control group had a mean score of 7.73(SE=0.43) with SD of 2.34. There was an increase in the mother's perceived susceptibility to diarrhea infection at immediate post intervention in the experimental group.

The mothers' perceived severity of diarrhea infection at immediate post-intervention showed a mean score of 5.06 (S.E= 0.20) with SD of 1.14 and the control group had a mean score of 5.33(SE=0.16) with SD of 0.92. The mothers perceived benefits of preventing diarrhea infection increased in the experimental group immediate after the intervention with a mean score of 7.33 ± 1.53 while the control group had a mean score of 6.63 ± 1.21. Also, the mother's perceived barriers to preventing diarrhea for the experimental group showed a mean score of 6.96 ± 2.38 and the control group had a mean score of 6.20 ±2.77 (See, Table 5.)

Furthermore, the overall mean perception score of the experimental group increased from 25.0 ± 7.69 at baseline to 27.46 ± 4.26 at immediate-post intervention, while the control group has slight decrease in the perception mean score from 25.90 ± 3.88 to 25.70 ± 5.67. The change in the participants' perception of diarrhea between the baseline and the immediate-post intervention computed by paired T-Test showed that the variation observed in the mean scores of the experimental groups was significant ($p< 0.05$) while there was no significant difference in the mean score of the control group (p> 0,05) (See, Table 6). The experimental group had an effect size of 0.83 while the control had very little effect size.

Table 5: Immediate-Post Intervention Participants Perception of Diarrheafor the Experimental and Control Group

Perception of Hepatitis B Infection	Experimental N(%)	Control N(%)
Perceived Susceptibility	**Measured on a 12-point Rating Scale**	
Low(0-6)	1(3.3)	22(73.3)
High(7-12)	29(96.7)	8(26.7)
Total	**30(100)**	**30(100)**
Mean ±SD	**9.43±1.50**	**4.76±2.96**
Perceived Severity	**Measured on a 10 point rating scale**	
Low(0-5)	5(56.7)	15(50.0)
High(6-10)	25(43.3)	15(50.0)
Total	**30(100)**	**30(100)**
Mean ±SD	**7.63±1.75**	**6.06±2.25**
Perceived Benefit	**Measured on a 14 point rating scale**	
Low(0-7)	5(16.7)	22(73.7.)
High(8-12)	25(83.3)	8(26.3)
Total	**30(100)**	**30(100)**
Mean ±SD	**9.4±2.09**	**6.40±3.14**
Perceived Barrier	**Measured on 12 point rating scale**	
Low(0-6)	264(86.7)	16(53.3)
High(7-12)	4(13.3)	14(46.7)
Total	**30(100)**	**30(100)**
Mean ±SD	**4.80±1.56**	**5.9±2.55**
Overall Perception	**Measured on a 48 point rating scale**	
Poor (0-24)	3(10.0)	18(60.0)
Good (25-48)	27(90.0)	12(40.0)
Total	**30(100)**	**30(100)**
Mean±SD	3.33 ± 4.72	23.13 ± 6.4

Table 6: T- Test Evaluating the Impact of the Intervention on Respondents Perceptionof Diarrhea by Comparing the Baseline and the Immediate Post

Variable	Paired Differences							p-value
		$\bar{X}$	S.D	S.E	95%CI			
	Group				Lower	Upper	T	Df	
Baseline Perception – Immediate Post Intervention Perception	EG	2.46	7.37	1.34	-0.28	1.79	1.83	29	0.03
	CG	0.20	7.31	1.33	-2.53	2.93	0.15	29	0.44

Table 7: Impact Evaluation of Participants' Perception of Diarrhea for Control Group

Variable	Maximum points on Scale of Measure	Baseline N = 30		Post Intervention N =30		*ES (95% CI)	p-value
		x̄(SE)	±SD	x̄(SE)	±SD		
Perception	48	25.70(1.03)	5.67	25.9 (0.46)	3.88	0.04(-1.16 to 1.25)	0.44

***ES: effect size computed from Cohen d,*

Table 8: Impact Evaluation of Participants' Perception of Diarrhea for Experimental Group

Variable	Maximum points on Scale of Measure	Baseline N = 30		Post Intervention N =30		*ES (95% CI)	p-value
		x̄(SE)	±SD	x̄(SE)	±SD		
Perception	48	25.0(0.77)	7.69	27.5 (0.77)	4.26	0.83(0.06 to 1.59)	0.03

***ES: effect size computed from Cohen d*

Comparison of the Participants Prevention Practice of Diarrhea between Baseline and Immediate-post Intervention

The mean prevention score of the experimental group increased from 19.03 ± 5.91 at baseline to 22.20 ± 3.67 at immediate-post intervention, while the control group has slight decrease in the prevention mean score from 20.86 ± 3.41 to 20.13 ± 4.89. The change in the participants'

prevention of diarrhea between the baseline and the immediate-post intervention computed by paired T-Test showed that the variation observed in the mean scores of the experimental groups was significant ($p< 0.05$) while there was no significant difference in the mean score of the control group (p> 0,05) (See, Table 9). The experimental group had an effect size of 0.65 (See, Table 10) while the control had little effect size -0.16 (See, Table 11).

Table 9: Immediate-Post Intervention Participants Prevention Practices of Diarrheafor the Experimental and Control Group

Variables	**Maximum Points on Scale of Measure**	**Category**	**Experimental group**		**Control group**	
			N = 30		**N=30**	
			F	**%**	**F**	**%**
Prevention	27	Poor (0-9)	-		1	3.3
		Fair (10-18)	4	13.3	6	20.0
		Good (19-27)	26	86.7	23	76.7
Mean±SD			22.20 ± 3.67		20.13± 4.89	

Table 10: T- Test Evaluating the Impact of the Intervention on Respondents Prevention of Diarrhea by Comparing the Baseline and the Immediate Post

Variable		**Paired Differences**							**p-value**
		$\bar{X}$	S.D	S.E	95%CI				
	Group				Lower	Upper	**T**	**df**	
Baseline prevention – Immediate Post Intervention prevention	EG	3.16	6.56	1.19	0.71	5.61	2.64	29	0.007
	CG	-0.73	5.65	1.03	-2.84	1.37	-0.71	29	0.24

Table 11: Impact Evaluation of Participants' Prevention Practices of Diarrhea for Control Group

Variable	Maximum points on Scale of Measure	Baseline N = 30		Post Intervention N =30		*ES (95% CI)	p-value
		x̄(SE)	±SD	x̄(SE)	±SD		
Prevention	27	20.13(0.62)	4.89	20.8 (0.62)	3.41	-0.16(-1.21 to 0.88)	0.24

***ES: effect size computed from Cohen d,*

Table 12: Impact Evaluation of Participants' Prevention Practices of Diarrhea for Experimental Group

Variable	Maximum points on Scale of Measure	Baseline N = 30		Post Intervention N =30		*ES (95% CI)	p-value
		x̄(SE)	±SD	x̄(SE)	±SD		
Prevention	27	19.03(1.07)	5.91	22.20 (0.67)	3.67	0.65(-0.56 to 1.87)	0.007

***ES: effect size computed from Cohen d*

DISCUSSION OF FINDINGS

The participants in both experimental and control group had fair knowledge of diarrhea at baseline. This findings in at variance with the result of Merga and Alemayehu (2015) in western Ethiopia where they reported maternal knowledge of recognition of the danger signs of dehydration due to diarrhea, and prevention and treatment management of diarrhea diseases in children as inadequate. Also, Workie, Sharifabdilahi & Addis, (2018) reported nearly two-thirds of the mothers had good knowledge of diarrhea. Gollar, and Avabratha, (2018) reported that in coastal Karnataka India majority of the mothers were knowledgeable about signs and symptoms, spread, and prevention of diarrhea.Rokkappanavar, Nigudgi, and Ghooli, (2017) reported that in Kalaburagi, Karnataka, India, more than half of the participants lacked sufficient knowledge about danger signs, spread, and prevention. Kaçan et al., (2022) reported high mean diarrhea knowledge score among mothers in Turkey. Momoh et al. (2019) reported that in Lagos, approximately 59.2% of respondents had good knowledge of diarrhea. Sa'ad et al. (2018) reported that in Kano state, the majority of the 109 women interviewed were well-versed in both Diarrheas. This difference in results may be because of the difference study location which is most urban as compared to this study population that in the rural area.

This study revealed that less than half of the participants in both the experimental and control group had poor perception of diarrhea. This finding is similar to the result of Helmi et al., (2022) where they reported poor perception of diarrhea among their respondents.

This study revealed that more than half of the respondents in both the experimental and control group had fair prevention and home management practices of diarrhea.This finding is at variance to the findings of Ancey et al, (2021) where they reported that mother prevention and home care management of under-five diarrhea diseases as been inadequate.Momoh et al. (2019) in Lagos reported that more than half of the respondents had good practice for diarrhea prevention and home management. Terefe et al. (2022), in Oromia, West Ethiopia, more than half of respondents have a good home-based management practice for diarrhea in children under the age of five. Collins et al, (2021) in Kisumu County, Kenya reported practiced good diarrhea management among their respondents.

This study also revealed that more than half of the participants in both the control and experiment group gave ORS and zinc to their babies. Also less than half could correctly explain the preparation process. This finding is similar to the result of Sa'ad et al. (2018) in Kano state, where majority of the women interviewed were well-versed in both Diarrhea and Oral rehydration therapy.Sadasiba et al., (2017) reported thatless than half of mothers were aware of and treatment of diarrhea. Also, Rokkappanavar, Nigudgi, and Ghooli, (2017) reported that in Kalaburagi, Karnataka, India, majority of participants were aware of ORS, with more than half having adequate preparation and administration knowledge. As a result of these findings at baseline health education programs are required to train mothers and ensure good diarrhea prevention and home management practices of the under-five diarrhea diseases.

The intervention programme adopted for this study had a positive impact of mother's level knowledge of diarrhea. There was a significant change in the level of knowledge of diarrhea from baseline to the follow-up period in the experimental group as opposed to the control group. This finding agrees with the results of previous studies that knowledge can increase after educational intervention (Mohapatra et al, 2019; Pasi et al., 2021;Sunanda et al, 2017) This study finding is in tandem with the finding of Meimantabadi et al. (2016) that education based on the HBM had a positive effect on improving knowledge.

Furthermore, the health education intervention have a significant impact on the perception of the mothers of diarrhea as there was an increase in perception mean score from baseline line to the follow up period. Also, there was an increase in the mother's prevention and home management of diarrhea in the experimental group as opposed to the control group. These findings support the result of Mohapatra et al, (2019) of significant increase in the prevention of diarrhea among the experimental group. Sunanda et al, (2017) found that a structured educational program had a

significant effect on mother prevention and home management practiceof diarrhea. Mushota et al., (2021) reported that before intervention, the proportions of participants prevent and management diarrhea increased following the educational intervention. Adepoju and Sowunmi (2022) reportedthat respondents' prevention of diarrhea was low in the pre-intervention period in both the experimental and control groups, while there was a significant increase the prevention of diarrhea in mothers of children under 5 years of age in the experimental group at post-intervention

CONCLUSION

The theory-driven health education intervention produced a statistically significant increase in the mother's knowledge, perception, prevention and home management practices of diarrhea. One can conclude that the health education intervention was effective increasing the mother's knowledge, perception, prevention and home management practices of diarrhea. The intervention programs used for this study were effective in correcting mother's attitude towards childhood diarrhea. Matrons and nurses in charge of antenatal and postnatal clinics should teach mothers, particularly the illiterate, about healthy feeding habits, hygiene habits, and the benefits of proper exclusive breast-feeding over bottle feeding and how to prepare ORS on a regular basis.

Recommendation

Based on the findings the following are recommended;

1. Intermittent public health campaign by the Local Government Area's Primary Health Care Department to strengthen the progress made by this study, particularly in the areas of hand washing and home management practices using ORT and Zinc
2. The module developed can be adopted by the health care worker (Nurses, Community health officers) as part of their training manual since it was effective in improving knowledge, perception, prevention and home management practices of the mother's on diarrhea.
3. Local Government Area health workers should strengthen the teaching of management practices to mothers regarding childhood diarrhea because these mothers responded differently to all management practices.

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