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## ARTICLE

### Current neonatal skin care practices in four African sites

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*Running title: Skin care in four African settings*

#### Abstract

Data for this study on skin care practices and emollient use in four African sites, were collected using in-depth interviews, focus group discussions and observations with mothers, grandmothers, fathers, health workers, birth attendants and people selling skin care products. Analysis included content and framework analyses.

Emollient use was a normative practice in all sites, with frequent application from an early age in most sites. There were variations in the type of emollients used, but reasons for use were similar and included improving the skin, keeping the baby warm, softening/strengthening the joints/bones, shaping the baby, ensuring flexibility and encouraging growth and weight gain. Factors that influenced emollient choice varied and included social pressure, cost, availability and deep rooted traditional norms.

These findings are important given the widespread use of emollients, the repeated exposure of newborns in the first month of life, and the potential impact of emollients on mortality.

**Key words:** Newborn, Skin, Emollient, Africa

## Introduction

Approximately 2.9 million neonates die every year, 23% of these from infections (1). Skin plays an important role in preventing infections by providing a physical barrier, and a surface for accumulating beneficial bacteria and antimicrobial proteins (2). Premature infants have functionally compromised skin, that lacks the Vernix caseosa and is easily injured, all of which increases susceptibility to infections (3, 4). Applying topical emollients shows promise as a means of reducing infections in premature babies in low-income countries (5-8), and is highly cost effective (9). A meta-analysis of three hospital trials found a 27% reduction in neonatal mortality (RR: 0.73, 95% CI: 0.56, 0.94) and an increase in weight and weight gain with emollient application (4). In low-income settings the skin of term infants may be compromised by intrauterine malnutrition and poor skin care practices and emollients could also prove beneficial in term infants and in community settings and the need for trials has been identified (10-14). The mechanisms through which emollients work is unclear but it is likely that they preserve skin integrity with early and frequent application potentially key to their impact (3).

Little is known about which emollients are beneficial. Published trials have used sunflower oil, Aquaphor and coconut oil, suggesting that a wide range of emollients may be beneficial (3). Emollients such as mustard oil, which is commonly used in Asia, have been shown to damage epithelial integrity in mouse models and to induce an inflammatory response (11). In Asian settings the application of mustard oil is an engrained traditional practice, and studies have been conducted to understand how and why emollients are applied (14-16). Less is known about practices in sub-Saharan Africa aside from suggestions that, in contrast to Asia, emollient application may not be a universal practice (8). Without information on current practices, it is difficult to adapt this potentially important and cost effective intervention for African settings. This paper reports on perceptions and practices related to emollient use in four African sites.

## Methods and materials

We collected qualitative data on emollient use and related practices from four African sites between July-November 2011: Ekiti State in South West Nigeria, Borno State in North East Nigeria, the Oromia region of Ethiopia and the Lindi and Mtwara regions of Tanzania. These sites have high neonatal mortality burdens and varied socio-demographic, health care and infrastructure profiles. We selected four typical communities in each site to reflect site diversity in access to health facilities, ethnicity and geography. In Tanzania, community selection was restricted to the control communities of an on-going newborn care trial (17). Ethical clearance was obtained from ethics boards in the UK and in each study site, and informed consent was obtained from all participants, no respondents refused to participate.

Data were collected from a range of respondents using a range of methods (Table 1). This ensured we obtained a range of views and allowed data from different respondents and sources to be corroborated. The sample sizes and content of each method are also shown in Table 1. Site variations in sample size reflect that interviewing stopped when saturation was reached, and that respondent groups were excluded if they were not relevant in that setting.

### Table 1 here

Data were collected in the local language by trained interviewers in a neutral location and lasted 30-90 minutes. Focus groups included 6-8 people stratified by age and where appropriate

ethnicity. Respondents were sampled purposively through community informants or snowball sampling to ensure a range of ages, parities and gender of child and, if there was site variability, a range of place of delivery, educational level, socio economic status, ethnicity and religion.

Interviews were audio-recorded and field notes taken. Interviewers wrote expanded notes (18), using the recordings to check completeness and to add verbatim quotes. All focus groups discussions were transcribed. The observations were video taped with clarifying questions asked at the end of the observation. Data quality measures included holding regular reflective team meetings and giving constructive feedback to interviewers on their interview techniques and expanded notes.

Data were analysed by the principal investigator and the site team. Transcripts were read for familiarization, and the team coded 2-3 interviews together to share conceptual thoughts and increase coding rigour (19), the same interview was then coded by each individual and discussed to improve coding standardization. A coding template and code book were developed in NVivo and all interviews and focus groups coded. The code book was modified as inductive codes emerged. Teams held regular meetings to check each other's coding. The data from the narratives were particularly rich, so a framework analysis was conducted to aid in comparing and contrasting findings (20). The video observations were reviewed by a paediatrician who looked at hand washing, length of exposure, handling of the baby and application of substances.

## Results

We first summarize the emollients used, why and how they were applied and what factors influenced emollient selection. Within sites findings were similar across ethnic groups except in Borno where differences emerged between the Bura and Kanuri groups.

Emollient application in the first months of life was a normative, long standing tradition in all sites: 'My daughter, anything you see us doing here, we came and met our parents and grandparents doing it so we continue' [46 year old Bura grandmother, Borno]. Table 2 shows the details of the emollients used in each site. In Ethiopia, fresh homemade butter was most common, with the less 'pure' bought butter only used if this was unavailable. In Tanzania, coconut and cooking oils were most common and in Borno, Shea butter, commercial baby oils and olive oil. In Ekiti, baby lotion was most common but a wide range of other substances were also used including engine oil and menthol based balms. These were often used simultaneously on different body parts. A skin rash known locally as 'lqbalode' was a key concern in Ekiti, leading to the changing and adding of substances based on perceived impact: 'If we use shea butter today we use nycil (baby lotion) tomorrow and that single act has led to the reduction of lqbalode' [18 year old Ekiti mother]. In the Nigerian sites the counterfeiting of products was reported as common, especially olive oil, with photocopied labels and in some case a strong kerosene smell. In Ekiti and Borno, oil was also used to help remove the Vernix after delivery.

### Table 2 here

In all sites, emollients were applied to make the skin 'soft', 'smooth', 'attractive', 'healthy', 'strong', and 'rash free'. Other reasons were to keep the baby warm (all sites), to soften/strengthen the joints/bones, shape the baby, ensure flexibility, encourage growth and weight gain (Borno, Tanzania and Ethiopia) and to help the baby sleep (Borno and Ethiopia).

Some of the effects were emollient specific, for example, giving warmth was only associated with Vaseline in Ethiopia and with Mentholatum in Ekiti. In Tanzania and Ethiopia some effects were jointly attributed to the emollient and to massage during application:

'I keep my baby warm by rubbing oil on the whole of his body after bathing....' [35 year old Bura mother, Borno].

'It [stretching with oil] helps the body parts ...to be sitting well and not to become weak.... the oil enters inside the body and helps the bones to be soft and the baby becomes in good condition' [35 year old Tanzanian mother].

'We have seen that massaging with butter has allowed my baby to gain weight since she sleeps well' [30 year old mother Ethiopian mother]

Respondents felt that families may not want to give up the substances they currently use in favour of a new emollient, unless the new substance was more beneficial: 'Why would she stop using old oil which she has used on all her children to great effect, you would need to convince her that the new oil is better' [Ekiti FGD mother].

In all sites, emollient application was usually done by female relatives in the first few days after birth and then by the mother. In Nigeria and Tanzania, routine emollient application began after the first bath, which was immediately after delivery in Nigeria and between several hours after delivery to the next day in Tanzania. In Ethiopia, butter application usually started in the second week of life when the baby was no longer 'just blood' and was considered strong enough: 'Butter is good for the baby when she's strengthened otherwise the body can't bear it' [22 year old Ethiopian mother]. Ethiopian respondents had mixed views about whether families would agree to apply any new emollient from birth.

Bathing before application was considered essential in all sites to ensure babies were clean, did not overheat and so that the emollient was effective. Respondents firmly rejected the idea of applying emollients without bathing: 'You can't stay without bathing....every time you want to oil them you bath them to remove the previous oil ... if you do not, it will be like adding heat and sweat on their body' [Tanzanian FGD Grandmother]. In Ethiopia, mothers reported application only after the morning bath and in the other sites there was seasonal variation with emollients applied less often in hot weather and several times a day in cooler seasons: 'People do apply oils [in the hot season] but most people don't apply oils in the afternoon.. they think that they will make the baby to feel more warm' [35 year old Tanzanian mother].

The observations found that in Ethiopia application was very thorough and large quantities of butter were used. Application was less systematic and quicker in the other sites with some areas missed during application. The observed mean length of application of 6.2 minutes in Ethiopia, and between 1.2-1.6 minutes in the other sites. In Ethiopia and Tanzania, application involved massage which was sometimes rough and included rubbing, pulling, pressing, manipulating joints and shaping features. In Ekiti, a hot cloth massage and 'exercising' the baby was done after bathing and before emollient application, whilst in Borno this was only practiced by the Bura ethnic group. The hot clothe massage was often intensive and was culturally entrenched: 'My mother ... massaged my baby very well all my effort to stop her was to no

avail.... By the time she did it for about two to three days the baby has got used to being throwing up and down and the crying started reducing gradually' [Ekiti health worker].

In Tanzania, families expressed a preference for coconut oil but some used cooking oil as it was cheaper, brand was not important. In Ekiti, social pressure meant that shop bought emollients were commonly used, with price and brand trust also influencing selection: 'People are only buying those 'Pears' and 'Mimi' to show people that will be coming to greet them when they delivered their babies that they prepared for the baby' [28 year old emollient seller]. In contrast in Ethiopia and amongst the Bura in Borno there was strong social pressure to use homemade butter and shea butter as they were traditional and best for the baby.

During focus groups, mothers and grandmothers tried different types of emollients. Baby oil, sunflower oil and Vaseline were recognized in all sites, with sunflower oil referred to a cooking or vegetable oil. Vaseline was not acceptable for use on newborns in Tanzania, and in Ekiti only in the cool season, as it was believed to make the baby hot. Sunflower oil was considered to come off too fast by the Buras in Borno, but was acceptable in all other sites. Lotions were the least acceptable of the tested emollients in all sites as they were too rapidly absorbed into the skin and were perceived to cause rashes. In Ethiopia, substances with strong smells were disliked as they were believed to cause an illness referred to as 'mitch', however, in the other sites, a nice smell was desired although respondents wanted emollients that were gentle and chemical free.

## **Discussion**

Hospital studies have shown that emollient therapy reduces mortality in preterm infants in Asian settings (4). Emollient therapy could also be beneficial in community settings and for full term babies (10, 11) and community based trials are planned, or underway, in India and Nepal (21, 22). In contrast to the progress being made with emollient therapy in Asia, no trials have been conducted in African settings, this is partly due to a lack of knowledge about current emollient use.

We found emollient use to be a deeply rooted and normative cultural practice in four diverse African sites. Only coconut oil, commonly used in the Tanzanian site, has been previously tested in low income settings, and was found to be beneficial (4). Some of the emollients used in Nigeria, such as engine oil and those containing menthol, are known to be harmful (23), and the counterfeiting and adulteration of products in that setting is worrisome. Given the current widespread use of emollients of unknown benefit, and the potential impact of some emollients on mortality, trials such as those being conducted in Asia are needed in a range of African settings. The results from Asian trials may not be transferrable to African settings given the difference in baseline practices.

Any African newborn emollient trial, or intervention, would need to convince participants to change their current practices. We found reasons for emollient use were similar across sites and were deep rooted. We reported varied preferences across sites in whether emollients were bought or homemade, locally or commercially manufactured, whether single or multiple emollients were used, how they were applied, when application began and on the importance attached to brands, cost and social pressure. Any trial would need to be specifically designed to reflect these contextual differences.

In all sites, except Borno, strong “massage” occurred either during emollient application or as part of bathing, with the potential for injuring the skin. Improving these practices would be essential to address in an emollient trial or intervention, particularly given the possibility that emollients may only work if the skin remains intact (3).

In contrast to our findings a previous review of newborn care studies in Africa, concluded that emollient use may not be a universal practice in the region (8). The reviewed studies did not focus on emollient use per se and respondents may not have reported on it without specific probes. This study provides the first in-depth and comparative data on emollient use in Africa. The use of a standard methodology across sites, multiple methods and a team approach to data collection and analysis improved the rigour of the study, but there is the potential for reporting bias. Data were collected from small geographic areas and the findings may not apply to other areas with the results from the Nigerian sites highlighting that emollient use can vary within a country and between ethnic groups.

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**Table 1: Sample size and method content**

<b>Method</b>	<b>Sample size</b>	<b>Relevant content</b>
Newborn care narratives with mothers who delivered in the last 3 months	- 16-20	- Newborn and skin care practices and reasons for these - Influencers and conductors of emollient application
Observations of babies less than 1 month of age	- 8	- Current bathing and emollient practices
In-depth interviews with families of children under 1 year of age	- 12-16 mothers - 9- 12 grandmothers - 8 fathers	- Newborn/skin care practices - Barriers and facilitators to behaviour change - Desired emollients characteristics
In-depth interviews with health workers and birth attendants	- 8 health workers - 0-12 birth attendants	- Newborn/skin care practices - Barriers and facilitators to behaviour change - Role in newborn care - Desired emollients characteristics
In-depth interviews with emollient sellers	- 8 -10 emollient sellers	- Emollients sold - Their clients - Desired emollient characteristics
Focus groups (mothers and grandmothers of children under 1 year of age, health workers and birth attendants)	- 4 with mothers - 4 with grandmothers - 0-2 with health workers - 0-4 with birth attendants	- Newborn/skin care practices - Barriers and facilitators to behaviour change - Knowledge of brands - Trials of emollients



**Table 2: Emollients applied in each site**

<b>Country</b>	<b>Main substances applied (X/Y= number of narrative women who used each substance)</b>
Ethiopia	<ul style="list-style-type: none"> <li>- Butter (11/16)</li> <li>- 'Vaseline' (3/16)</li> <li>- Hair lotion (2/16)</li> <li>- Nothing applied at time of interview (2/16)</li> </ul>
Tanzania	<ul style="list-style-type: none"> <li>- Coconut oil (11/20)</li> <li>- Cooking oil (9/20)</li> <li>- Baby oil (4/20)</li> </ul>
Borno	<ul style="list-style-type: none"> <li>- Ground nut oil to clean the baby after delivery (6/20)</li> <li>- Other oil to clean the baby after delivery (4/20)</li> <li>- Shea butter (9/10 Bura)</li> <li>- Baby oil (5/10 Kanuri)</li> <li>- 'Olive' oil (3/10 Kanuri)</li> <li>- Mahogany or Neem oil to the fontanelle (9/10 Bura)</li> <li>- Engine oil on circumcision wound (4/4 who had been circumcised)</li> </ul>
Ekiti	<ul style="list-style-type: none"> <li>- Goya 'olive' oil to clean baby after delivery (10/16)*</li> <li>- Other oil to clean baby after delivery (4/16)*</li> <li>- Baby lotions (12/21)</li> <li>- Herbal/medicated creams (4/21)</li> <li>- Shea butter (3/21)</li> <li>- Mentholatum (3/21 to body; 13/21 to the cord)</li> <li>- Engine oil (3/21 to the body; 4/7 on circumcision wound)</li> <li>- Baby oil to the fontanelle (7/21)</li> </ul>

\*Denominator is those who could report on what happened after delivery