ENABLING FACTORS FOR THE OPTIMAL VACCINATION OF INFANTS OF ADOLESCENT MOTHERS IN URBAN SLUM COMMUNITIES IN IBADAN, NIGERIA

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ABSTRACT

Background: **Infants of adolescent mothers often have suboptimal vaccination, exposing them to vaccine preventable diseases and the attendant morbidities and mortalities. Understanding the factors that contribute to the optimal vaccination of infants of deviant adolescent mothers could provide insights which may be valuable in addressing poor vaccine uptake among infants of adolescent mothers in disadvantage settings.**

Aim: **This study explored the enabling factors for optimal vaccination of infants of deviant adolescent mothers living in urban slum communities of Ibadan, Nigeria.**

Methods: **Exploratory qualitative study with embedded design was used. Twelve deviant adolescent mothers whose infants were fully vaccinated had in-depth interviews. Data were transcribed and analysed using thematic analysis guided by the attitude-social influence-self efficacy model.**

Results: **Mean age of participants was 17.92±1.08 years, 2(16.7%) were married, and 8(66.7.0%) were cohabiting with their partners while 2(16.7%) were single. The adolescent mothers had good attitude towards infant vaccination as seen in their confidence in vaccine efficiency, priority given to vaccination and belief in the secondary benefits of vaccination. They also enjoyed tremendous support from their social circles and had a positive social norm for vaccination. These mothers also had good self-efficacy through their strong personal agency and efficiency in navigating the vaccination processes for their infants.**

Conclusion: **The optimal vaccination of the infants of the adolescent mothers was the result of their good attitude towards infant vaccination, strong social support and high self-efficacy in navigating vaccination processes. Replicating these factors among other adolescent mothers may promote optimal vaccination of their infants.**

Keywords: Infant vaccination, Adolescent mothers, Urban-slums, Ibadan

INTRODUCTION

Infants of adolescent mothers face multiple health problems because of the physical, psychological and social immaturity and vulnerability of their mothers. These problems include prematurity, small for gestational age[1], malnutrition, infection with vaccine preventable diseases, and in extreme cases, mortality.[2,3] One of the contributors to the high mortality that is seen among them is the poor access to, and utilisation of health care services, and this includes vaccination services.[4] This poor access is usually due to social, economic and behavioural factors that results in stigma [5], inability to pay for health services and suboptimal decision-making capacities respectively. These and other factors contribute to the low immunization coverage for infants of adolescent mothers. There is evidence that the vaccination uptake by adolescent mothers in South Africa is less than the national average[6] and infants of adolescent mothers were less likely to be fully vaccinated compared with infants of older women in Kenya.[7]

The poor vaccination status of infants of adolescent mothers is because of a complex interplay of multiple factors. Adolescent pregnancy is not acceptable in many African societies which makes pregnant adolescents to suffer stigma and rejection[5,8], limiting access to good health care services, both in pregnancy and after delivery. Adolescent mothers are also less likely to have steady income because of limited education and skills, predisposing them to poverty and its attendant consequences.[9] In addition, many adolescent mothers are not married, depriving them of the social support that married women enjoy in the traditional African settings.[10] However, the married adolescents are likely

to lack decision making autonomy, with little or no contribution to making choices regarding their infants' health because of the power imbalance that results from being married to much older men.

Children in urban slums have poor health indices, especially under-five children who have the highest risk of mortality in African urban slums.[11] This is due to multiple factors including poor infrastructures, poverty, low parental education, unsanitary living conditions and high-density population[12] and a high probability of been born to adolescent mothers.[13] These factors contribute to the spread of vaccine preventable diseases which account for a significant proportion of under-five mortality that is seen in urban slum. Also, immunization services are sometimes not readily accessible and, in some situations where such services are available, the parental agency to access the services are weak. Despite these, there are some infants who live in urban slum settings and have optimal immunization, despite the challenges that abound around them. These are positive deviants who defy all odds to be immunized. Exploring the experiences of the mothers of deviants can unravel salient characteristics and behaviours that resulted in their ability to surmount the challenges that prevent infants of adolescent mothers in urban slums from getting optimal immunization.

The poor immunization of infants of adolescent mothers needs to be addressed specially because of the peculiar challenges that they face, in addition to the challenge of living in urban slum communities. While the infants in rural areas are receiving special attention because of their already recognised challenges and evidence of their poor immunization status, the challenges of infants in urban slums remain masked because their immunization data are often subsumed in the overall urban data. However, the immunization status of the Nigerian urban slum infants has been shown to be sometimes worse than those in the rural areas.[14] These infants cannot be left behind because they deserve to be protected from vaccine preventable diseases. Their mothers have been identified as vulnerable, and they are also vulnerable, both requiring appropriate support to fulfil the Sustainable Development Goal 3.[15] There have been calls for the application of a multi-pronged approach to address the persistent suboptimal immunization of Nigerian infants.[16] This calls for novel strategies to address this concerning problem. One of the solutions could be unearthed by understanding the strategies that adolescent mothers whose infants had optimal immunization in urban slums adopted that helped to achieve full immunization status for their infants.

Therefore, this study was designed to explore the enabling factors that helped adolescent mothers to achieve timely and complete vaccination of their infants in selected Ibadan urban slum communities.

METHODS

Study area

The study was conducted in Ibadan, the capital city of Oyo State in southwestern Nigeria. The state is divided into 33 local government areas (LGAs) and the LGA are divided into 351 wards for administrative purposes. Ibadan has two types of slum communities: those that resulted from the indigenous areas due to the deterioration and non-rehabilitation of housing facilities over the years, coupled with overcrowding; and the new communities where housing standards are compromised.[17] The latter is usually due to rural-urban migration. This study was conducted in eight purposively selected indigenous slum communities, namely: Oje, Yemetu, Oke Aremo, Beere, Alaadorin, Ile Oke, Idi Omo and Atenda. They were all located in ward three and four of the Ibadan North local government area. These communities met the criteria of urban slums according to the definition of slums by the UN_HABITAT.[18]

Study design

This was a qualitative study with embedded design, that was nested in a larger study which was designed to improve infant vaccination in urban slum communities of Ibadan.[19]

Parent study

The larger study was designed to explore how the inclusion of older women caregivers in infant vaccination can improve vaccination timeliness and completion in Ibadan urban slum communities. This was built on the existing culture of older women providing support for the care of infants in these communities. There was an exploratory phase that determined the community stakeholders' perspectives about infant vaccination, and the outcome of this phase was used to design a training manual to educate older women about infant immunization and train them on the importance of their support for optimal infant vaccination in their communities. These older women were recruited with the help of pregnant women from selected antenatal clinics and they were the identified women who were to provide support for the care of the infants of the pregnant women post-delivery. There was a control group of pregnant women who did not have any trained older women as support and both groups were followed up after delivery and their infant vaccination were documented till nine months of age (when the Nigerian infant vaccination schedule

should have been completed). However, some infants of adolescent mothers in the control group had both timely and complete vaccination at the end of the follow up period. These adolescent mothers were the participants in this study.

Study population

These were adolescent mothers (aged 10 to 19 years) who were living in the study communities.

Inclusion criteria

The study included adolescent mothers, aged 10 to 19 years, whose infants were at least a year old and had completed the routine Nigerian infant immunization schedule.

Exclusion criteria

The study excluded women who were outside the age of adolescence stated above and those whose infants did not complete their immunization schedule.

Sampling technique

The study participants were purposively selected if they were between the age 10 to 19 years and their infants had timely and complete infant vaccination.

Study instrument

Interview guide that was developed based on the Attitude-Social influence and Efficacy (ASE) model [20] was used for data collection. The ASE model was introduced by DeVries *et al.*[21] and it has self-efficacy added to the components of the earlier proposed theory of reasoned action (made up of attitude and social norm) which was postulated by Fishbein and Ajzen.[22] The ASE propose that behavioural intention is determined by the three proximal cognitive factors: attitudinal beliefs (and emotion), social influences (social norms, support, pressure and modelling) and self-efficacy expectations.[20,23] These cognitive variables operate in the milieu of external variables like sociodemographic characteristics and previous experiences.

Data collection

In-depth interviews (IDIs) were conducted with the selected adolescent mothers. The interviews were conducted in the local language (Yoruba) by two experienced research assistants who spoke Yoruba fluently. Both research assistants had master in public health degree and they had training on how to interview adolescents using the interview guide. One research assistant was the interviewer, while the second was the timekeeper and notetaker. Data were taken at the residence of the adolescents on the dates and time chosen by the adolescents. Each interview was recorded using two digital recorders. The adolescents provided written informed assent, and those who were 18 and 19 years gave consent before participation. The biodata of the adolescents was taken before the interviews. Data collection continued until saturation was reached (no new information was seen in the content of two consecutive interviews).

Data analysis

The audio data was transferred from the digital recorder to a computer. The data was transcribed verbatim using Express Scribe® and translated from Yoruba into English by the interviewers. Data were analysed using thematic analysis, guided by the components of the ASE model. Each transcript was read carefully, and deductive coding was conducted based on the components of the ASE model by two independent coders. The codes were reconciled in a meeting by the coders. Similar codes were then critically reviewed and grouped together to generate sub-themes and then themes. Each sub-theme was discussed by the coders to arrive at the most appropriate ones that represent the grouped codes. The best quotes that represented each sub-theme were selected from the transcript.

Ethical considerations

Ethical approval was obtained from the University of Ibadan Ethics Review Committee C: (UI/EC/18/0206) and the Oyo State Ethics Research Committee (AD 13/479/784). Informed assent and consent were obtained from the adolescent mothers before participating in the research.

RESULTS

There were 12 adolescent mothers in the study, and their mean age was 17.92±1.08 years. Only two (16.7%) were married, and eight (75.0%) were cohabiting with their partners while 2(16.7%) were single. None of the adolescents was in school. The identified themes and sub-themes are as shown in Table 1.

Table 1: Themes and sub-themes from the data

Theme	Sub-theme
1. Attitude	a. Confidence in vaccine efficacy to protect infants from diseases
	b. Prioritizing infant care
	c. Belief in the secondary benefits of immunization
2. Social Influence	a. Social circle support
	b. Social norm
3. Self-Efficacy	a. Personal agency for infant immunization
	b. Keeping to clinic appointment and time
	c. Handling lateness to clinics
	d. Handing vaccine side effects

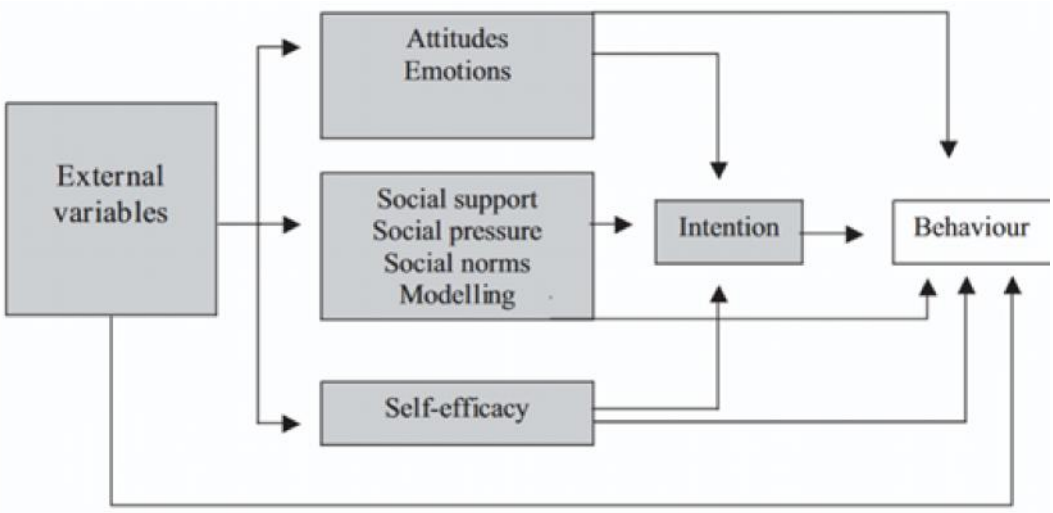


Figure 1: The attitude-social influence-self efficacy (ASE) model [21]

Attitude

The adolescent mothers generally had good attitude towards infant vaccination uptake. This is further described in the following subthemes.

Confidence in vaccine efficacy to protect infants from diseases

All the adolescent mothers had confidence in the ability of the vaccines to prevent infection and diseases in their infants. While some of them mentioned the specific diseases that the vaccines can prevent, some adolescents just said the vaccines prevent diseases. These are illustrated with the quotes below.

"Immunization is very good for children. It prevents diseases from organisms that we cannot see. It also prevents paralysis of the arm and leg." – **Participant 12**

"It prevents paralysis of the arm and leg; it prevents measles, it also prevents fever. The role it plays is much." – **Participant 11**

"It prevents paralysis of the arm and leg; it prevents tuberculosis and whooping cough." – **Participant 10**

Prioritising infant care

The adolescents believe that the care of their infants is very important and they rate the care of their infants as more important than the other responsibilities that they had. This made them to prioritise the immunization of their infants as shown in the quotes below.

"For me, my child is my work; before going to work, I ensure that I do necessary things first." **– Participant 8**

"…it is my responsibility to get my child immunized because I don't want my child to get sick." – **Participant 12**

Belief in the secondary benefits of immunization

The study adolescents also had belief in the other benefits of infant vaccination. They said that immunization protects their infants' future and it will give them peace. Some also mentioned the benefit of having vaccination cards which may be required for travelling to a foreign country in the future. The following quotes illustrate these beliefs by the adolescents.

"…so as to prevent my child from getting sick. And because of the future of the children" – **Participant 12**

"…it is good for children. It helps them to have strength." – **Participant 7**

… if someone wants to travel out, they will request for the immunization card to check if the child has completed immunization." – **Participant 1**

Social influence

Social circle support

The adolescent mothers' decision to immunize their infants had strong support from their social circle. Most of their important others had input in the decision to immunize their infants at different stages. Mothers and grandmothers featured prominently as major support for the immunization of their infants as seen in the quotes below.

"My grandmother encouraged me a lot to immunize my child." – **Participant 5**

"…my mum helped to ensure I immunize my child." – **Participant 11**

Also, the husbands/partners of the adolescent mothers played important roles in supporting the immunization of their infants. This is shown in the quote below.

"My husband supports me to get my child immunized…" – **Participant 12**

"My husband encourages me to get my child immunized. – **Participant 10**

"My husband supports me with transport fare…" – **Participant 3**

The influence of the health care workers, including community birth attendants was also enormous in the immunization of the infants of the adolescent mothers as they emphasised the importance of immunization to the mothers. This influence was also possible because of the proximity of the community birth attendants to the home of the adolescent mothers. These are illustrated by the quotes below.

"It is our nurses. They inform us that immunization is compulsory for children." – **Participant 2**

"Community birth attendant helped me to get my child immunized. The community birth attendant lives close to us." – **Participant 7**

Some of these health care workers go extra lengths to ensure the immunization of these infants by providing financial and other supports for immunization uptake as shown in the quote below

"…community birth attendant will support financially to go get it. … But our community birth attendant could do anything to ensure we get immunized." – **Participant 9**

Neighbours and religious leaders also played important roles in supporting adolescent mothers to immunize their infants. some of the adolescents pair up with their neighbours to take their infants to immunization clinics. The quotes below illustrate this.

"…neighbors…help to ensure I immunize my child." – **Participant 11**

"*My neighbours and I go to the immunization clinic together.*"- **Participant 12**

"Our female clergy (*Iya Adu'a*) tells us to immunize our child."- **Participant 8**

Social norm

Some of the adolescent mothers were vaccinated as infants and this was the reason why they vaccinated their own infants as shown in the quote below.

"The reason is because I was also given immunization when I was child."- **Participant 4**

Self-efficacy

Personal agency for infant immunization

The adolescent mothers spoke about their personal agency that helped them to achieve optimal immunization of their infants. This occurred at every step of the immunization process. Some of them ascribed the optimal immunization of their infants to their resolve to get their infants immunized as shown below.

"Nobody helped me. It was I who helped myself to get my child immunized." – **Participant 4**

"It benefits me also, that is why I get my child immunized." – **Participant 8**

"…I go on time for immunization. I don't skip appointments." **Participant 1**

Keeping to clinic appointment and time

Some of the adolescents were able to remember the immunization clinic appointment dates without any support because they understood the importance of infant immunization as shown below.

"I can remind myself; when I know that immunization is important for my child." – **Participant 4**

They were also able to arrive at the immunization clinics early by consciously making efforts to plan their day ahead to navigate anything that could be a barrier. This includes waking up early and choosing clinics with a lower number of infants for immunization. These are shown in the quotes below.

"… I also get to the immunization clinic early in the morning so that they attend to me on time. I must have woken up around 5am and sleep again till 6am to avoid slumbering." – **Participant 7**

"… Because of delay, for instance at a state hospital…but when someone goes to the smaller health centres (primary healthcare center)… you will be attended to on time. And there are other places where they pay for immunization, if someone does not want delay." – **Participant 9**

Handling lateness to clinics

However, some of them who were late for the immunization clinic appointment were still able to handle the situation and get their infants immunized as shown below.

And the nurses who get angry because our lateness, we beg them to pardon us." – **Participant 11**

Handling vaccine side effects

The adolescent mothers also spoke about their ability to handle the side effects of some vaccines, specifically, the fever associated with pentavalent vaccine, the swelling and pain at vaccination sites, and the discharge from the BCG vaccine site. These are illustrated below.

"When the child gets feverish after immunization, I would give paracetamol. And when the arm gets swollen, I will place ice block on it." – **Participant 11**

When the swelling on the arm softens and starts discharging pus, the pus will be cleaned off with cotton wool and will be disposed in the toilet." – **Participant 8**

*"My child's hand was swollen. This made my child cry and irritated. And we gave drug. By the second day, the child was calm.***- Participant 7**

Discussion

The adolescent mothers in this study had positive personal attributes that favoured infant vaccination and they were surrounded by strong support systems which all culminated in the timely and complete vaccination

of their infants. This is against different obstacles (like the mothers' adolescent age, living in urban slums, limited education and limited financial capabilities) which could have hindered them from vaccinating their infants.[24] The attributes and systems that supported infant vaccination in the face of these obstacles need to be understood as replicating them in the lives of the other adolescent mothers may promote the timely initiation and completion of the vaccination of their infants.

The positive attitude of these adolescent mothers towards infant vaccination covers their confidence, priority and perceived secondary benefits of vaccination. The confidence they had in vaccines is a demonstration of their trust in the vaccine efficacy, the health system that made the vaccine available and the stakeholders involved in deciding the vaccine that should be included in the vaccination schedule.[25] An earlier study reported low trust by mothers in vaccines and health care system which could lead to vaccine hesitancy[26] and lack of trust in the vaccines was identified as a major barrier for infant immunization in Africa.[27] This emphasises the importance of community involvement in the different stages of vaccination programmes as this will lead to improved credibility with resultant trust and acceptance of vaccines. The adolescent mothers also prioritised the care of their infants which made them to be committed to getting them vaccinated. This is impressive as an earlier study reported that mothers had difficulties in prioritising their infants' vaccination in the midst of other competing responsibilities.[26,28] Also, the lack of motivation was an important reason given by mothers for the incompletion of their infants' vaccination in an earlier study from Ibadan.[29] The perceived benefits of having an immunization record is also commendable as adolescent mothers in other studies were less likely to have the immunization card of their infants.[30] This shows the futuristic thinking abilities of these adolescent mothers which can help them to prepare for their infants' future.

The adolescent mothers in this study also had very strong support from their social circle which supported the vaccination of their infants. This contrasts with earlier reports of stigmatisation of adolescent pregnancy and births and the lack of support for adolescent mothers in African settings.[8,31] The support was in layers, from the home environment (from their partners, their mothers, grandmothers and neighbours), to the health facilities (nurses and community birth attendants) and religious centres. This strong social support is reflective of a likely strong culture of infant immunization which could have created an enabling environment where the adolescent mothers had reminders, encouragements, financial and emotional supports for their infants' immunization. Fathers' involvement and parental joint decision making have been shown to improve infant vaccination uptake.[32,33] Despite this advantage, the lack of fathers' involvement remains a major barrier to infant immunization in Africa, especially fathers with little or no formal education.[27] There have been reports of poor behaviour of health care workers discouraging mothers from bringing their infants to the clinic for vaccination[8], but the healthcare workers were reported in this study to have played important roles in the vaccination of the infants of these adolescent mothers through health education and encouragement. Interestingly, the community birth attendants were mentioned by almost all the adolescent mothers as an important support for infant vaccination, despite the non-recognition of the roles that CBAs play in infant vaccination in the slum communities.[34] Some adolescent mothers also referred to their own immunization and gave that as the reason why their infants should be immunized. This is like a social norm which influenced their decision to get their infants vaccinated.

Self-efficacy has been identified as an important modifiable factor that can be used to improve infant vaccination.[35] The adolescent mothers in this study reported good self-efficacy which contributed to the achievement of optimal vaccination of their infants. Many of them were able to navigate the vaccination processes on their own through reminders, arriving timely for immunization appointments and even handling lateness for appointments with the health care staff. The self-efficacy helped them to overcome commonly reported barriers to immunization like forgetfulness and multiple responsibilities.[36] This self-efficacy likely stems from the development of strong executive functions which must have helped them in achieving good time planning, organisation skills to plan their activities, decision making, self-regulation[37] and good interpersonal relationship skills that will have helped in their interactions with the health care workers in the clinic. Executive function is defined as higher cognitive abilities which control thoughts and actions with the aim of achieving set goals.[38] It develops all through childhood and much more during adolescence when the specialisation of the structures and functions of the brain, especially, the pre-frontal cortex leads to effective and efficient executive function.[39] However, the development of executive function in adolescence has received very little attention in Africa and a closer look may provide more insight into how the adolescent mothers achieved such self-efficacy. However, executive function in adolescence has been linked to healthy and close relationship with adults in the adolescents' social circle[38] and it varies with culture[40]

and socioeconomic class[41], but exiting studies have reported inconsistencies of these associations.

Implications for practice and policy

There should be consistent focus on improving attitudes towards infant immunization in urban slum communities. This can be achieved through the setting up of peer-to-peer education system, using these deviant adolescent mothers as educators for the other adolescent mothers.[42] Attitude towards infant vaccination can also be improved by the involvement of the community members in the different levels of the immunization process through the involvement of the members of the existing Community Health Development Committee of urban slum communities in the rollout of immunization programmes, vaccine transportation and storage, and vaccine administration. This is because the members of these committees are trusted community members and vaccine programmes can leverage on their existing communication system to reach the community members with correct vaccine information.

The stigmatisation of adolescent pregnancy and mothers should stop. Many times, adolescent pregnancy signifies a failed system in the protection of girls. Efforts should be channelled towards the prevention of adolescent pregnancy and marriage, and these includes the introduction and support of culturally acceptable sexuality education, as well as improvement in socioeconomic status of families through targeted programmes (many adolescent pregnancies are the result of poverty).[43] The important others in the social circles of existing adolescent mothers should be encouraged to support the immunization of their infants. The development of executive functions in adolescence can be supported through early stimulation in childhood by parents and other adults. This can then be consolidated using coordinated peer clubs where the deviant adolescent mothers can share their experiences with infant vaccination and their peers can learn from them peers as earlier reported in literature to prevent postpartum depression among adolescent mothers and malnutrition of their infants.[44,45]

Limitations and strengths

This study has some limitations. First, this a qualitative study with a small sample size making the generalisation of the findings impossible beyond the study area. Also, the qualitative data could not quantify the strength of the identified factors nor determine their interaction with other variables. However, the strength of this study includes its focus on a vulnerable and often overlooked population that contributes significantly to zero dose children, especially in urban settings. The study also provides a context specific insight which emanated from the lived experiences of the adolescent mothers and the results gave deep insights into the behavioural and social drivers of vaccination for infants of adolescent mothers. The results provide a baseline for the design of a larger study to further explore the strength of the identified factors in facilitating the vaccination of infants of adolescent mothers. The findings can also be used to design interventions which can address the poor immunization uptake of the infants of adolescent mothers and by extension contribute to the improvement of infant vaccination in Nigeria.

CONCLUSION

The adolescent mothers in this study had personal and environmental factors which encouraged and supported the optimal vaccination of their infants. Many of these factors are replicable and can be applied to improve vaccination of the infants of adolescent mothers in urban slum communities and other similar settings.

Conflict of interest: Authors have no conflict of interest to declare.

Contribution of authors: Both authors conceptualised and designed the study, while BOS supervised the data collection and transcription. Both authors analysed the data, wrote the first draft of the manuscript and verified its final draft.

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