

# Predictors of infant-survival practices among mothers attending paediatric clinics in Ijebu-Ode, Ogun State, Nigeria

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## Research article

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# Abstract

**Background:** Despite concerted global efforts towards achieving infant-survival, infant mortality lingers as a problem in developing countries. Environmental and personal-level factors are assumed to account for this situation. This study was undertaken to provide better understanding of the dynamics of predictors of infant-survival practices among mothers with infants attending paediatric clinics.

**Methods:** A cross-sectional survey design was adopted. Data was collected from 386 consenting nursing mothers selected by stratified sampling technique. Interviewer-administered questionnaires were used for data collection. The questionnaire consisted of 38-items involving demographic information of respondents, health-literacy counsels received during antenatal care, social-support from significant others and self-efficacy to carry-out infant-survival instructions. Responses were transformed into rating scales for each variable and data analysis was conducted by linear regression analysis with test of hypotheses, at 5% level of significance.

**Results:** The mean age of respondents was  $29.79 \pm 5.84$  years. Majority (81.6%) were married. Yorubas (83.90%) were predominant. Participants had mean scores of  $11.41 \pm 3.91$ ,  $10.61 \pm 3.67$  and  $16.61 \pm 4.56$  respectively computed for levels of health-literacy, social-support and self-efficacy. The dependent variable measured was their level of infant-survival practices and respondents scored  $16.53 \pm 4.71$ . The study found a significant association among variables. Self-efficacy was the major predictor variable of self-reported infant-survival practices ( $R=4.66$ ;  $R^2=0.217$ ;  $P \leq 0.05$ ).

**Conclusion:** We conclude that participants had average levels of health-literacy, social-support, self-efficacy and infant-survival practices. Efforts should be made by healthcare providers to empower pregnant women on activities essential for infant-survival. Family members of nursing mothers should as well be knowledgeable about the advantages of supporting them.

## Background

Global deaths among under-fives recorded from 1990 to 2015 showed marginal improvement towards achieving the target for the Millennium Development Goal-four (MDG-4) with records of 90.6 to 42.5 deaths per 1,000 live births [1]. Reports have given the global percentage reduction in infant and child mortality to be 53% over the 15-year goal which was aimed at 75% reduction [2]. Recent data equally shows a rate of 98.7 deaths for every 1,000 births in West Africa, which is about fifteen times the average values for developed regions [1]. Specifically, data revealed a prevalence of 69 deaths per 1,000 live births in Nigeria in 2015 which ranked the country as one of the top ten nations in infant mortality [3]. Among the 5.941 million children who died in 2015 before their fifth birthdays were 2.681 million neonates [4]. These are pointers to the non-attainment of the MDG-4.

Some causes of infant and under-five mortalities are preterm birth complications, infections, pneumonia, malaria [3, 5], diarrheal diseases [6], tetanus, measles, meningitis, birth asphyxia, poor feeding, HIV/AIDS and injuries [7]. Acute respiratory infections such as pneumonia account for millions of infant and child

deaths annually from undernutrition, sub-optimum feeding and lack of immunization [8]. From studies, certain overlooked factors that contribute to infant mortality are inadequate antenatal attention, poor service provision from healthcare workers, and absence of skilled-care providers [9]. Requirements of mothers include skill-building on health education and the relevance of timely immunization [10], exclusive breastfeeding [11], positive sanitary habits and prevention of diarrhoea and malaria. If not critically attended to, these issues will continually contribute to infant deaths regardless of the Sustainable Development Goals recently put in place.

Fehling et al (2013) asserted that a link exists between the skilfulness of health care providers and maternal and child health [12]. Behaviour-change in mothers to enhance their self-efficacy in ascertaining infant-survival will be as a result of comprehensible counselling [13], health educational messages and skilled delivery [14, 15]. Adebowale and colleagues (2012) observed that socio-demographic attributes such as age and educational status of mothers affect infant care with children born in maternal and child health-facility deprived areas being more likely to die than those born in better places [16]. Importantly, deficiencies emerging from lack of social support exacerbate poor health outcomes. Programs with innovative approaches to engage key influencers (such as fathers and grandmothers) to assist and encourage mothers would be more successful in influencing their behaviours to improve infant care, including infant feeding [17].

Health-literacy, social-support and self-efficacy have been identified as personal and environmental-level components for the enhancement of infant-survival practices. It was inferred by Fry-Bowers and colleagues (2014) that health-literacy has a positive influence on decision-making for mothers on infant care [18]. Moon et al (2016) concluded that the multi-level approach for infant care in terms of sleep safety should include regulation of policies, modification of cultural and ethnic values, education skills and health counsels by professionals [19]. Infants are a delicate and vulnerable sub-population; their survival is a fundamental pointer to maternal and child health and the development of any nation [20, 21]. This study aimed at identifying salient predictors of infant-survival practices among mothers with infants attending paediatric clinics.

## Methods

This study adopted a cross-sectional survey design. It was conducted in Ijebu-Ode local government situated in Ogun state, South-West Nigeria. The population was 2,006 mothers whose infants were attending infant welfare clinics for postnatal care. The anticipated sample size was 423 with an attrition probability of 10%. Thus 386 consenting nursing mothers were enrolled into the study. Stratified random sampling technique was used to select participants from the health centres. Nine primary healthcare centres which cut across all the wards were enlisted from the twelve centres. The only tertiary health facility in the study location was included. Participants were drawn from the health centres during the days each held immunization sessions.

Data from participants were collected by interviewer-administered technique. Constructs from the PRECEDE (Predisposing, Reinforcing, and Enabling Constructs in Educational Diagnosis and Evaluation) Model [22] were adopted in developing the instrument in English and Yoruba languages. A pilot-test was first conducted for internal consistency of the instrument using 40 nursing mothers from Ilishan primary health centre, followed by a re-test for reliability of the instrument with the same participants. Data from the pilot-test was statistically analysed and a Cronbach alpha standard score of 0.738 was obtained with corrections made where necessary. Data was collected from the 27th of February 2017 to the 21st of March 2017.

## Variables

Demographic data elicited information on age, marital status, occupational status, religion, ethnicity, educational attainment, parity and number of infants ever lost. The health-literacy variable contained items on instructions/counsels communicated to participants during antenatal care. Three items had the dichotomous response format (Yes/No) and six items had multiple-choice response format. Social-support received contained five items with the Likert-type 4-response options (never, rarely, occasionally and always) and 1-item with multiple-choice response pattern. Self-efficacy to adhere to infant-survival instructions received consisted of eight items with the Likert-type 4-response option (strongly agree, agree, disagree and strongly disagree). The dependent variable was Infant-survival practices which included seven items with Likert-type 4-response options (never, rarely, occasionally and always).

The ratings of the variables provided responses to the research questions on what the levels of health-literacy, social-support, self-efficacy and infant-survival practices of the participants will be. Data derived were computed and analysed using the Statistical Package for Social Sciences (SPSS) version 21. Responses from the variables were transformed into rating scales to derive standard measures. Correlation and linear regression analysis were conducted to give statistical responses to the research questions and hypotheses. Analysis of Variance (ANOVA) was evaluated to assess how demographic data influenced responses of participants and to compare their responses based on demographic characteristics. Decision rules for the test of null hypotheses were set at 5% level of significance. Therefore, P-Values greater than 5% were rejected.

## Results

From the ten health facilities, 386 nursing mothers participated in the study. The number retrieved from each health centre was according the level of patronage by the centres and the days each centre held immunization. Table 1 shows the distribution of respondents by health centers.

Table 1  
Distribution of Respondents across Health Centres

Health Centres	Number of Respondents
Otunba Tunwase National Paediatric Centre	26
Ikanigbo/Isoku	35
Odo-Esa	77
Itantebo	19
Oke-Aje	24
Iwade Oke/Isale	45
Ita-Osu	38
Italapo	49
Oke Oyinbo	52
Itamapako	21
Number of Respondents	386

## Demographic Characteristics

The mean age of participants was 29.79 years (SEM 5.84) and 307 (79.7%) were  $\geq 25$  years. Other ethnicities were Idoma, Ishan, Okene, Delta, Ijaw, Edo, Eghele and Coutonou. Forty-six (11.90%) had lost one or more infant(s) before the survey. Table 2 shows a summary of the socio-demographic characteristics of the participants.

Table 2  
Demographic characteristics of participants

Items	Number of Respondents = 386 Frequency (N) Percentage (%)	
Marital Status		
Single	60	15.5
Married	315	81.6
Separated	7	1.8
Widowed	2	0.5
Divorced	2	0.5
Occupational Status		
Unemployed	57	14.8
Self-employed	224	58.0
Civil servant/Private firm	73	18.9
Housewife	32	8.3
Retired	0	0
Religion		
Christianity	252	65.3
Islam	122	31.6
Traditional belief	12	3.1
Ethnicity		
Yoruba	320	82.9
Igbo	41	10.6
Hausa	12	3.1
Others ethnic groups	13	3.4
Educational attainment		
Non-formal	21	5.4
Primary	37	9.6
Secondary	164	42.5

Items	Number of Respondents = 386	
	Frequency (N)	Percentage (%)
Tertiary	164	42.5
Number of Children alive		
One child	124	32.1
Two children	133	34.5
More than two children	129	33.4
Number of infants ever lost		
None	340	88.1
One	31	8.0
Two	13	3.4
More than two	2	0.5

## Health-Literacy ( HL )

The personal-level predisposing factor of Health-Literacy received regarding infant-survival practices explored the depth of counsels and instructions received by respondents during antenatal sessions. Majority, 339 (87.8%) knew the age of an infant to be 0 to 2 years. About average (173; 44.8%) were aware that infants are fragile and cannot be fed with just any food. Regarding food handling, 346 (89.6%) reported that handling the food of infants in unclean ways will lead to diarrheal infections. Only 60 (15.5%) affirmed that infants should be protected from mosquito bites, dirty environments and herbal concoctions. Less than a quarter (72; 18.7%) admitted that breastmilk is the only healthy diet for an infant less than six months while 314 (81.3%) chose either infant formula or pasteurized milk or both. When asked for the activity that is relevant for the wellness of infants, only 84 (21.8%) chose antenatal and postnatal care sessions as more relevant than beautifying the infant by creating dimples on them.

Also, (157; 40.7%) knew that keeping the environment clean and cleaning the nipple before breastfeeding will protect their infants from falling ill while 61 (15.8%) claimed that the use of adult medicated soap is good for bathing infants. Ominously, not more than 107 (27.7%) had received counsels on the use of insecticide-treated nets (ITNs), exclusive breastfeeding and alcohol avoidance. About a quarter, 86 (22.3%) could carry-out all the five activities (administration of prescribed infant medications, use of ITNs, preparation of infant meals, preparation of oral rehydration solution and sterilization of infants' items) without aid.

## Social-Support ( SS )

The environmental-level reinforcing factors of participants measured the level of social-support they received from significant others. Ninety-four participants (24.4%) reported having no one to care for them and their infant, 39 (10.1%) reported to have more than one person while 253 (65.5%) claimed to have one person (either husband, mother, mother-in-law, sibling or husband's sibling). Table 3 gives details on further responses of participants' social support.

Table 3  
Social-Support responses of participants

Items	Frequency/Percentage			
	Never	Rarely	Occasionally	Always
I get assistance from my husband when taking my infant for immunization	75 (19.4)	54 (14.0)	70 (18.1)	187 (48.4)
When it is time to go for immunization, my family members tell me it is not necessary for my baby's health.	309 (80.1)	39 (10.1)	17 (4.4)	21 (5.4)
How often do you have someone to assist you when taking your infant for clinic sessions?	96 (24.9)	100 (25.9)	97 (25.1)	93 (24.1)
I am encouraged to practice the health counsels I have received for my infant by those around me.	78 (20.2)	68 (17.6)	70 (18.1)	170 (44.0)
How often do you have someone else to take care of you, and your infant?	86 (22.3)	68 (17.6)	86 (22.3)	146 (37.8)
Number of Respondents = 386				

## Self-Efficacy ( SE )

Participants' perceived level of confidence was measured as self-efficacy to adhere to infant-survival instructions received. Table 4 gives details of the responses from participants.

Table 4  
Self-efficacy of respondents to adhere to infant-survival instructions received

Items	Number of respondents = 386 Frequency/Percentage			
	Strongly Agree	Agree	Disagree	Strongly disagree
I am not confident to take my infant for clinic sessions	57(14.8)	61(15.8)	102(26.4)	116(43.0)
I am willing to comply with the counsel on six months exclusive breastfeeding for my baby	151(39.1)	156(40.4)	41(10.6)	38(9.8)
I am not confident enough to take my infant for immunization	54(14.0)	43(11.1)	109(28.2)	180(46.6)
From what I know about malaria, I will be careful enough to protect my infant from getting it	196(50.8)	137(35.5)	17(4.4)	36(9.3)
If I have my way, I will wash my hands anytime I need to touch my infant's items	175(45.3)	165(42.7)	24(6.2)	22(5.7)
Sterilizing objects before using them for my infant is inconvenient	56(14.5)	103(26.7)	97(25.1)	130(33.7)
Antenatal sessions are time-consuming, I will not attend them in the future	50(13.0)	70(18.1)	105(27.2)	161(41.7)
Keeping my environment clean all the time is tasking, I cannot do it regularly	45(11.7)	54(14.0)	83(21.5)	204(52.8)
Number of respondents = 386				

## Self-reported Infant-survival Practices

The actual behaviour of the participants in practicing infant-survival instructions and counsels was assessed. Table 5 describes the responses of participants.

Table 5  
Self-reported infant survival practices

Items	Frequency/Percentage			
	Never	Rarely	Occasionally	Always
I practice six months exclusive breastfeeding for my baby(ies)	45 (11.7)	53 (13.7)	36 (9.3)	252 (65.3)
I make use of Insecticide Treated Nets to prevent my baby from getting malaria.	30 (7.8)	61 (15.8)	52 (13.5)	243 (63.0)
I take my baby for immunization when due.	23 (6.0)	30 (7.8)	48 (12.4)	285 (73.8)
How often do you clean your nipples when you need to breastfeed?	44 (11.4)	75 (19.4)	83 (21.5)	184 (47.7)
How frequently do you sterilize the items used for your infant?	36 (9.3)	65 (16.8)	61 (15.8)	224 (58.0)
I take my infant for regular clinic check-ups when required.	25 (6.5)	44 (11.4)	80 (20.7)	237 (61.4)
I keep my environment clean to protect my baby from falling ill.	11 (2.8)	20 (5.2)	31 (8.0)	324 (83.9)
Number of Respondents = 386				

## Variable Scores

On a 19-point scale, respondents scored a mean of  $11.41 \pm 3.91$  in Health-literacy. Social support was rated at 17-points leaving respondents with a mean of  $10.61 \pm 3.67$ . Additionally, the aggregate score for self-efficacy of respondents was  $16.61 \pm 4.56$  out of a 24-point rating. Finally, the mean scores for respondents' infant-survival practices was  $16.53 \pm 4.71$  out of 21 points. Table 6 gives a detailed summary of respondent's scores for each variable.

Table 6  
Mean scores of Respondents

Variables	Number of respondents = 386		95%
	Score on rating scale Mean (SE) $\pm$ SD		Confidence
	Percentage (%)		Interval
Health-Literacy	19	11.41 (0.19) $\pm$ 3.91	60.05 11.02–11.81
Social-support	17	10.61 (0.18) $\pm$ 3.67	62.41 10.24–10.97
Self-efficacy	24	16.61 (0.23) $\pm$ 4.56	69.20 16.16–17.07
Self-reported infant-survival practices	21	16.53 (0.24) $\pm$ 4.71	78.71 16.06–17.01

# Regression And Correlation Analysis Among Variables

The hypotheses postulated in this study stated that health-literacy, social-support, and self-efficacy will be significantly associated with infant-survival practices and that one of the independent variables will predict infant-survival practices most significantly. The regression analysis conducted proved that there was a relationship between the independent and dependent variables. The Null hypotheses were therefore rejected. Further analysis showed that self-efficacy was the major predictor of the dependent variable ( $R = 4.66$ ;  $R^2 = 0.217$ ;  $P < 0.05$ ). Analysis by Pearson's correlation revealed the existence of associations among all variables. Bivariate correlation was significant at the 0.05 level (2-tailed). Figure 1 describes the result of the regression and correlation analysis.

## Relationships Between Demographic Characteristics And Variables

### Health centers

Analysis of scores across the health centers showed that Itamapako scored the least in HL (9.85; 95% CI: 7.82–11.88), SE (14.09; 95% CI: 12.16–16.02) and infant-survival practices (12.71; 95% CI: 10.96–14.46).

### Age

Respondents with the maximum age (43 years) scored the highest across all variables (HL; 17.99, SS; 14.99, SE; 24 and infant-survival practices; 21). Participants with relatively low ages scored the least across all variables with age 17 scoring 2.99 in HL, 7.79 in SE and 11.42 in infant-survival practices. Participants aged 18 years had a score of 7.41 in SS.

### Marital status

Married participants scored highest (11.63; 95% CI: 11.19–12.06 in HL, 10.71; 95% CI: 10.29–11.12 in SE, 16.93; 95% CI: 16.43–17.42 in SS and 16.61; 95% CI: 16.09–17.14 in infant-survival practices). However, divorced participants scored the least in HL (8.00; 95% CI: -42.82-58.82) and SS (10.00; 95% CI: 10.00–10.00) while separated participants scored the least in SE (11.71; 95% CI: 7.25–16.17) and infant-survival practices (13.00; 95% CI: 8.10-17.89).

### Employment status

Participants working with private organizations or as civil servants scored highest values across all variables with means of 13.43 (95% CI; 12.49–14.38) on HL, 11.60 (95% CI; 10.80-12.39) on SS, 18.78 (95% CI; 17.75–19.80) on SE and 16.95 (95% CI; 16.03–17.88) on infant-survival practices. Compared to the gainfully employed, responses of unemployed mothers on HL and infant-survival practices (10.21; 95% CI: 9.25–11.16, 16.33; 95% CI: 15.13–17.53) were low. The self-employed mothers also scored low in SS (10.31; 95% CI: 9.82–10.81) while housewives had the lowest in SE (15.87; 95% CI 14.30-17.44).

## Religion

Christians scored the highest across all variables (12.03; CI 11.54–12.51 in HL, 10.78; CI 10.32–11.25 in SS, 17.35; CI 16.80–17.89 in SE, and 16.70; CI 16.13–17.27 in infant-survival practices). Those practicing traditional belief scored the least in all variables (9.25; CI 7.04–11.45 in HL, 9.50; CI 7.59–11.40 in SS, 13.50; CI 10.89–16.10 in SE, and 12.50; CI 8.98–16.01 in infant-survival practices).

## Ethnicity

Considerate differences occurred based on ethnic groups. Those belonging to other ethnic groups scored highest in HL (12.23; 95% CI: 10.03–14.42). Yorubas scored highest in SS and SE (10.85; 95% CI: 10.45–11.26, 16.79; 95% CI: 16.28–17.29) while Hausas had the highest mean in infant-survival practices (16.75; 95% CI: 14.26–19.23). The Hausas however scored the lowest mean in HL (10.75; 95% CI: 7.79–13.70) while the other ethnic groups had the lowest in SS (9.00; 95% CI: 6.77–11.22) and infant-survival practices (14.23; 95% CI: 11.36–17.09). Igbos scored the least in SE with a mean of 15.48 (95% CI; 13.94–17.02).

## Educational attainment

Exploration of responses on educational attainment showed disparity. The means of participants who had attained tertiary level of academic learning was highest across all variables (HL = 12.75; 95% CI: 12.15–13.36, SS = 11.56; 95% CI: 11.04–12.08, SE = 18.56; 95% CI: 17.85–19.26 and infant-survival practices = 17.77; 95% CI: 17.19–18.35). The weakest scores were observed among participants who had non-formal education with means of 9.23 (95% CI; 7.72–10.74) in HL, 13.80 (95% CI; 11.83–15.78) in SE and 12.76 (95% CI; 9.47–16.05) in infant-survival practices. However, those who had primary level of education scored least (9.02; 95% CI: 7.85–10.20) in SS.

## Parity

Based on parity, participants with two children scored highest (11.72; 95% CI: 11.05–12.38 in HL, 10.82; 95% CI: 10.19–11.45 in SS, 17.14; 95% CI: 16.37–17.91 in SE and 16.67; 95% CI: 15.89–17.45 in infant-survival practices). Those with one child scored least in HL (10.92; 95% CI: 10.26–11.59) and infant-survival practices (16.38; 95% CI: 15.51–17.25). However, those who had more than two children scored least in SS (10.24; 95% CI: 9.59–10.88) and SE (16.24; 95% CI: 15.42–17.05).

## Infants ever lost

Participants who had never lost any infant had highest mean scores across all variables (11.60; CI 11.19–12.01 in HL, 10.85; CI 10.47–11.23 in SS, 16.82; CI 16.34–17.30 in SE, and 16.82; CI 16.34–17.30 in infant-survival practices). Those who had lost one or more infant(s) scored the least (ranging from 7.50; CI 1.14–13.85 for HL, to 12.50; CI 6.14–18.85 in infant-survival practices).

## Discussion

Studies to investigate infant survival should be geared towards understanding why infant mortality lingers in developing nations and how it can be significantly addressed. This study assessed ways by which health–literacy, social-support and self-efficacy of nursing mothers can determine infant-survival practices. The findings lucidly indicate that these factors are imperative in ensuring the survival of infants. Generally, results obtained showed positive associations between variables and older reproductive ages, better marital relationships, lucrative occupations, religion and tertiary learning. A significant proportion (11.90%) of the respondents had lost an infant or more at one time or the other before the survey was conducted.

Not Many participants were concerned about the fragility of an infant and how food should be prepared for them. Some denied that giving an infant herbal concoction will be harmful. Many disagreed that breastmilk is the best food for an infant less than six months. A good number of them did not take cleaning of the nipple before breastfeeding as an essential sanitary practice and could not carry-out all the instructions listed for infant-survival. Some reasons for these negative responses could be poor antenatal sessions or lack of support in carrying-out these practices when assistance was needed. Contrary to findings by Bolam and colleagues (1998) [23] which opined that health information and counselling had no positive impact on infant care practices, this study revealed a significant association between health-literacy of mothers and infant-survival practices ( $B = 0.385$ ;  $\beta = 0.320$ ;  $R^2 = 0.102$ ;  $P \leq 0.001$ ). This result is however consistent with some studies that opine that behaviour-change geared towards infant care and reduction of infant mortality can be achieved by health education and counselling of caregivers of infants [14, 15]. These recent findings may be as a result of changes that have occurred in these domains over time.

Assistance from family members plays a pivotal role in the ability to decipher and perform health information received. Among participants, less than average (48.4%) always received assistance from their husbands to take their infants for immunization. Only a few participants always got assistance for self and infant care from family members while some were dissuaded to immunize their infants. The positive relationship between social-support and infant-survival practices ( $B = 0.514$ ;  $\beta = 0.401$ ;  $R^2 = 0.161$ ;  $P \leq 0.001$ ) has been traced to relevant literature. A study [24] stated that involvement of men during pregnancy and childbirth is significant in the safety of the mother and child through emotional, physical and financial support, hence, men should equally receive health education for infant care. Mukuria et al (2016) [17] also resolved that key influencers such as fathers and grandmothers should be engaged in support for recommended infants care practices.

Although, 79.5% of participants agreed to comply with counsels on six months exclusive breastfeeding only a quarter (25.1%) exhibited confidence in taking infants for immunization while 41.2% claimed that it is inconvenient to sterilize infants' items. About a third 120 (31.1%) reported not to attend antenatal sessions in the future because they are time consuming. Additionally, 99 (25.7%) exhibited lack of interest in cleaning the environment and claimed that it is tasking. Less than average agreed to attend antenatal sessions in the future (41.7%) and to practice exclusive breastfeeding for six months (39.1%) while only a few understood the importance of sterilizing infants' objects. The relationship between self-efficacy and

infant-survival practices ( $B = 0.481$ ;  $\beta = 0.466$ ;  $R^2 = 0.217$ ;  $P < 0.001$ ) can be linked to access to health-literacy counsels, ability to understand instructions, availability of assistance in carrying-out these instructions and determinism.

Further analysis showed that Itamapako, the most rural setting scored poorest across all variables. Rural areas have less facilities, poor quality of healthcare, and are underprivileged. As portrayed in this study, similar studies have shown that higher infant mortality rates are predominant in rural areas due to poor facilities, low socioeconomic status and scarce attention from the few health attendants available [25, 26]. Furthermore, a probable reason for the poor scores of the young mothers between would be that most of them might have delivered outside wedlock and were neglected for promiscuity, leading to poor support. Other reasons could be physical immaturity, pregnancy complications, malnutrition and inadequate use of maternal and infant health services for the fear of shame. A similar study [16] revealed that infant mortalities are more associated with adolescent mothers than older mothers.

Married mothers scored highest means across all variables. The presence of a marital partner aids collective care. Husbands of such women will not only assist in catering for the infants but also encourage their wives to go for antenatal sessions, offer financial and tangible support and make them intentional to self-efficacy. The divorced and separated may not have such assistance. Likewise, participants engaged in lucrative jobs had better outcomes since they are more likely to be educated, empowered and funded than the unemployed, housewives and self-employed. The self-employed in this study referred to those who engaged in small scale businesses or petty trading. On examining the effects of employment on infant mortality, Ko and colleagues (2014) [27] showed related results to this and asserted that employment ensured tangible support for the mother and improved her self-efficacy to carry-out infant care counsels.

A possible justification for the high scores of Christians and low outcomes of those of the traditional religion could be that the traditional believers rely less on clinic instructions but more on herbs and may not have been consistently attending antenatal sessions. Social support was however independent of religious affiliation. From results on ethnicities of participants, the Yorubas may have scored high in social-support and self-efficacy because further analysis revealed through a cross-tabulation that of the 164 mothers who had attained tertiary learning, the Yorubas had the highest percentage (87.19%). There was also a positive correlation between higher educational attainment of participants and the variables.

Infant mortality is associated with poorer regions where women are hardly educated [28]. Children born to mothers without formal education are prone to early death. People who attain higher levels of academic learning are more likely to understand the depth of health-literacy instructions. They might be more able to tell their family the exact assistance needed for better support. Adebowale, Yusuf and Fagbamigbe (2012) [16] similarly discovered in a study that lower mortalities were observed among the Yorubas since they were more educated, engaged less in childhood marriage and engaged more in profitable jobs.

Another observation was that participants with higher parity had better scores than first timers in terms of health-literacy and infant-survival practices. This could be because those with only one child may not have been accustomed to childbearing and its rudiments. However, a possible explanation for the low scores of participants with greater parity in self-efficacy and social support could be that family members assumed they already had skills needed for infant-survival owing to their experience. Mothers with history of previous infant deaths had less social-support, had concerns with adherence to infant-survival instructions and scored poorest in health-literacy. Lack of these elements may have accounted for the previous infant mortalities.

This study is not without limitations. First, the nursing mothers considered for the survey were those whose infants were receiving immunization in health centres, those who were not attending immunization sessions were not considered, therefore, the results may not be generalized for all nursing mothers. Secondly, results based on ethnicity may be favorable to the Yorubas because they comprised the largest ethnic proportion of the location. Thirdly, respondents may have been bias in giving responses since the data retrieved were based on self-reported information.

## **Conclusion**

The ability of mothers to carry-out infant-survival practices does not depend only on one activity. From this study, it has been established that the multi-level approach from personal to environmental-level factors of nursing mothers will collectively have positive behavioral effects on infant-survival practices based on the theories adopted to conceptualize the problem phenomenon. Health-literacy messages from healthcare providers should comprise of but not be limited to information and guidelines on infant nutrition, prevention of illnesses, hand washing and personal hygiene, exclusive breastfeeding, sanitation, immunization and sterilization of infants' items.

Social support for mothers should come during pregnancy and continue after childbirth. Information that concerns the health needs of women and their new-borns should reach the husbands since they are the main decision-makers in the home. It is however not to be limited to the husband of the woman especially for those who may not be living with their marital partners for some reason. Nursing mothers should be strengthened with skills that will make them willing, determined and confident enough to perform infant-survival skills.

Conscious efforts should be made by health care providers to instruct and counsel pregnant women on activities required for the survival of their coming infants in less time-consuming ways. This will enable them to know how to care for the infants before they arrive. In Addition, women should be empowered and occupied with activities that will improve their educational levels and economic status. Rural communities should also be equipped and facilitated in order to enhance infant-survival.

## **Declarations**

## **Ethical approval and consent to participate**

Ethical approval was obtained from Babcock University Health Research and Ethics Committee (BUHREC). Permission to carry out the study was equally obtained from authorities at the Local Government health office at Ijebu-Ode and the Chief Medical Officer at the tertiary health centre. The criteria for participation was stated before participants filled in data. It was also indicated that there were no risks nor recompenses involved in participating. Informed consent was obtained from participants before enrolling. Anonymity and confidentiality were ensured, and participation was voluntary.

## **Consent for publication**

Not applicable

## **Availability of data and materials**

The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

## **Competing interests**

The authors declare that they have no competing interests.

## **Funding**

Not applicable

## **Authors' contributions**

EES collected, analysed and interpreted the data and was the major contributor in writing the manuscript. NOA reviewed the manuscript at each stage during the study. All authors read and approved the final manuscript.

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## Figures

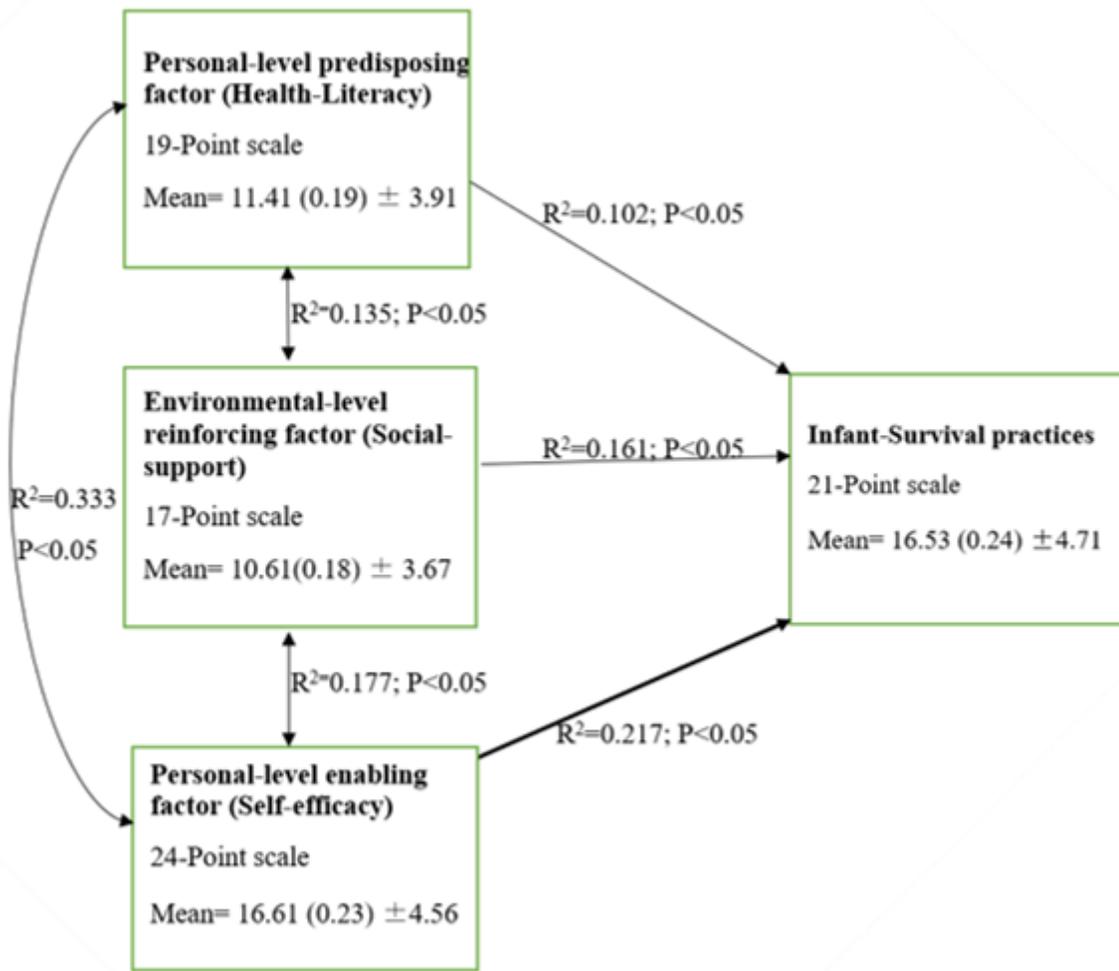


Figure 1

Figure showing correlation amongst variables

## Supplementary Files

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- [Appendix.docx](#)