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Use of chlorhexidine digluconate 7.1% gel for umbilical cord care in selected regions in Northern Ghana: qualitative perspectives of key stakeholders

Demi Priscilla Letsa Duah[1], Andrews Adjekwei Adjieteh[1], Selase Adjei[1], Kamil Fuseini[1*], Akua Danquah Obeng-Dwamena[2], Joseph Addo-Yobo[1] and Augustine Ankomah[3]

Abstract

Background The Government of Ghana in 2017 included chlorhexidine (CHX) digluconate 7.1% gel in the essential medicines list to replace methylated spirit for umbilical cord care. However, there are limited studies around the use of the CHX gel. This paper explores the perspectives of stakeholders in childcare regarding the use of the gel for umbilical cord care in selected regions in Northern Ghana.

Methods Data for the study were from 42 in-depth interviews and 12 focus group discussions conducted among mothers, caregivers, fathers, traditional birth attendants, and health care providers (including pharmacists and over the counter medicine sellers). The transcribed data was analysed and organized into themes and sub-themes using thematic analysis approach. The data analysis was conducted using NVIVO version 12 analytical software.

Results CHX gel was used side-by-side with methylated spirit for umbilical cord care in the study areas. Use of methylated spirit for umbilical cord care was found to be common, and in the home setting there was evidence of use of traditional substances such as shea butter, toothpaste, cow dung, herbs and chalk. However, shea butter was regarded as the "golden standard" for cord care among non-health professionals. Co-use of traditional and orthodox cord care substances was also rife. The limited use of the CHX gel was attributable to the fact that some participants, especially health providers were convinced that the gel and methylated spirit were both effective; hence they continued prescribing methylated spirit over the gel for cord care. Evidence on the efficacy of the gel was mixed perhaps a reflection of the limited awareness and knowledge about the CHX gel, and the limited use behaviour / use skills. Additionally, awareness of the inclusion of the CHX gel in the national health insurance was also mixed.

Conclusions The CHX gel is yet to replace other cord care substances as the use of methylated spirit and traditional substances were still prevalent. Hence, a comprehensive strategy is needed to create awareness and educate providers, significant others, and the community about the gel and its efficacy if it is to replace methylated spirit as the cord care substance.

*Correspondence:
Kamil Fuseini
kfuseini@tfhoghana.org

Full list of author information is available at the end of the article

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Background

The neonatal period of life is the most vulnerable period of child survival [1]. Progress towards achieving the global goal of reducing neonatal deaths to 12 or fewer deaths per 1000 live births by 2030 is advancing steadily, decreasing from 30 in 2000 to 17 in 2020 per 1000 live births, with marked regional variations [1–3]. For instance, in 2020, sub-Saharan Africa, which includes Ghana, recorded the highest neonatal death rate of 27 per 1000 live births, while Europe and Northern America recorded the lowest (3 neonatal death rate per 1000 live births) [1]. Within the sub-Saharan Africa region, West and Central Africa recorded the highest neonatal death rate of 30 per 1000 live births [2].

Globally, about 80% of neonatal deaths are attributed to preventable causes with infections, complications of preterm birth, and intrapartum-related neonatal deaths or "birth asphyxia" being the three major causes [3, 4]. The newly cut umbilical cord is a common entry point for invasive bacteria that cause newborn sepsis and death [5]. In low resource settings, harmful cord care practices such as the application of traditional substances on the umbilical stump of newborns have been linked to infections of the cut umbilical cord, sepsis and neonatal deaths, which remain widespread, especially in settings where home births are prevalent [6–8].

Hygienic cord care practices as part of essential newborn care significantly reduce the risk of infections [9–11]. For instance, evidence shows that use of chlorhexidine (an antiseptic) for umbilical cord cleansing in neonates reduces the risk of neonatal mortality and omphalitis in infants born at home in high neonatal mortality rate settings [12].

The World Health Organization (WHO) recommends the daily chlorhexidine (CHX) (7.1% CHX digluconate aqueous solution or gel, delivering 4% CHX) application to the umbilical cord stump during the first week of life for newborns who are born at home in settings with high neonatal mortality (30 or more neonatal deaths per 1000 live births). Clean, dry cord care is recommended for newborns born in health facilities and at home in low neonatal mortality settings. Further indicating that use of CHX in these situations may be considered only to replace application of a harmful traditional substance, such as cow dung, to the cord stump [13, 14].

In Ghana, neonatal deaths have decreased over the years; however, the decline has been slow and remains higher than the 2020 global neonatal death rate of 17 deaths per 1000 live births. Neonatal deaths in Ghana decreased from 42 deaths per 1000 live births in 1990 to 36 deaths in 2000 and further declined to 23 deaths in 2020, with an annual rate of reduction of 2% between 1990 and 2020 [1].

The leading cause of neonatal deaths in Ghana is infections (31%) followed by preterm birth complications (29%), and intra-partum related (27%) mortality [UNICEF 2013 cited in 15]. A subnational study in the Brong Ahafo region of Ghana also revealed that infections were the leading cause of neonatal deaths (40%), followed by birth asphyxia (33%). The study further showed that the leading cause of home-based neonatal deaths were due to infections (49.6%), followed by prematurity (22%); in health facilities, infections was the second leading cause of neonatal deaths (31%) after birth asphyxia (45%) [8].

To reduce the risk of neonatal deaths due to infections, the Ghana Health Service in 2017 included CHX gel in the essential medicines list to replace methylated spirit for umbilical cord care. This was in line with the recommendation of the WHO for the "*daily application of CHX digluconate 7.1% gel to the umbilical cord until the cord falls off and the wound is completely healed*" [5, 13]. However, recent studies in the country have found that harmful cord care practices such as the application of mud, mustard oil and saliva persists [16, 17]. Poor cord care practices are linked to lack of skilled delivery and childcare at home as it is associated with lack of quality care during or immediately after childbirth [16].

In Ghana, the Northern region (now split into Northern, North East and Savannah regions), with neonatal death rate of 26 deaths per 1000 live births, has the highest percentage of home deliveries (40%) and the lowest percentage of deliveries assisted by a skilled provider (59%) [18]. These conditions might exacerbate the noncompliance with the directive of Ghana Health Service regarding the use of CHX gel for umbilical cord care. It can also lead to the potential use of harmful cord care substances leading to infections in the three regions similar to what has been established in similar contexts [17].

Since Ghana adopted the use of CHX gel to replace methylated spirit for cord care, there has been limited evidence surrounding the use of the gel for cord care. For instance, in a recent study on the knowledge and quality of essential newborn care practices in the Greater Accra region, Ghana, it was revealed that 39.5% of respondents reported using CHX gel for cord care [16]. However, the study did not explore further issues surrounding CHX gel for cord care such as awareness, knowledge, use, challenges, and availability among neonatal child caregivers. Thus, this study seeks to explore these issues among mothers, caregivers, traditional birth attendants, healthcare providers, and key stakeholders in three northern regions (Northern, North East and Savannah regions),

with high neonatal death rate, highest percentage of home deliveries and the lowest percentage of deliveries assisted by a skilled provider [18].

Methods

Descriptive exploratory qualitative research design was employed for this study. The study was conducted in northern Ghana in three healthcare facilities with the highest number of deliveries in each of the respective regions. The three selected were (1) Tamale Teaching Hospital in Tamale Municipality, Northern region, (2) Baptist Medical Centre in East Mamprusi Municipality, North-East region, and West Gonja Hospital in West Gonja District, Savannah region. Together, these health facilities recorded over 10,000 deliveries a year. Data collection was conducted between February and April 2021.

The study employed focus group discussions (FGDs) and in-depth interviews (IDIs) to collect the data, using semi-structured interview/discussion guides with a list of questions or specific topics to be covered; however, interviewers probed further on things said by participants. The FGDs were used to explore community level perspectives of cord care practices including the use of CHX gel among mothers, fathers, caregivers, and health providers. The purposive sampling technique was used to select participants for the study. With respect to health workers, the research team worked with the management of health facilities to recruit health care providers who have been working in the ante-natal, labour/delivery wards, and neonatal intensive care units (where available) in the past two years. These health workers usually have direct contact with mothers, fathers, and caregivers. The research team worked with a local research organization (A&E Consult) specialized in recruiting participants for research studies. The local organization was conversant with the research areas (selected facilities district or municipality) and helped to recruit mothers who had facility-based births (women who had delivered at a health facility with a child less than a year) and those who did not (women who did not deliver in a hospital with a child less than a year), caregivers (i.e., caregivers of children less than one years), and husbands/fathers (i.e., husbands or fathers of children less than 1 years). In each community, the research organisation provided potential participants with information about the study. Potential participants who expressed interest were directed to the data collector for further screening. In total, 12 FGDs (with 6–8 participants in each group) were conducted, three each among mothers, caregivers, and husbands/fathers/men/ health workers. The FGDs took between 60 and 90 min to complete.

The IDIs, which generally took between 30 and 60 min, were used to better understand individual experiences regarding cord care including CHX gel. Purposive sampling was used to select and interview health workers (i.e., midwives or nurses who have worked in the antenatal, labour wards or post-natal wards within the past 2 years) and traditional birth attendants (TBAs) (birth attendants who belong to the association of TBAs and have worked as a TBA for the past two years). Over-the-counter medicine sellers, pharmacists, mothers, and caregivers were also interviewed. The procedure for IDI sampling was the same as the FGD sampling, that is, through the local research agency. In total, 42 IDIs were conducted, six among health workers, nine each among caregivers of children delivered at home, mothers of children delivered at home, traditional birth attendants, and other key informants (Over-The-Counter Medicine Sellers (OTCMS) and pharmacy attendants).

Experienced research assistants were trained to collect the data. Interviews with health providers were conducted in English and for the TBAs, mothers, caregivers and fathers/husbands, the interviews were conducted in English or their preferred local language (i.e., Dagbani in Tamale, Mamprusi in East Mamprusi and Gonja in West Gonja) of the study participant.

Data analysis

The audio-recorded interviews and discussions were transcribed verbatim into English. NVIVO qualitative analytical software (version 12) was used to organise and analyse the data. The thematic analysis approach was used to analyse the data [19]. Deductive and inductive coding approaches were used to identify and code themes [19, 20]. A codebook was initially developed using a predetermined coding framework based on the interview and discussion guides. Through the iterative process of coding and analysis, codes were added to the codebook. To ensure inter-coder reliability, transcripts were analysed by a team of two persons with 10% of the transcripts being double coded to address differences in coding. The initial codes generated were then grouped into preliminary categories of themes. Through reading, re-reading and constant comparison, the themes were categorized into sub-themes and themes.

Results

This section presents the background characteristics of participants in the study (Table 1) and the results under various themes and sub-themes around substances used for umbilical cord care, use of CHX gel, and challenges related to the use of CHX gel for umbilical cord care.

Background characteristics

Study participants

A total of 42 IDIs were conducted across the three study sites, Tamale (TM) Metropolis in the Northern region, East Mamprusi (EM) Municipality in the North East

Table 1 Percent distribution of study participants

	IDIs		FGDs	
Variable	**Number**	**Percent**	**Number**	**Percent**
Age group				
15–24	4	9.5	8	8.7
25–34	7	16.7	43	46.7
35–44	7	16.7	14	15.2
45–54	8	19.1	14	15.2
55–64	2	4.8	8	8.7
65+	6	14.3	5	5.4
Missing	8	19.1	0	0.0
Sex of participant				
Female	32	76.2	60	65.2
Male	10	23.8	32	34.8
Education				
No education	17	40.5	37	40.2
Primary	1	2.4	0	0.0
Junior High School/Middle	2	4.8	11	12
Senior High School/SSS	5	11.9	17	18.5
Tertiary	12	28.6	27	29.4
Missing	5	11.9	0	0.0
Religion				
Christian	11	26.2	19	20.7
Muslim	29	69.1	73	79.4
Traditionalist	1	2.4	0	0.0
Missing	1	2.4	0	0.0
Current marital status				
Never married	3	7.1	5	5.4
Married	31	73.8	77	83.7
Widowed	7	16.7	10	10.9
Missing	1	2.4	0	0.0
Category of participant				
Mother	9	21.4	22	23.9
Caregiver	9	21.4	24	26.1
Health worker	6	14.3	23	25
Pharmacy attendant	3	7.1	na	na
OTCMS	6	14.3	na	na
TBA	9	21.4	na	na
Father/Husband	na	na	23	25
Total	**42**	**100.0**	**92**	**100.0**

na – not applicable

region and West Gonja (WG) District in the Savanna region, where 14 IDIs were conducted in each study site. The mean age of participants in the IDIs was 44 years with the minimum and maximum age being 21 and 74 years. The highest proportion (19.1%) of them were between the ages of 45 and 54 years and the lowest (9.5%) were aged 15–24 years. Close to eight in ten (76.2%) of the IDI participants were female and one in five (40.1%) did not have any formal education. Approximately seven out of ten (69.1%) of them were Muslims, and the majority (73.8%) were married. Participants in the IDIs included mothers (21.4%), caregivers (21.4%), health care workers (14.3%), pharmacy attendants (7.1%), OTCMSs (14.3%) and TBAs (21.4%) (Table 1).

In total, 12 FGDs were conducted, which included 92 participants in total. The mean age of participants in the FGDs was 37.6 and close to half (46.7%) of them were aged 25–34 years. More than two-thirds (65.2%) of the participants were female and two in five (40.2%) of the participants had no education, which was the highest. About eight out of ten (79.4%) participants were Muslim and more than four-fifth (83.7%) were married (Table 1).

Data analysis framework

Figure 1 shows the data analysis framework which outlines how the various themes tie together. Subsequent sections present details of the various themes.

Substances used for umbilical cord care

In this study, various cord care substances were identified and grouped into traditional (not recommended by health care providers) and orthodox (recommended by health care providers).

Traditional cord care substances

It was found that, in home seatings, various traditional cord care substances such as shea butter, toothpaste, Vaseline, cow dung, saliva, fowl droppings, herbs, and chalk were identified to be used for cord care:

> *R: Pepsodent [a brand of toothpaste] is also very good in treating the cord. [IDI, Home, Mother, EM_31]*
> *R2: The Pepsodent heals wounds faster. [FGD, Facility, Mothers, EM_09]*
> *R: If you want it [umbilical cord] to heal or fall faster, then you can use the shea butter. [IDI, Home, Mother, WG_27]*
> *R1: For example, cow dung, shea butter, toothpaste. Others use chalk. [FGD, Health providers, TM_02]*
> *R5: Yes, a lot of people have given testimonies about the toothpaste that it works so well. [FGD, health providers, EM_03]*
> *R1: It is the herbs and shea butter I know most people use.*
> *R3: Some people use toothpaste; others use animal oil. But my wife uses none of them, she prefers using only saliva and it works for her. [FGD, Fathers, WG_04]*

Unlike the other traditional cord care substances that were identified, it was very common that non-health professionals emphasized that shea butter makes the cord fall and heal faster:

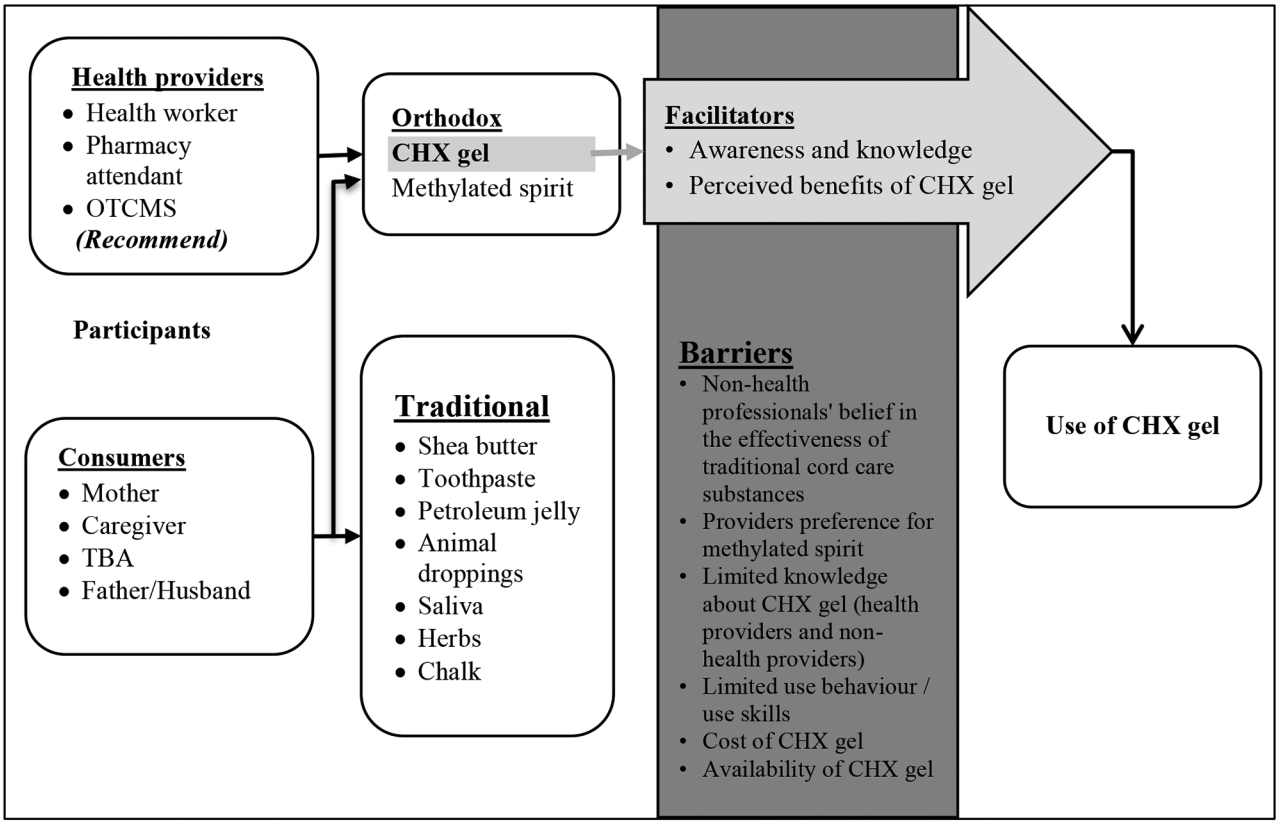

Fig. 1 Data analysis framework

R: … the best among them is the shea butter in my opinion, if only you clean around the cord very well every morning and apply it, it works very well. [IDI, TBA, WG_08]

The shea butter was found to be a trusted traditional cord substance as it was touted as the most effective cord care substance and, in some cases, some participants indicated that it is better than CHX gel:

R: The chlorhexidine gel is good, but the shear butter heals fast, within 3 days. [IDI, Home, Caregiver, EM_42]

Some women who gave birth in health facilities still used traditional cord care substances when they got home even though they would have been advised on the appropriate cord care substance(s) to use at the health facility:

R8: The reason why some of us took [the orthodox cord care substance] and came home and dumped it is that I am already used to shea butter, and it works for me. So, when we brought it home, I said we should use the shea butter. [FGD, Caregivers, Facility, EM_15]

R5: Yes, Vaseline. That is what is recommended to be used in applying on the navel. And when they return home, they resort to the shea butter and leave the Vaseline. [FGD, Father, TM_05]

Confidence in traditional cord substance

Use of traditional substances such as shea butter was a long-standing tradition which made it very difficult to abandon and use prescribed cord care substances such as the CHX gel. Some participants indicated that some of these traditional cord care substances have been effective for several generations. Some indicated that it was used on them, and they have also used them on their children, and they have been very effective in cord care:

R2: Since we were also kids, our mothers used the shea butter on us. They even added it in water for us to drink. They also apply it to our body very well. … So, for all these years, we have always known that the shea butter was good for our health. Even when the cord falls and you continue applying it on the baby, it keeps the baby healthy. [FGD, Mother, Facility, TM_08]
R7: It was the same shea butter that was used on my navel when I was born. [FGD, Father, TM_05]

R: We came to meet what our grandparents were using, so that is what we use, that is the shea butter and the leaves. [IDI, Home, Mother, WG_27]

Co-use of cord care substances

Some participants indicated using both the traditional and orthodox cord care substances at the same time. For example, the methylated spirit was used to first clean the cord afterwards shea butter or saliva was applied:

R: We also use some leaves … I use the one that was given by the hospital, that is the spirit but as time went on, I used the shea butter. [IDI, Home, Mother, WG_27]
R: … they write for you to go buy methylated spirit for cleaning the cord thoroughly every morning, then after cleaning, you observe the cord is drying up, we apply shea butter to avoid it drying up. [IDI, TBA, WG_08]
R1: … the nurses recommend some water-like medicine (methylated spirit) after delivery to be used at home to manage the cord. Then afterwards we also use shea butter to further heal it quickly. [FGD, Caregiver, Facility, WG_13]

Orthodox substances used for umbilical cord care

Two main orthodox cord care substances, methylated spirit and CHX gel were mentioned by health professionals and the other participants:

M: So, what do you use for cord care in this community?
R: We use what is given us by the hospital that is the spirit [methylated spirit]. [IDI, Mother, Home, WG_27]
R2: … we recommended it [CHX gel] for our clients who come for ANC services, they are given education on how to use it and how important it is. [FGD, Health, WG_01]
R: In the absence of the CHX gel I use methylated spirit. [IDI, TBA, EM_15]

Given that Ghana's policy on essential newborn care indicated the replacement of methylated spirit with CHX gel, the subsequent sections focus on the use of CHX gel for umbilical cord care.

Use of CHX gel for umbilical cord care

In this section, we explore CHX gel's awareness and use, perceived benefits, and challenges related to umbilical cord care.

Awareness and use of CHX gel for cord care

From the IDIs and FGDs, awareness of CHX gel for umbilical cord care was mixed. Generally, health providers were aware of the CHX gel, with evidence of trainings organized for midwives and other health providers on CHX gel for cord care:

R: Recently they organized training on the use of Chlorhexidine gel for cord care … they organized a workshop for midwives and health workers. [IDI, Health provider worker, EM_06]

Some mothers, caregivers, fathers, and TBAs were also aware of CHX gel. However, some of them were not aware of it indicating that they had never heard or seen the CHX gel even after research assistants showed them a sample. It is important to note that some of the mothers gave birth in health facilities:

R7: Yes, if even you give birth at home, you are given the CHX gel to use for your baby at the hospital. [FGD, Mothers, Facility, EM_09]
R5: Me too, no, I haven't heard or seen it before. [FGD, Caregiver, Facility, TM_14]
R: No, I have never seen or heard about it, even the nurses have never told us about it. [IDI, Home, Mother, WG_25]

Perceived benefits of CHX gel

Some health providers and users of the CHX gel attested to its effectiveness. It was revealed that users did not come back with issues of umbilical cord infection. Some participants also mentioned that the CHX gel was better than the methylated spirit citing the fact that babies do not feel any pain when it is applied on them:

R: … This CHX gel was better than the other one [methylated spirit]. [IDI, Home, Mothers, TM_28]
R5: I have personally recommended it, and none has reported back with cord sepsis, … we have not had any case whereby a mother brings a baby with cord sepsis because of the chlorhexidine. [FGD, Health, WG_01]
R: Because when you apply the gel on the baby, she does not cry. But with the liquid one (methylated spirit), they feel pain and cry. … It is cool and soft. [IDI, Home, Caregiver, TM_38]

Participants such as TBAs and mothers also noted the effectiveness of the CHX gel in making the umbilical cord fall and heal fast within a short period of time:

R1: Within three days, the cord will fall. And in a week's time, the wound too will also heal. So, it [CHX gel] is very effective. [FGD, Mother, Facility, TM_08]
R: When you use the CHX gel on a baby's cord it doesn't have more sores, and the healing is smooth. [IDI, TBA, EM_15]
R: As I said it [CHX gel] is good, it is effective. We think that it is effective when you use it, so we have chosen to move with that product. [IDI, KII, Pharmacy, EM_23]

It was noted that unlike the CHX gel, when methylated spirit is applied to the umbilical cord, it dries up fast, hence does not stay long enough to guard against infections. It was further added that the CHX gel makes the cord fall naturally:

R: The infections as I mentioned and the delay in healing. Those are the two challenges of the methylated spirit. Because it dries fast, it doesn't stay long to fight whatever infections that may occur around the cord. But the chlorhexidine is very effective. [IDI, KII, TM_21]
R7: I will also recommend CHX gel because that one is oily and when you apply it, it makes it soft, and it gradually heals and makes the cord fall off naturally … I will recommend that if it is available the hospital should be using the CHX gel. [FGD, Health, WG_01]

Perhaps the effectiveness of the CHX gel was what made some mothers indicate categorically that they prefer the CHX gel:

M: Among all the medications you mentioned, which of them do you prefer?
Rs: All participants responded that they preferred CHX gel. [FGD, Mothers, Facility, EM_09]

Challenges related to the use of CHX gel

The study revealed various challenges related to the use of CHX gel including health providers' preference for the methylated spirit, providers continuing to prescribe methylated spirit, belief in the efficacy of other cord care substances, limited education, limited use skills, limited availability and cost.

Preference for methylated spirit over the CHX gel

It appeared that there was a strong preference for methylated spirit over the CHX gel among both health providers and non-health providers. It was found that the preference for the methylated spirit among some health providers was because some of them believed that the methylated spirit and CHX gel were both effective but noted that the patronage of methylated spirit had overshadowed the CHX gel:

R4: I also prefer the methylated spirit.
R7: I think they are both good – the spirit and the Chlorhexidine. [FGD, Health, TM_02]
M: For R4, you have used it, tell us the reason for the low patronage.
R4: I think what is available [methylated spirit] has overshadowed this gel. Many people are used to the methylated spirit.
R5: I think it is because we have substances that do the same thing as this one [CHX gel]. [FGD, Mother, Facility, TM_08]

Providers also noted that they have been using and recommending methylated spirit for a long time with no problems; but they recently started using the CHX gel and have started having challenges. Some participants believed that because the CHX gel keeps the cord area moist, it makes it susceptible to infections:

R1: I said we prefer the spirit because we have been using that over the years and we have had good results. But with the chlorhexidine gel, only a few times. And when we started using it, we were just having problems.
M: What does the spirit do that the chlorhexidine doesn't do?
R3: The spirit dries it. It dries it fast. When you use it to clean, it dries it. You don't see it moist, [which] breeds organisms.
R5: But with the chlorhexidine, when you apply it too much, it will keep it moist for a longer period, which will attract microorganisms.
R6: Because it doesn't dry immediately, anything that goes in there immediately stays there and then it starts to get infected.
All: Spirit. [FGD, Health, TM_02]

Providers recommend methylated spirit over CHX gel

The study revealed that health providers continue to recommend and or prescribe methylated spirit over the CHX gel:

R1: For me, the hospital does not talk about it [CHX gel] like the way they recommend the spirit. If they had been talking about it like the way they do about the methylated spirit, everyone would have gotten to know about it. Once you deliver, it is the spirit

that they will recommend. [FGD, Mother, Facility, TM_08]
R6: When I gave birth at the facility and was about to be discharged, the nurses told me that I should do well and be applying the methylated spirit regularly so that the cord doesn't get dry. [FGD, Mother, Facility, WG_07]

Belief in the effectiveness of other cord care substances relative to CHX gel

Another challenge was the belief that the methylated spirit and other cord care substances were more effective compared to the CHX gel. Some health professionals indicated that they started getting complaints from their colleagues in other childcare units that the CHX gel was not effective against infections and that it also caused inflammation of the umbilical cord. As a result of these challenges, they reverted to the methylated spirit:

R2: And then NICU [newborn intensive care unit] started bringing complaints that the medicine that the mothers are using is causing cord infection. … So, the way the complaints were coming, we just decided to stop it. So, we went back to our spirits.
R3: A friend used it. And around the base of the cord, the area became inflamed. The area was reddish, so she stopped using it. [FGD, Health, TM_02]

It was also noted that community members were also complaining about the effectiveness of the CHX gel:

R1: … The husband insisted that they should use chlorhexidine gel, so they used the chlorhexidine gel for 10 good days. The umbilical looked fresh and was still hanging.
R4: Though I have ever used the Chlorhexidine gel and it worked for me, in the larger population, you get many people complaining about the longer duration for the cord to come out. [FGD, Health, TM_02]

Some health professionals also mentioned that there were complaints that the CHX gel was not effective in making the cord fall fast. Hence, mothers were complaining as they wanted the cord to fall off fast (for example, within five days). It was further noted that even when CHX gel was used, the entire cord stump did not usually fall. As a result, some women preferred the methylated spirit over the CHX gel as it made the entire cord fall fast:

R: If I apply it on the cord it takes over a week or two without separating or if the cord falls, some remains in the navel. … [IDI, Mother, Home, EM_32].

R1: The problem is, it takes time for the cord to fall and most of the mothers complain that it takes too long, they want it [to fall] within the first five days, … they prefer the spirit to the chlorhexidine because the spirit will let the cord fall off very fast but the chlorhexidine follows a natural process, it will take days … and you see that when you are applying it sometimes the cord will change colour, it will be yellowish. [FGD, Health, WG_01]

However, some participants raised concerns about the efficacy of the traditional cord care substances, indicating that the orthodox cord care substances were better than the traditional cord care substances:

R: I think our ancestors used it and taught our mothers. But I have grown to learn that the hospital one works better than the shea butter. Honestly, the one given at the hospital is better than the shea butter. This is because the shea butter makes the navel develop a bad smell with time. But the one given by the hospital does not make the navel smell badly. [IDI, Mothers, Home, TM_28]
R: We use shea butter to apply but for some the shea butter doesn't work well for them, so they prefer the liquid one [methylated spirit]. [IDI, TBA, EM_14]

Limited knowledge

It was noted that awareness and knowledge among health professionals and non-health professionals was limited, perhaps contributing to the perception that the CHX gel was not effective. Some health providers indicated that they did not have enough knowledge about CHX gel, which was the reason why they do not recommend it to clients:

R1: The chlorhexidine, I don't know much about it. That is my reason.
R2: I will recommend methylated spirit because it makes the cord dry faster. [FGD, Health, TM_02]
R6: You see, the exposure too is also something, if a staff or health worker is not exposed to it you can't recommend it, that is the issue that I am looking at, now that it is coming into the system, I know with time, we will be recommending it. [FGD, Health, WG_01]

The limited knowledge among women was also found to be attributed to the fact that a lot of women still give birth at home, hence these women were not exposed to information and education about using the CHX gel:

R: It is just that like I said when you deliver at home, you don't have much knowledge or information about any drug that is used in cord care. [IDI, Home, Mothers, TM_30]

Limited use behaviour / use skills

It was revealed that it was difficult educating mothers and other child caregivers to use CHX gel compared to the methylated spirit:

R2: When you educate them [about methylated spirit], it is easier, and you don't need so much to work with it unlike chlorhexidine. [FGD, Health, TM_02]
R1: And you have to make sure you clean it before you apply the next gel. And somebody also said you have to put just a thin gel around it, which is relative. Is it that you should use something small or use half of the thing or what? So, the education is a bit cumbersome. With the spirit, the education is simpler, and the chlorhexidine is a bit difficult. [FGD, Health, TM_02]

A health worker revealed that due to the poor level of knowledge, some people do not use the CHX gel as prescribed, or they misapply it. For instance, a health provider explained that there are medications for eye problems that are packaged like the CHX gel, hence some people tend to use CHX gel on the eyes of babies. It was also noted that sometimes conditions under with the CHX gel was applied was not hygienic:

R: Many people do not know how to use it. You know many drugs come in this form for eye diseases so anybody seeing anything in a tube assumes that it is for the eyes. And you know for newborn babies, usually, excuse me to say, if the mother's perineum is not clean and the baby is swept out, it gets some eye infections. And so, they will assume that it is for the eye, and they will apply it there. [IDI, Health worker, TM_03]
R1: My opinion is that most at times it depends on the hygienic condition under which they use the drug. So, we should educate the women to always wash their hands well before they use the drug. [FGD, health provider, EM_03]

It was noted that some participants were not following the prescribed application of CHX gel which can lead to challenges and people thinking that the CHX gel is not effective. In part, this might be a result of limited knowledge about CHX gel:

R7: I think they are both good – the spirit and the chlorhexidine. It is just that our mothers and … we don't know how to apply it, let me put it that way. Because when they go home, they don't know that it is a whole tube. They don't know that they are supposed to apply small on the cord. Then they will go and press plenty and smear it on the cord. It keeps long before it dries up. And then when it dries up, and the following day it looks like there is dirt on it, and they don't know that they are supposed to clean it before adding another one. So, they will add another, and they will keep adding. And so, the cord will clot because of the infection that comes with it. So, I think that they are both good. It is just the usage. Education has not gone down well on the usage. [FGD, Health, TM_02]

Limited availability

Availability of the CHX gel was also a critical challenge to its use. Some participants indicated that there were times when CHX gel was not available in health facilities, hence health providers had to prescribe it for clients to purchase outside the health facility:

R4: Some health facilities do not have CHX gel so when you deliver there, they write the name of the gel for you to buy. [FGD, Mothers, Facility, EM_09]

Cost of CHX gel

Cost of CHX gel also posed a challenge for some people and this restricted its use. It was found that the CHX gel was more expensive than the methylated spirit, which could prevent people from patronizing it:

R5: We are recommending, and we hope to continue to recommend but I personally have a problem with the price. … looking at the cost, what they used to pay to get spirit is lesser than what they pay now to get the CHX gel. [FGD, Health, WG_01]
R4: The Chlorhexidine was around seven cedis or eight cedis. And ten cedis for the big one. But for the spirit, you can get it at three cedis. [FGD_Health_TM_02]

Related to the issues of cost is the coverage of the CHX gel under the NHIS as this will eliminate out-of-pocket cost. It was found that some participants were not sure whether it was covered or not:

R6: Chlorhexidine gel is [covered under] NHIS. … We normally write it in their folder for them to go and collect from the dispensary so that we can use it for them to see. [FGD, Health provider, EM_03]

R8: … I don't know whether it is added to the NHIS or not. [FGD, Health, WG_01]
R1: The NHIS must also be seen to be working, with respect to being captured [to cover it] and not sell it to people. [FGD, Father, TM_05]

Discussion

This study explored the use of CHX gel for umbilical cord care among key facility and community level stakeholders in neonatal care in three northern regions in Ghana, using the qualitative method approach. The findings revealed that in practice, use of CHX gel for umbilical cord care is yet to replace methylated spirit despite its replacement being recommended in Ghana's policy on newborn umbilical cord care [5]. Indeed, there was evidence that CHX gel was used for cord care; however, use of other cord care substances including traditional ones were also very common. This affirms the limited use of CHX gel for cord care in Ghana as demonstrated in a recent study in the Greater Accra region that about 40% of respondents indicated using it for cord care [16].

The limited use of CHX gel can, in part, be attributed to the fact that in health care facility settings, use of methylated spirit, the prescribed cord care substance prior to the policy change, was still very common. Some health care providers continue to recommend or prescribe methylated spirit to women contrary to the policy. In addition, it was found that some health care providers believed that CHX gel and methylated spirit achieved similar results with respect to cord care. Hence, providers continued to prescribe it (methylated spirit) for cord care. This lends credence to other studies in similar contexts which show no difference in incidence of umbilical cord infection with the use of chlorhexidine or methylated spirit in newborns [21, 22]. This is especially true in settings with predominantly facility-based deliveries and lower mortality rates [23], which is not necessarily the case in northern Ghana. Another study in Nigeria showed that there was no evidence that methylated spirit was inferior to CHX gel in preventing neonatal omphalitis; thus, it may be considered a safe and effective alternative where CHX gel is unavailable [24].

Some participants believed that the CHX gel was very effective in cord care as it made the cord fall naturally and healed the wound fast, no burning sensation on babies compared to the methylated spirit, and that, the methylated spirit did not stay on the cord long enough to prevent infection. Evidence from Central Uganda also showed that child care givers had the perception that chlorhexidine reduced smell and abdominal colic [25]. On the contrary, some health providers still had strong preference for the methylated spirit over the CHX gel indicating that they have used it for a long time without problems. Some participants including health providers indicated that the CHX gel did not make the cord fall fast, which was of primary concern to users. Similar to the finding of this study, empirical evidence from Nigeria appears to support this assertion that the CHX gel prolongs cord separation compared to methylated spirit, which was found to be a major cause of dissatisfaction among users [26].

As shown elsewhere, cord care practices are determined and influenced by several factors and of importance are health education and awareness campaigns targeted at women of childbearing age found in women's meetings, local markets, and primary health care delivery centres especially in the rural settings [27]. The evidence in this study showed that use of CHX gel was challenged by the lack of awareness and knowledge and limited behaviour skills / use skills in its use among health providers and significant others such as grandmothers and TBAs who cared for the newborns. There was evidence that some people usually did not apply the gel appropriately, making the gel less effective hence the notion of its ineffectiveness. Perhaps this can be explained by the fact there is usually higher nonadherence with respect to the use of CHX gel compared to methylated spirit as found in Nigeria [21]. Additionally, users need to be educated on how the CHX gel works, to allay unnecessary fears and wrong conclusions [26].

Related to the issue of awareness is providers' knowledge about the inclusion of CHX gel in the NHIS, which eliminates out-of-pocket payment and can subsequently increase uptake. The CHX gel is covered under the NHIS (see the Ghana NHIS medicine list – code: CHLORHGE1); however, some health providers were not aware or sure about it and continued to make clients buy it out-of-pocket, which was sometimes not even available.

Furthermore, in the home setting, use of traditional substances such as shea butter, toothpaste, Vaseline (petroleum jelly), cow dung, saliva, fowl droppings, herbs, sewing machine oil, animal fat and chalk was also very common, similar to findings from other studies [16, 17]. These methods appeared to be trusted by some clients limiting their use of orthodox cord care substances. Among all the traditional substances used, there appeared to be a consensus that the shea butter was the "gold standard". The use of these traditional substances was often backed by the fact that they have been used for generations with high levels of effectiveness. Worthy of note however is the fact that co-use of cord care substances was very common as people sometimes combined the use of traditional and orthodox substances at the same time.

Recommendations arising from the findings included the fact that health providers need to educate significant

others in childcare about the CHX gel from the hospital to the community level targeting groups such as TBAs, mothers and caregivers. These they indicated could be through various media platforms, community gatherings and one-on-one education. Health providers recommending and or prescribing the CHX gel instead of the methylated spirit, encouraging satisfied users to share their testimonies, and ensuring that the CHX gel is available. The government should ensure that clients have access to the CHX gel through the NHIS and possibly also reduce the cost to levels lower than the methylated spirit.

Limitation

A potential limitation of this study is that it was conducted in selected districts in northern Ghana, hence, the results cannot be generalized to the whole country. However, the findings reflecting the issues surrounding the use of CHX gel for umbilical cord care may be applicable to settings with similar socio-cultural and economic circumstances as the regions studied.

Conclusions

The findings of this paper show that in practice the CHX gel is yet to replace the methylated spirit as the use of other cord substances including traditional substances are still prevalent. It appears that awareness and education about CHX gel was limited hence, both health workers and other significant others in childcare were yet to be convinced about the efficacy of the CHX gel especially over the methylated spirit. The lack of confidence in CHX gel had health providers recommend or prescribe it half-heartedly. A strategy is needed to create awareness and educate providers and significant others about CHX gel if it is to replace methylated spirit as the cord care substance in Ghana. Conscious efforts should also be made to investigate the trusted traditional substance "shea butter" with respect to its efficacy in cord care.

Abbreviations

CHX	Chlorhexidine
EM	East Mamprusi
FGD	Focus Group Discussion
KII	Key Informant Interviews
TM	Tamale
WG	West Gonja

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Author contributions

All authors brainstormed to conceptualize this study. KF, ADOD and AA carried out the analyses. KF, ADOD and AA drafted the manuscript. All authors reviewed and made substantive revisions to the manuscript at various stages. All authors read and approved the final manuscript for submission.

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Data availability

The qualitative interview guides used in this study were developed for this study. Three IDIs and four FGD guides were utilized to elicit information from participants. The qualitative dataset generated and/or analyzed for this study are not publicly available due to funding agreements, however, they are available from Total Family Health Planning Organization upon written request and approval at info@tfhoghana.org.

Declarations

Ethics approval and consent to participate

The study protocol was reviewed and approved by the Ghana Health Service Ethical Review Committee (GHS-ERC 009/01/21) and the Christian Health Association of Ghana (CHAG-IRB03012021). Data collectors, upon meeting a potential participant screened for eligibility. If eligible, study participants were taken thought the informed consent process and requested provide written informed consent before participating in the study. Where necessary parents/guardians also provided written informed consent before the participant assented to be part of the study. Participation in the study was completely voluntary. Permission was also obtained from community leaders in the study areas. All study methods were implemented in accordance with the guidelines and regulations in the Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

[1]Total Family Planning Organisation, 74 Second Osu Badu Street, Airport West, Accra, Ghana
[2]Population Council, P. O. Box CT 4906, Cantonment, Accra, Ghana
[3]School of Public Health, University of Ghana, P.O. Box LG 25, Legon, Accra, Ghana

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References

1. UN Inter-agency Group for Child Mortality Estimation. Levels & Trends in Child Mortality. New York, NY, USA: United Nations Children's Fund; 2021.
2. Hug L, Alexander M, You D, et al. National, regional, and global levels and trends in neonatal mortality between 1990 and 2017, with scenario-based projections to 2030: a systematic analysis. Lancet Glob Health. 2019;7:e710–20.
3. Lawn JE, Kerber K, Enweronu-Laryea C, et al. 3.6 Million Neonatal Deaths—What Is Progressing and What Is Not? Semin Perinatol. 2010;34:371–86.
4. WHO, Mortality N. https://www.who.int/news-room/fact-sheets/detail/levels-and-trends-in-child-mortality-report-2021 (2022, accessed 9 June 2022).
5. Ministry of Health, Ghana Health Service. *Chlorhexidine Digluconate 7.1% Gel: The Newly Recommended Product for Newborn Umbilical Cord care in Ghana*. Ghana, 2018.
6. Afolaranmi TO, Hassan ZI, Akinyemi OO et al. Cord Care Practices: A Perspective of Contemporary African Setting. *Front Public Health*; 6, https://www.frontiersin.org/articles/https://doi.org/10.3389/fpubh.2018.00010 (2018, accessed 22 September 2022).
7. Dare S, Oduro AR, Owusu-Agyei S, et al. Neonatal mortality rates, characteristics, and risk factors for neonatal deaths in Ghana: analyses of data from two health and demographic surveillance systems. Glob Health Action. 2021;14:1938871.

8. Edmond KM, Quigley MA, Zandoh C, et al. Aetiology of stillbirths and neonatal deaths in rural Ghana: implications for health programming in developing countries. Paediatr Perinat Epidemiol. 2008;22:430–7.
9. Agrawal PK, Agrawal S, Mullany LC, et al. Clean cord care practices and neonatal mortality: evidence from rural Uttar Pradesh, India. J Epidemiol Community Health. 2012;66:755–8.
10. Doskoch P. Application of antiseptic to umbilical stump reduces risk of neonatal infection and mortality. Int Perspect Sex Reprod Health. 2012;38:109–10.
11. Karumbi J, Mulaku M, Aluvaala J, et al. Topical Umbilical Cord Care for Prevention of Infection and Neonatal Mortality. Pediatr Infect Dis J. 2013;32:78–83.
12. Sankar MJ, Chandrasekaran A, Ravindranath A, et al. Umbilical cord cleansing with chlorhexidine in neonates: a systematic review. J Perinatol. 2016;36:S12–20.
13. World Health Organization. *WHO recommendations on postnatal care of the mother and newborn*. Geneva: World Health Organization, https://apps.who.int/iris/handle/10665/97603 (2014, accessed 3 June 2022).
14. World Health Organization. WHO recommendations on maternal and newborn care for a positive postnatal experience. Geneva, Switzerland: World Health Organization; 2022.
15. Ministry of Health. Ghana National Newborn Health Strategy and Action Plan 2014–2018: A road map to reduce neonatal deaths nationwide. Ghana: Ministry of Health, Ghana; 2014.
16. Ayete-Nyampong J, Udofia EA. Assessment of knowledge and quality of essential newborn care practices in La Dade Kotopon Municipality, Ghana. PLoS ONE. 2020;15:e0237820.
17. Saaka M, Ali F, Vuu F. Prevalence and determinants of essential newborn care practices in the Lawra District of Ghana. BMC Pediatr. 2018;18:173.
18. Ghana Statistical Service, Service GH. ICF. *Ghana Maternal Health Survey 2017*. Accra, Ghana: GSS, GHS, and ICF, 2018.
19. Creswell JW. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. 4th ed. Los Angeles: SAGE Publications Inc; 2013.
20. Bryman A. Social Research Methods. Oxford University Press; 2012.
21. Okpaleke M-H, Ndikom CM, Bulama KU. Incidence of umbilical cord infection in neonates receiving 7.1% chlorhexidine gel and methylated-spirit in ibadan. J Neonatal Nurs. 2019;25:20–5.
22. Sazawal S, Dhingra U, Ali SM, et al. Efficacy of chlorhexidine application to umbilical cord on neonatal mortality in Pemba, Tanzania: a community-based randomised controlled trial. Lancet Glob Health. 2016;4:e837–44.
23. Semrau KEA, Herlihy J, Grogan C, et al. Effectiveness of 4% chlorhexidine umbilical cord care on neonatal mortality in Southern Province, Zambia (ZamCAT): a cluster-randomised controlled trial. Lancet Glob Health. 2016;4:e827–36.
24. Shwe DD, Afolaranmi TO, Egbodo CO, et al. Methylated spirit versus chlorhexidine gel: A randomized non-inferiority trial for prevention of neonatal umbilical cord infection in Jos, North-Central Nigeria. Niger J Clin Pract. 2021;24:762–9.
25. Mukunya D, Haaland MES, Tumwine JK, et al. We shall count it as a part of kyogero: acceptability and considerations for scale up of single dose chlorhexidine for umbilical cord care in Central Uganda. BMC Pregnancy Childbirth. 2018;18:476.
26. Okpaleke M-H, Ndikom CM. Umbilical cord separation time: chlorhexidine vs methylated-spirit. Afr J Midwifery Womens Health. 2019;13:1–9.
27. Asiegbu UV, Asiegbu OG, Ezeonu CT, et al. Determinants of Cord Care Practices among Mothers in Abakaliki, Ebonyi State, South East, Nigeria. Open J Prev Med. 2019;09:43.

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