

Challenges Experienced by Healthcare Workers on Maternal Tetanus Toxoid Vaccination in Kilimanjaro Region Tanzania

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ABSTRACT

Background: Healthcare Workers (HCWs) are the first part of call for healthcare enquirers and have a key role in providing appropriate information and evidence-based healthcare recommendations to pregnant and postnatal mothers in order to ensure that they are well informed regarding maternal vaccinations. The World Health Organization (WHO) recommends that five doses are needed in order to acquire lifelong immunity against tetanus. A pregnant mother is considered to be more than 80% protected once she receives at least two doses of the vaccine. This study aimed to identify challenges experienced by the healthcare workers on maternal Tetanus Toxoid (TT) vaccination in Kilimanjaro region, Tanzania.

Method: A qualitative approach comprising of In-Depth Interviews (IDIs) and focus group discussion (FGD) was conducted with 10 healthcare workers selected from 10 health facilities in remote villages of Hai district. The healthcare workers were selected purposively based on their availability and convenience; thematic analysis guided the data process.

Results: Majority of the Healthcare workers were female, enrolled nurses with college education; their age ranged between 26-59 years with experience of work between 1 to 31 years.

Main themes were extracted from the analysis namely: unreliable storage of vaccines, shortage of vaccines, shortage of healthcare workers, behavior of the healthcare workers and spousal influence on maternal vaccinations.

Conclusion: The shortage and unreliable storage of TT vaccine has led to mothers missing their required doses, the spousal support and good mother-provider relationship is essential to ensure that the pregnant and post-natal mothers receive all the required doses. The regional and district health officials should ensure constant supply of TT vaccine with the recommended standards of vaccine storage facilities.

Keywords

Tetanus Toxoid (TT), Healthcare workers (HCWs), Tanzania.

Background

Maternal vaccination provides a long lasting protection to mothers and their babies from communicable diseases [1]. Antenatal care

providers such as physicians, obstetricians, nurses and midwives, have a key role in providing appropriate information and Evidence-based recommendations to pregnant and postnatal mothers in order to ensure that they are making informed choices regarding vaccination [2-4]. Maternal and neonatal tetanus is responsible for 110,000 deaths a year in Africa and 16 countries in Sub-Saharan

Africa are responsible for 90% of the global neonatal tetanus [5]. In SSA maternal tetanus toxoid (TT) vaccination is recommended for pregnant women to prevent maternal and neonatal tetanus infections [6-9].

There are five doses recommended in order to acquire lifelong immunity against tetanus. A pregnant mother is considered to be more than 80% protected once she receives at least two doses of the vaccine [9-12]. Failure of pregnant mothers to receive the recommended doses is still faced in SSA whereby in Eastern Ethiopia, 51.8% of mothers has received at least two doses in their last pregnancy and only 7% of mothers completed the recommended 5 doses and in Tanzania 88% of women recent births had received two or more TT vaccines [7-13].

In an effort to ensure a total and adequate coverage of TT vaccine among pregnant women in order to combat maternal and neonatal tetanus, the role of healthcare workers has been seen as cornerstone within East African communities. Healthcare workers are trusted by pregnant women to have adequate knowledge on TT maternal vaccine and through their communication and counselling with mothers they can readily influence the uptake of maternal TT vaccine [14].

Healthcare workers have reported challenges such as shortage of staff, low knowledge about the vaccine's efficacy and their availability, poor staff motivation and commitment, poor follow up of vaccines by mothers prevent wider vaccination coverage in developing countries [14-16].

In this study, we aimed to describe the challenges that healthcare workers experience during provision of maternal TT vaccination services at their health facilities in Hai District Kilimanjaro Region. The results from this study will help create interventions and education programs to tackle these challenges and help policy makers and planners to identify restricted access in the system in order improve utilization and sustainability of healthcare services.

Materials and Methods

This baseline study used a qualitative approach that included In-Depth-Interviews (IDIs) and a Focus Group Discussion (FGD) to assess the challenges that healthcare workers within the selected health facilities faced during provision of maternal TT vaccines in Hai district. This district was selected due to the steady history of home deliveries and poor antenatal visits within the remote villages and the poor infrastructures within these villages have an effect on means of transportation that interfere smooth running of the antenatal services.

Study area

This study was conducted in Hai district of Kilimanjaro region, within 3 wards; 10 villages were selected namely; Kia, Sanya station, Masama, Rundugai, Kawaya, Mkalama, Kikavu chini, Tindagani, Mtakuja and Machame Narumu and Uroki. There is one dispensary within each village which provides antenatal services including maternal TT vaccination.

Study Population

The population comprised of 10 healthcare workers which were all nurses represented each of the selected health facilities.

Study sample size and recruitment

Purposive and convenience sampling was used to identify the selected healthcare workers, who could be able to give rich data of the required information for the semi- structured interviews [17,18]. We included only those with working experience in their respective health facilities for at least one year and above. The study used minimum *sample size* to reach *data saturation* [19].

Data collection

The Semi structured interview guides for IDIs and FGD was created based on the study objectives. The guide was equipped to capture demographic information, experience in administering TT vaccines, supply of the TT vaccine, its transportation to health facilities, storage in health facilities and spousal/family role in influencing mothers to receive the vaccine.

The interview guides were translated to Swahili (local language in Tanzania) by two investigators and a bilingual Kiswahili-English linguist assisted in reading the translated versions to check for clarity of the guides before the study.

In-depth Interviews and one focus group discussion were conducted by trained researchers in Swahili in private rooms at the health facility to ensure confidentiality. The sessions began with the researcher thanking the participants for their acceptance to participate in the study; and a brief introduction of the research purpose. This was followed by the researcher reading out the written informed consent so that each participant was well-informed before he/she could decide to participate in the FGD and IDIs. The participants were encouraged to be open and honest in discussions. They were also asked to give their personal opinions, comments, seek clarifications or say anything related to the discussion. The researcher then carefully outlined the norms applicable to such group discussions and assured them that privacy and confidentiality would be observed regarding the contents of the discussion. It was also emphasized that any experience revealed or anything said by a group member represented his/her personal opinion.

All interviews and the focus group discussion were digitally recorded, the researcher acted as the discussion leader in the FGD. Data was collected in teams of two researchers allowing for an interviewer and note taker. On average, each IDI took about 30 minutes and the FGD took about two hours, where there was no more information required as regards to the interview guide [20].

Data analysis

The audio recordings were firstly transcribed to text in Swahili, and then translated into English to facilitate the thematic analysis by SL, AH and PM. The transcriptions and translations were verified against the audio- recordings for accuracy and adjustment by SB. MAXQDA version 20.3 was used for data management

and analysis. The analysis involved interpretation of the data through listening to recordings, multiple readings of the translated transcripts, and stepwise construction of codes and categories by SL, AM and PM [19-21]. The categorization included identification of the subthemes and themes.

Ethical approval

Ethical approval was obtained from the Kilimanjaro Christian Medical University College Research Ethics and Review Committee (CRERC): Ethical clearance no. 2484. Permission to conduct the study was granted by the Regional Medical Officer and the Municipal Council of Hai district. Prior to data collection, the research team met with the district medical officer, the district reproductive and child health officer and leaders of the selected villages to explain the objectives of the study. Each participant signed an informed consent after the aims and purpose of the study had been thoroughly explained to them and before they could participate in the study. Confidentiality was maintained throughout the study, by use of identification numbers instead of participant details, safe storage of recordings and transcripts were analyzed in password protected computers and software.

Results

Participant's demographics.

In total, 10 healthcare workers represented the ten selected health facilities, who participated in a baseline assessment IDIs and FGD (Table 1).

Themes and subthemes regarding challenges experienced by healthcare workers on maternal vaccination.

Unreliable storage of TT vaccine

Faults in source of energy

Multiple healthcare workers reported the challenges they face with

storage of vaccines, this is due to an unreliable source of power they use for vaccine storage within their health facilities. They tend to use electricity, gas, solar or combinations of either of the sources. Some of health facilities that use gas as a source of power for the refrigerators of the vaccine had no back up gas cylinders. This was witnessed when HCW shared her experience:

“Fortunately, what we do is watch the gas cylinder was kept on what date and estimate within 40-45 days that’s when it will be over and we already know we do not have extra cylinders what we watch is the 40-45 days and when we see its almost running empty and there is no any dispensary staff that lives near the health facility. We move the vaccine earlier before it runs out. That’s what we always do because if it runs out at any time and I am home and it’s far from the dispensary till I reach work the next day, that means the vaccines would be useless” (HCW –IDI from dispensary X-1).

For one of the health facilities, access to a new gas cylinder can take about 1-2 months, this is due to the logistics that have to be followed with the district hospital leaving women within their village with no access to TT vaccine for those months or are forced to go to a nearby health facility for the doses.

“Well we do not get the gas cylinder till we write a letter to the DMO so as it passes through the process it can take even a month, because of paying for gas and the gas itself we get it from Moshi. Until you go there bring it back so as it can be inspected at the council so it takes a long while” (FGD R. 2 HCW from dispensary X-5)

Another health facility that uses solar energy to run the refrigerators for the TT vaccine explained how during the rainy season there is no enough energy to run the refrigerators thus the vaccines are moved to the nearby health facility for storage. The healthcare worker reported:

Table 1: Demographic characteristics of the HCWs involved in FGD and IDIs (N- 10).

S/N	Health facility/ Dispensary	Age	Sex	Education status	Designation	Working experience (In years)
1	Kia 1	59	F	College	Enrolled nurse	31
2	Rundugai	30	F	College	Enrolled nurse	2.5
3	Sanya station	30	F	College	Attendant	7
4	Narumu	28	F	Diploma	Enrolled nurse	7
5	Tindigani	26	M	College	Enrolled nurse	1
6	Kaway	30	F	College	Enrolled nurse	7
7	Kia 2	32	F	College	Enrolled nurse	8
8	Mtakuja	26	M	College	Enrolled nurse	2
9	Kikavu chini	27	M	College	Enrolled nurse	2.5
10	Mkalama	43	F	College	Enrolled nurse	18

Table 2: Main theme and subthemes.

Main theme	Subtheme
Unreliable storage	Movement of vaccine
	Faults in source of energy:- electricity, gas faults
Shortage of vaccine	Lack of transport
	Inefficiency follow up of vaccine
Shortage of healthcare workers	Inadequate vaccination services
Behavior of healthcare workers	lack of teamwork
Spousal influence	Spousal TT knowledge

“Now when it’s raining that solar is not charging, it goes off, the alarm rings indicating that there will be no enough charge so we start again to pack vaccination and send to the nearby facility so during rain we get that situation”

(FGD – R. 4 HCW from dispensary X-4)

Movement of vaccine

Vaccines are required to stay within 2°C and 8°C as recommended by the WHO. Under no circumstances should the cold chain system of the vaccine be broken until it is administered to the mother but due to the unreliable source of power for vaccine storage these village health facilities face, it has led to the healthcare workers moving the vaccines to either a nearby health facility or to the district hospital for storage. This movement happens when the refrigerators are already off or are about to switch off due to the unreliable source of power. The healthcare worker who experienced this reported:

“Also, we at the dispensary you can find that there is no electricity, if the gas runs out, we return the vaccine. If she can come at the clinic to get the vaccine, there is no vaccine, they are at the district gas run out” (HCW IDI from dispensary X-5)

Shortage of TT Vaccine

Healthcare workers also elaborated how recently there has been a wavy trend on availability of the TT vaccines. These village health facilities get their vaccine supply from the district hospital which has been inconsistent over the past few months thus leading to mothers who attend the health facilities not get the vaccine in the required order. A healthcare worker who experienced the shortage in vaccine, had this to share;

“Mmmhh so somewhere in the middle there was a period where the vaccine was inadequate, it came back but now I see that they have reduced, even until now we don’t have tetanus vaccine. A mother comes to clinic she doesn’t get the vaccine in the order required” (FGD R.5 HCW from dispensary X-1)

With the same issue another healthcare worker had a concern and said;

“At this moment as we speak there has been shortage of TT vaccine, we try to get at the district and ask if there is vaccine, how can we get it and they too will tell you there is no vaccine and now we don’t know what to do (HCW IDI from dispensary X-6)

Due to this shortage of vaccine within the health facilities, the pregnant and post-natal mothers end up missing their TT vaccines, they do not get them at the recommended order thus putting the mothers and their babies at risk of tetanus infection. This experience was presented as:

“Vaccination are few you will find may be a person has come to the clinic for the first time fail to get another time when you tell her to go at another Dispensary to get that vaccination will ignore you may find mother has given birth has not been injected tetanus even once you will start afresh so to be given frequent education” (IDI HCW from dispensary X-7)

Lack of TT vaccine transportation

TT vaccines are supplied within every region by the government, each region supplies the vaccines to the district hospital and the district hospital supplies the vaccines to all the village health facilities. Recently, some of the village healthcare workers reported on how they are currently facing problems with transportation of vaccine after the car for vaccine transportation from the district to their health facilities got into an accident. This has led to the healthcare workers themselves to follow the vaccines in the district hospital using vaccine carriers and public transport, such experience was captured as:

“The was a car that distributed vaccine within the district, for now they say it got in an accident. So, because of the car accident right now we follow the vaccine ourselves, with our own transport, we find a motorcycle or if at the center for example at our center you get one motorcycle, we get the motorcycle and follow it” (FGD HCW R.6 from dispensary X-5)

“Transport is a challenge because kawayi is far from the district hospital, I will take the motorcycle and the vaccine carrier to the district hospital to get the vaccine then I go back with the motorcycle to Kawayi” (FGD R.6 HCW from dispensary X-6.)

Another healthcare worker from one of the health facilities with the same problem reported:

“When we miss vaccine maybe when we ask there, they say maybe transport is difficult we try to go and get it ourselves because it’s not that far from here, you use a bajaji or a hiace in the morning for only 1000” (HCW IDI from dispensary X-2)

Other healthcare workers in the villages elaborated that transportation of vaccine is a challenge to them during the rainy seasons due to the poor infrastructures, they roads either are flooded or too slippery for vehicles.

“May be that period of slippery since here when slippery exceed even cars fail to come here” (HCW IDI from dispensary X-4)

“In the rain, for example at our area it’s impossible to pass through. The road we use turns into a river during the rainy season you cannot travel. That season we stay that away” (FGD R. 2 HCW from dispensary X-5)

Inefficient follow up on TT vaccine

Despite the known fact of how important TT vaccine are to mothers and their babies, some mothers fail to follow up with TT vaccine doses after giving birth, due to the now focus on the baby, getting back to work or simply not realizing the importance of finishing up the remaining doses. The healthcare worker reported:-

“If she gets the first injection, the second one she has gone and forgotten, she has a baby who is now all grown up and tells you that I have forgotten, you must start afresh, you tell her can you start afresh because you have ruined the order of the injections”

(HCW IDI from dispensary X-1)

As part of the Maasai tradition when a mother gives birth she is kept inside for the first few months so as she can be well fed, taught how to take care of the baby, nursing of the baby etc. during this period the new mothers do not go outside for any activities including going to the clinic for a TT vaccine for those who were scheduled to receive their next dose during that period. One healthcare worker illustrated this way:

“After giving birth maasai mother doesn’t come out of the house for 4 or 3 months, she is just inside and not allowed to leave. It can happen that within 3 months she was supposed to get her 3rd dose but she won’t come” (FGD R.4 HCW from dispensary X-5)

The women are also busy with their responsibilities, trying to earn money to support the family which in turn makes them skip their TT vaccine appointments. This was captured as:

“So, you find that this mother when she wakes up go to her business with her donkey so for her to come to clinic and see months have passed it’s difficult”. (HCW IDI from dispensary X-5)

Some healthcare workers explained how through their experience with mothers who are scared of injections, these mothers used to miss their TT vaccine dose due to their trypanophobia. Continuous education has been seen effective to combating this fear:

“In the past, Maasai community used to be afraid of the injections first, just to be injected they see it is a problem but after continuation of the health education on importance of vaccination and how they protect infectious diseases, they become motivated as they understood it protects their health, they come for vaccinations”. (HCW IDI from dispensary X-4)

Shortage of healthcare workers

Healthcare workers are the backbone of maternal TT vaccinations, they are the ones who educate the mothers about the vaccine, administer the vaccine and counsel the mothers to follow up with the vaccines until they get all the required doses. Due to shortage of the healthcare workers within some health facilities, once a healthcare worker is “on leave” or “on holiday”, the quality of the vaccination services provided to mothers suffers, they miss their TT vaccine doses. One healthcare worker put it this way:

“Another challenge may be to say is lack of staff because you will find a person there at RCH is no one else, you are alone” (HCW IDI from dispensary X-8)

“For me you will find there is shortage of staff for example when you’re on leave then vaccination also is on leave pregnant mothers are on leave children are on leave first then are returned” (HCW. FGD R.3 from dispensary X-10)

Some healthcare workers also reported that due to shortage of staff within their health facilities, The staff are overworked as they have to do all the required RCH services including provision of TT

vaccine and other health services to the patients who attends their facility. A healthcare worker from Kia had this to say:

“You can at times be late to deliver services sometimes, you will be working hard to convince the patient to wait, that wait until I do this you see, wait until I finish this first then I come back to you, now someone else cannot understand she must say “you work on that person but not me first” when you think that it’s a patient they cannot understand quickly” (HCW IDI from dispensary X-2)

Behavior of healthcare workers

The staff within these health facilities have also been reported to not receive and treat pregnant mothers with a good, professional attitude, some of the healthcare workers are reportedly harsh to the mothers and this has led to mothers avoiding going to the clinic in order to avoid the harsh treatment. The healthcare workers reported as follows:

“The challenge happens may be among us some of the staff who are there may be another person is not using good language you see, may be us service provider to try to use language which is friendly to our customer so as they may get all the needs” (FGD R.2 HCW from dispensary X-7)

“So, you will find they tell each other when you go that health facility you will meet someone who will give you service now it depend with staff there are others you will find they talk well with patient but others talk harsh it’s a challenge” (HCW IDI from dispensary X-3)

Lack of teamwork

It has also been reported that there is an unwritten division of labor between the doctors and the nurses and the duties they perform. Although this can be understood in terms that the doctors and nurses have had different trainings and they both play an important in provision of care to mothers. A gap can be seen in the teamwork of these two cadres when a pregnant woman misses their TT vaccine dose just because the nurse was not at the clinic. A healthcare worker who experienced this reported:

“In reality our doctors refuse completely to be involved with the issue of nurse although here we make noise but reality doesn’t lie meanings when you’re at the facility you do all the work but when you’re not at the institute then works stops” (HCW IDI from dispensary X-8)

Further another healthcare worker with the same experience from her village dispensary shared her experience and said:

“If the nurse is not at the hospital, mothers won’t receive the TT vaccine, the doctors say “he works of RCH is difficult” (FGD R.4 HCW from dispensary X-10)

Spousal influence in receiving TT vaccine

The spouse of the pregnant and post-natal mothers has an important role to play in maternal TT vaccination, because they are the ones

that can encourage, motivate and remind the mothers of all her TT doses or they can also end up discouraging the mothers from getting the TT vaccine by their actions or words. Experience from one of the healthcare workers with negative influence of a spouse was due to lack of trust within this couple, as the mothers have their TT injection date written on another unofficial card by the nurse apart from the RCH card which shows all the appointments date during pregnancy. The spouse did not trust that the mother had gone to the clinic for TT vaccine and lead to violence at home. The nurse was called to solve the quarreling issue, quoted as:

“She came to the clinic I gave her the T Tinjection, going back home she was beaten and was told go back to the nurse since the clinic card was written another date, not the date that she went to get the vaccine, I wrote the date of her TT vaccine on another card I made for her. So, I went back home with her and talked to her husband, he received her but was not satisfied, now this is a Maasai man, he has three other wives, if another wife gets pregnant, she might be scared to go for TT vaccines because she is scared, she will also be beaten”
(HCW IDI from dispensary X-10)

From other villages we learnt that women also miss their vaccines due to responsibilities at home, the nomadic lifestyle of the Maasai tribe which involves movement of the husband, wives and children with their livestock in search for pasture. The mother misses her TT vaccines during pregnancy and will only go to the hospital when she is near her delivery thus missing the protection of her and the baby from tetanus infections.

“The way I see there, a lot of mothers you find that she is taking care of the livestock and they go with the cattles far in the forest, when the mother gets pregnant in the forest, she can't just be given permission to come, these women to see them the pregnancy is far long and the one to service them when are at labor, so you can find the mother has stayed there and comes at 6 or 7 months” (FGD R. 3- HCW from dispensary X-4)

Spousal TT knowledge

Spousal knowledge of TT vaccine and its importance to mother and baby is crucial, this is why recently the health system in the country has insisted that the antenatal clinic is renamed to “clinic for mother, father and child”. During these visits the father gets educated on the importance of the vaccines and why the mother should get all the required doses, fathers who miss these appointments do not know the importance of this vaccine and ends up assigning chores to pregnant women that interferes with their TT vaccine schedule. The healthcare worker emphasized this by saying:

“That too is a challenge because this person now won't get the vaccine, in the maasai community maybe she can be told to go take care of the livestock or to fetch water or go get firewood now this mother won't get the services she requires” (HCW - IDI from dispensary X-3)

Discussion

This qualitative baseline study explored challenges experienced by healthcare workers on maternal TT vaccination in Hai district

of Kilimanjaro Region, Tanzania. The participating healthcare workers in this study portrayed their clear role of interest in emphasizing the importance of the tetanus toxoid regime to pregnant and postnatal mothers, however they also reported the roadblocks they face during provision of the TT vaccines in their health facilities. The central findings in this study included shortage of vaccines, unreliable vaccine storage, transportation of vaccines and negative spousal influence on TT vaccine.

The shortage of vaccines from this study seem to be rare as highlighted by the healthcare workers; when there is limited supply from the higher chain of the vaccine supply. Similar studies done in Angola and Republic of Congo reported that health facilities were out of stock of vaccines due to the transitioning from the Gavi support [22]. Literature reviewed from Pakistan, Ethiopia and Angola also reported that shortage of vaccines was experienced in some of the health facilities in the country and this was accredited to poor stock management and inadequate national supply [15,22]. In USA, it was also found that some health centers do not stock up on TT vaccine due to costs and reimbursement issues, mothers attending these centers were referred to sites with the vaccines by their healthcare provider [23].

A study by Sykes et al. states that vaccines are biological products that may lose effectiveness or even be destroyed with each event of exposure to temperatures below or above the recommended temperature range (2°C-8°C) [24]. Inappropriate storage during transportation which may expose vaccines to temperatures outside the recommended ranges can decrease their strength. An actual vaccine supply chain and logistic system is critical to safeguard product quality. In our study, findings showed unavailability of the recommended transportation according to the cold chain management guideline, there was no official transportation with maintained temperatures from district to health facilities. There was movement of vaccine via carriers by healthcare workers using motorcycles, hiace etc. in a poor infrastructure. The study established electricity failure in urban and lack of gas in rural areas coupled with absence of contingency plan as major challenges to WHO temperature conformity in storage of cold chain medicines in developing countries.

This has been the same to other studies, including a Tanzanian study, on cold chain management that recommend the establishment of the quality-ensured cold chain maintenance that compliance with several structural and procedural aspects is necessary [25-28]. In our study, the remote areas of Hai district are composed of different tribes including the Maasai tribe. In this tribe the men in the family have more authority to make all decisions in the family including the mother's health, we found that in some communities the spouses have negative influence mother's attendance to the ANC for their TT vaccination due to lack of trust, prioritizing household chores for the women to complete instead of attending the clinic and also they generally don't fully understand the importance of this vaccine to the health of the mother and baby. These findings have been echoed in studies done in Pakistan where

spouse decision on issues related to mother's health and lack of knowledge of importance of the vaccine were seen as challenges in provision of TT vaccines [29].

Strengths and limitations of the study

The key strength of this study was the involvement of healthcare workers from 10 villages in Hai district, these villages have distinct background characteristics such as tribe and provided a good way to highlight the findings from these villages. The qualitative approach provided room to capture the experiences and views of the participants. Despite the strengths, the limitations include the study was conducted in one district and the findings may not necessarily reflect the experience in other districts in Tanzania.

Conclusion

Our study highlights the challenges healthcare workers in Hai district face during provision of maternal TT vaccine services. The shortage and unreliable storage of the vaccines has led to mothers missing their required doses, the spousal support and good mother-provider relationship is essential to ensure that the pregnant and post-natal mothers receive all the required TT doses.

We recommend the healthcare system in Kilimanjaro region to ensure a constant supply of TT vaccine to these health facilities with a stable source of energy for its storage. Furthermore, continuous education is needed within families for a better understanding of the importance of the maternal TT vaccine.

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Author's contribution

SN, AH, AM and BM were involved in the conception and design of the study. PM, SN, AH, ZL and AM were involved in data collection and AM, PM, SN SB, were involved in analysis of the data. All authors reviewed and approved the final manuscript.

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