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Research

# "Because of mchango, I give my baby gripe water so he sleeps and stops crying": Exclusive breastfeeding and parents' concerns about colic-like symptoms in infants under 6 months in Lake Zone, Tanzania

Hope C. Craig[1a], Cynthia R. Matare[1,2], Stephanie L. Martin[1,3,4], Rosemary A. Kayanda[5], Gina C. Klemm[1], Rachel Bezner Kerr[6], Kirk A. Dearden[5], Luitfrid P. Nnally[7], Katherine L. Dickin[1,8]

[1] Division of Nutritional Sciences, Cornell University, [2] Food and Nutrition Division, Food and Agriculture Organization of the United Nations, [3] Department of Nutrition, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, [4] Carolina Population Center , University of North Carolina at Chapel Hill, [5] Corus International, [6] Department of Global Development, Cornell University, [7] Division of Health, Social Welfare and Nutrition Services, President's Office Regional Administration and Local Government – Dodoma City, [8] Department of Public and Ecosystem Health, Cornell University

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## Background

Effective social and behavior change strategies for exclusive breastfeeding (EBF) rely on understanding how families interpret infant behavior and provide care. Little research thoroughly explores household use of non-prescribed medicine for infants under 6 months in rural Tanzania, which can interrupt EBF and may have other harmful unintended effects.

## Aim

To explore parents' use of non-prescribed medicine in response to infants' colic-like symptoms during the EBF period.

## Methods

We conducted thematic analysis of a series of qualitative, semi-structured interviews with 36 mothers and 30 fathers of infants 0-6 months in Lake Zone, Tanzania. Here, we focus on emergent themes related to concerns about colic-like symptoms and global implications for public health practitioners.

## Results

Parents reported concerns about excessive crying and perceived infant abdominal pain, attributed to a potentially serious disease state locally known as *mchango*. Most parents gave non-prescribed medicines (e.g. gripe water, oral traditional medicine, and/or other commercial medicines) to treat or prevent *mchango* and associated symptoms, often including infant crying. After receiving supportive counselling on soothing techniques, most were willing to avoid giving non-prescribed medicines. Some reported continued challenges attributed to *mchango* symptoms, namely inconsolable crying.

## Conclusion

While symptoms of *mchango* reported in this study overlapped with colic symptoms, literature in Tanzania suggests, in some cases, *mchango* is perceived to have spiritual origins and potentially be dangerous if left untreated. Empathetic counseling can offer parents knowledge and skills to manage colic-like symptoms without using non-prescribed medicines. Health workers need clear messages and training on risks of non-prescribed medicines and Tanzanian legislation banning its promotion and distribution.

a Corresponding author: hcc38@cornell.edu

## INTRODUCTION

Exclusive breastfeeding (EBF) from birth to six months protects against child morbidity and mortality (Victora et al. 2016; World Health Organization 2014). In Tanzania, EBF rapidly declines with child age, from 84% of infants at 0-1 month old to just 27% at 4-5 months old (MOHCDGEC et al. 2015). In 2008, UNICEF/WHO defined EBF as giving only breastmilk without any other food, drink, or water, except "drops, syrups (vitamins, minerals, medicines, or ORS) prescribed by a doctor," (UNICEF and WHO 2012; WHO 2008). More recently, in 2021, UNICEF/WHO updated the EBF indicator detailing that "herbal fluids and similar traditional medicines are counted as fluids [that disrupt exclusive breastfeeding], and infants who consume these are not exclusively breastfed" (UNICEF and WHO 2021).

Around the world, substances that are not medically prescribed are given to infants and young children to address conditions perceived to be related to health, growth and development (Bland et al. 2004; Levy, Webb, and Sellen 2010; Mgongo et al. 2019; Desai et al. 2014; Kerr, Berti, and Chirwa 2007; Radwan and Sapsford 2016). Excessive crying or colicky behavior, for example, is a common problem during the first months of infancy for which substances that interrupt EBF, including gripe water, are provided (Blumenthal 2000; Kerr, Berti, and Chirwa 2007; Bland et al. 2004; Radwan and Sapsford 2016; Jain et al. 2015). While little is known about the causes of excessive crying in otherwise healthy infants, the behavior has effects on both infants and the caregivers concerned with soothing them (Lucassen et al. 1998; Gordon, Gohil, and Banks 2019; Muller et al. 2023). Often, caregivers do not perceive these substances, i.e. gripe water, as being in conflict with EBF; however, their use may have harmful unintended effects, such as reducing breastfeeding frequency and duration (Boskabadi and Bagheri 2015; Levy, Webb, and Sellen 2010). Though prevalent, providing such substances is a barrier largely overlooked in programs promoting EBF and infant health and well-being. In addition, little research thoroughly explores the distinction between global recommendations and local interpretation of EBF. Such differences in understanding could interfere with the effectiveness of campaigns and interventions promoting EBF.

We report parents' motivations for giving non-prescribed medicines to infants 0-6 months in the Lake Zone regions of Tanzania, where the prevalence of EBF up to 6 months is low and under-five mortality is the highest in the country (MOHCDGEC et al. 2015; Liu et al. 2016). This paper reports secondary analysis of qualitative data collected in a research study that tested mothers' and fathers' willingness to try, use and sustain recommended strategies to support EBF up to 6 months (Matare et al. 2019). Here, we call attention to a prominent, emergent EBF barrier in this sample: parental concerns about withholding non-prescribed medicines due to colic-like symptoms in the infant – e.g. crying, perceptions of stomach pain, and occasionally other symptoms – very often referred to as *mchango*. *Mchango* is a condition perceived to be potentially dangerous and sometimes associated with spiritual and cultural origins that can manifest in infants as colic-like and other symptoms (Roth Allen 2001). The Swahili term *mchango* was initially translated in our transcripts as colic. While the condition described by participants resembled what is often referred to as colic, *mchango* was sometimes described by participants as a problem involving spiritual origins and existing literature in Tanzania suggests *mchango* can manifest in a broader range of symptoms than colic alone (Roth Allen 2001; Mgongo et al. 2019). For these reasons, to be as true as possible to participants' voices and remain open to the specific ways that infant distress was perceived in this context, we use the term *mchango* when used by participants, rather than referring to colic. Understanding how parents and other caregivers aim to support infants' health and interpret infants' behavior and temperament is essential for developing effective social and behavior change strategies to support EBF.

## METHODS

### DESIGN

We conducted thematic analyses of a series of qualitative, semi-structured interviews to explore emergent themes related to barriers to EBF. The original research aim was to inform development of programs to support EBF through mixed-methods trials of improved practices (TIPs) (Dickin, Griffiths, and Piwoz 1997). The TIPs method involves repeated household visits to assess current feeding practices, provide tailored recommendations, ask families to choose a new practice, and interview them on their experiences with the new behavior. TIPs is a relatively rapid approach for assessing the acceptability and feasibility of behavior change recommendations in a small sample of households before promoting the behaviors more broadly. In this study, mothers and fathers were recruited to try tailored recommendations to support and improve EBF, and then report their successes, challenges, and other experiences and perceptions. Initial qualitative data analysis identified infant crying and the provision of non-prescribed medicines as an important emergent theme, leading to the focused analysis reported here. Results of parents' experiences with the broader range of EBF recommendations offered during the full TIPs study are reported elsewhere (Matare et al. 2019).

### SETTING AND RELEVANT CONTEXT

The Addressing Stunting in Tanzania Early (ASTUTE) program, known as Mtoto Mwerevu ("Smart Child") in Swahili, was a 5-year initiative to address child stunting in five regions near Lake Victoria in Tanzania. This formative research was designed to inform ASTUTE's social and behavior change communication components. For this study, four wards (two each in Mwanza and Geita regions of rural Tanzania) were purposively selected to maximize variation in access to district town centers and the lake. One village was randomly selected within each ward.

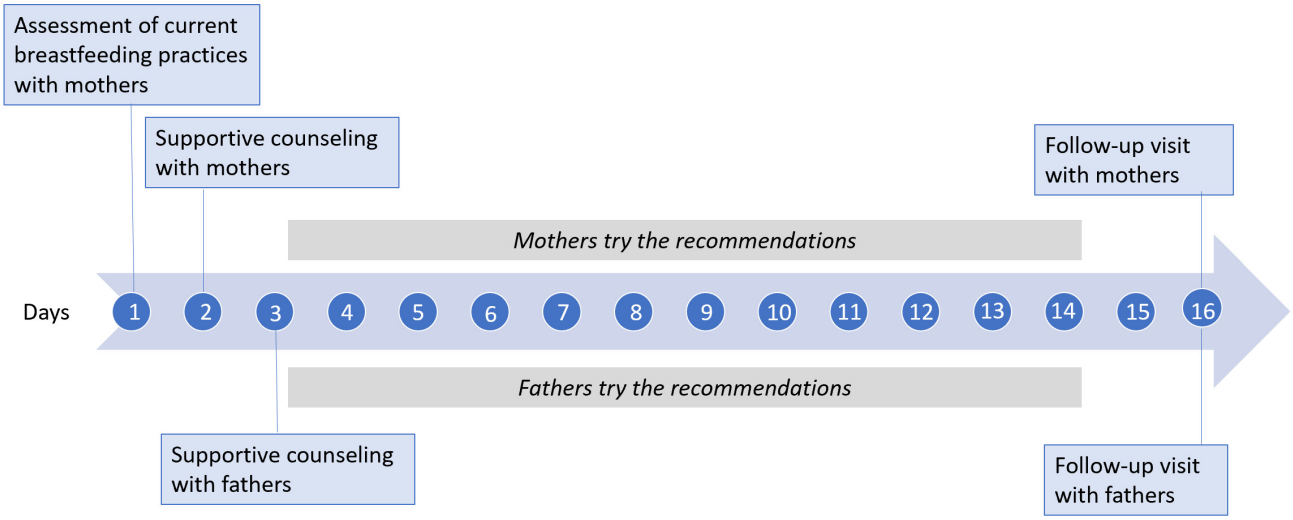


**Figure 1. TIPs Data Collection Procedure**

SAMPLE

Between April and May 2017, we conducted in-depth interviews with 36 mothers of infants 0-5 months. If present and available, husbands of women in the sample were also asked to participate in TIPs; 30 men agreed. Nine women in each of the four villages were purposively selected from a list of eligible mothers compiled by Community Health Workers, to maximize variation in child age, maternal age, education, parity, and average daily time spent away from the youngest child. Women were excluded if <15 years old, not breastfeeding the youngest child, or had plans that would preclude follow-up visits.

DATA COLLECTION

The original TIPs study protocol involved a series of qualitative, semi-structured interviews (Figure 1). Mothers were interviewed three times in their households over a 16-day period. Fathers were interviewed in their households two times over a 2-week period. The first household visit was a child feeding assessment with mothers to assess breastfeeding practices as a basis for providing tailored recommendations. Mothers discussed their experiences breastfeeding, including any support received, and provided an infant diet history, including 1) an open-ended recall of feeding practices since birth, 2) an open-ended 24h recall, and 3) a list-based recall of whether and how often foods/liquids were given in the past 24h and previous week, including medicines provided by the clinic/doctor and medicines provided by someone else. A second visit with mothers on the following day focused on counseling; mothers were offered and asked to select and try tailored recommendations to improve EBF practices (Table 1).

Most fathers participated in an initial focus group discussion on attitudes and practices prior to TIPs, and then fathers received one counseling visit, the day after their partner was counseled, and were asked to choose their own tailored recommendations. Counseling of fathers focused on behaviors to support the recommendations that the mother of their child had chosen the day prior (Table 1). In follow-up visits, two weeks after counseling, mothers and fathers were interviewed separately on experiences with the recommendations they had selected to try. In addition, an open-ended 24h recall and a list-based recall of whether certain food/liquid items were given in the past 24h and previous week were repeated with mothers at the last visit. All interviews were conducted in Swahili. Data collection was part of a larger TIPs study on EBF; details on broader EBF counseling recommendations are reported elsewhere (Matare et al. 2019).

DATA ANALYSIS

Qualitative data from assessment and counselling visits included interviewers' detailed notes taken during the interview, which they translated into English and expanded using audio recordings of the interviews. Qualitative data from follow-up visits included interviews transcribed verbatim from audio recordings and translated into English. Data were coded using ATLAS.ti Version 8 (Scientific Software Development, Berlin, Germany). Coding using the constant comparative method was conducted iteratively with thematic analysis based on the principles of grounded theory (Corbin and Strauss 2008). Quantitative demographic and infant diet data were analysed using Microsoft Excel. This paper reports qualitative analysis of themes specific to parents' perceptions of and experiences with *mchango* and associated symptoms in infants <6 months and how parents' efforts to address these concerns affected breastfeeding practices. Several Swahili words are included in italics when no direct translation was available.

This study was approved by the Cornell University Institutional Review Board and the National Medical Research Institute in Tanzania. All participants gave informed consent prior to participation.

**Table 1. Excerpts from Counseling Guides: Motivating messages to stop giving gripe water and non-prescribed medicines**

| **Problem Identified** | **Giving traditional medicines for treating colic (e.g. gripe water).** | |
|---|---|---|
| | **Mothers' Counseling Guide** | **Fathers' Counseling Guide** |
| **Recommended Practices to Try** | a. Stop giving any medicines that have not been provided at the clinic.<br>b. **For colicky babies:** Soothe or distract the baby in other ways (rock the baby to sleep; hold the baby on their tummy on your hand or lap while rocking the baby and rubbing the baby's back).<br>c. **For colicky babies:** Ask other family members to hold and soothe the baby. | a. Ask your wife and other family members not to give traditional medicines or medicines that have not been provided at the health facility.<br>b. **For colicky babies:** Assist the mother with soothing or distracting the baby in other ways (rock the baby to sleep; hold the baby on their tummy on your hand or lap while rocking the baby and rubbing the baby's back).<br>c. **For colicky babies:** Ask other family members to hold and soothe the baby.<br>d. If baby is sick, go with your wife and baby to see the health worker. |
| **Key Messages/ Question for Counseling** | • Giving only breast milk is the best way to protect baby's health.<br>• Breastmilk protects babies from diseases such as diarrhea, upper respiratory tract infections and other diseases.<br>**For colicky babies:**<br>• Colic in babies is common and not unique to your baby.<br>• Colic cannot be cured. So it is important not to give any medicines. However, your baby will grow out of this colic phase.<br>• It may help to speak or sing softly to your baby while you are rocking or massaging the baby. | • Giving only breast milk is the best way to protect baby's health.<br>• Breastmilk protects babies from diseases such a diarrhea, upper respiratory tract infections, and other diseases.<br>**For colicky babies:**<br>• Colic in babies is common and not unique to your baby.<br>• Colic cannot be cured. So it is important not to give any medicines. However, your baby will grow out of this colic phase.<br>• It may help to speak or sing softly to your baby while you are rocking or massaging the baby.<br>• It may also be helpful to give your wife a break to give her time to rest, by consoling the baby using any techniques that will help to console the baby. |

## RESULTS

Relevant emergent themes are presented from interviews with 30 mother-father couples and 6 mothers who did not have a partner who participated in the study. Mothers' ages ranged from 17 to 45 years old (mean = 27, SD = 8.4). Fathers' ages ranged from 20 to 61 years old (mean = 34, SD = 9.7).

At the assessment visit, less than one-quarter of women (n=8) had heard of the recommendation to exclusively breastfeed. In the open-ended recall of child feeding, it was common for mothers to initially report that their infant did not receive any food/drink other than mother's milk; however, when asked specifically in the list-based recall if the infant was given medicines, the majority of mothers (n=27) said their infant was given something medicinal (non-prescribed or prescribed by a health worker) at least once in the prior week. Twenty-five mothers reported giving non-prescribed medicines, including gripe water (n=16), oral traditional medicine (n=11), and/or other non-prescribed commercial medicines (n=3), including Septrin® (antibiotic) given for *mchango* or diarrhea, and Piriton® (antihistamine) given for flu. Notably, the three infants given non-prescribed commercial medicine were also given gripe water or a traditional medicine. Commercial medicines prescribed by a health worker, including antibiotics and fever reducer, were reported by eight mothers; only two infants given prescribed medicine would be classified as EBF, having received only mother's milk and prescribed medicine, while the remaining six received non-prescribed medicines in addition to the prescribed medicine.

### *MCHANGO* AND ASSOCIATED SYMPTOMS IN INFANTS ARE A CONCERN FOR PARENTS

Parental concerns about *mchango* and subsequent use of non-prescribed medicines that interfere with EBF emerged as a prominent theme in interviews. In more than half of households, parents expressed significant concern about *mchango* and felt it warranted provision of non-prescribed medications. More mothers (n=20) than fathers (n=7) reported *mchango* as a reason for giving treatment.

### REMEDIES FOR *MCHANGO* AND ASSOCIATED SYMPTOMS MAY INTERRUPT EBF

#### *GRIPE WATER AND OTHER COMMERCIAL MEDICINES*

Gripe water was the most common non-prescribed medicine reported at the assessment visit (n=16). Typically, mothers reported that gripe water was given to treat *mchango* and associated symptoms so the baby would stop crying and sleep. One mother said gripe water treated *mchango* by cleaning the baby's stomach and another mother gave gripe water to reduce perceived thirst. Most

often, gripe water was obtained at local drug dispensing shops[1] without a prescription. One mother, however, received gripe water from a doctor and another mother was told by health workers that it is better to give gripe water than traditional medicine. Most of the mothers giving gripe water gave it multiple times in the previous day and 4-7 days in the previous week (n=13). Seven of these mothers reported giving gripe water three times during the day preceding the interview and the 7 days preceding the interview; one reported giving gripe water to her three-week old infant every day since birth.

*TRADITIONAL MEDICINES*

Traditional herbal medicines made from local plants such as *mnengonengo* (Latin name: *Securidaca longipedunculata*) were another common treatment reported at the assessment visit. Though it was beyond the scope of this research to investigate the composition of the traditional treatments, several different herbal medicines were reported. Most mothers reported the medicines were given orally (n=11), while two mothers reported applying traditional herbal medicine to the nipple before initiating breastfeeding so the baby could ingest the medicine at the breast. Other non-oral use of traditional medicines was less common, including external application to the baby's fontanel (n=1), or to the baby's forehead and stomach (n=1) as well as being held beneath the baby's nose to smell/inhale (n=1). Beyond excessive crying, mothers reported giving traditional medicines for a diverse set of symptoms associated with *mchango*, including swelling and heating of the child's genitals (n=1), *mchango* of the head (n=1), chest pain or difficulty breathing (n=1), and foaming or spitting bubbles at the mouth while crying (n=1). One mother who gave traditional medicines reported *mchango* caused a line to appear on the child's head and the child became cold and shivered. Three mothers who gave traditional medicine reported that *mchango* symptoms are worse when the weather is cloudy; one mother said symptoms are worse at night and on cold mornings. Access to, information about, and advice to use traditional herbal medicines often came from elder family members, including the infant's grandmother or grandfather, neighbors and other mothers in the village.

SUPPORTIVE COUNSELING INCREASED EBF IN THE CONTEXT OF *MCHANGO* AND ASSOCIATED SYMPTOMS

After assessment identified these practices, mothers and fathers were counselled on the dangers of giving gripe water and non-prescribed medicines and were encouraged to avoid using them (Table 1). Subsequently, parents were offered tailored recommendations to try, such as using soothing techniques to calm the baby, seeking support from other family members, and taking the baby to the clinic if they were worried about the baby's health (Table 1). After receiving supportive counselling with motivating messages, most parents were willing and chose to stop giving gripe water and other non-prescribed medicines. Counseling was also provided on improved breastfeeding practices (e.g. increased frequency), as reported elsewhere (Matare et al. 2019), and some families chose to make multiple behavioral changes.

At the final follow-up visit, only one mother reported giving gripe water and said it was advised by a health worker; all other households reported stopping use of gripe water. Mothers' and fathers' experiences with the recommendations were closely tied to perceptions of the child's temperament, specifically crying and sleeping patterns, as well as gendered childcare expectations of mothers as primary caregivers. Some parents reported less intensity and frequency of crying, often together with the infant sleeping well and more often. For mothers especially, this was cited as a positive outcome that gave them more time to complete other activities without being disturbed by the baby. These outcomes also made it easier for parents to practice the recommendations and, in many cases, validated the practices as acceptable strategies to treat *mchango* symptoms:

> *We even tried [to soothe the baby] last night, the child cried a lot... We carried him on the back, but it failed. We tried breastfeeding him, but he refused... Finally, his mother decided to lay him on her lap while rocking him; that's when he slept.*
> *– 49-year-old father of 1-month old son*
> *I have found [the soothing recommendation] to be very useful... she stops crying and the stomach pain ceases to the point that she sleeps.*
> *– 42-year-old mother of 1-month-old daughter*

Further, parents were motivated by new understanding about children's temperament and potentially harmful ingredients of gripe water and other non-prescribed medicines:

> *The child did not trouble me anymore. Now, I realize that I just wasted my money [when I bought gripe water] ... I was told that it was mixed with alcohol, so I felt I saved my child from that problem, too.*
> *– 41-year-old mother of 2-month-old son*

1 These outlets are officially known as Accredited Drug Dispensing Outlet (ADDO). The Swahili word for ADDO is *duka la dawa*. They are popularly known as "*maduka ya dawa muhimu,*" while others refer to these outlets as "*duka la dawa baridi*" (Ndaki et al. 2021). Though they are required to be registered, some are unregistered. Registered ADDOs are not permitted to sell drugs, such as antibiotics, which require strict guidance from a professional pharmacist. They are often allowed to sell remedies for fever, flu, some skin conditions, oral hygiene and other essential drugs which are not potentially detrimental to health. We did not ascertain whether the outlets where gripe water was obtained by our parents were accredited or otherwise.

### PERSISTENT CHALLENGES RELATED TO CRYING BABY

At follow-up, however, some parents continued to express concerns about the baby crying and difficulty calming the baby, including parents who gave only breast milk and no other food, drink or medicine. Despite trying soothing techniques, some parents continued to struggle with babies' distress. One or both parents of eight infants, including five mothers and six fathers, reported it was difficult to use soothing techniques instead of non-prescribed medicines because the baby was crying a lot and refused to calm down, particularly at night. Younger mothers, ranging in age from 18 to 23 years old, reported difficulty dealing with crying more often than older mothers.

> *The trouble is dealing with the baby while he is crying. I find it hard, that is why I give him medicine so that he calms down.*
> *– 23-year-old mother of 3-month-old son*
> *The challenge is when you look at the baby, she continues to cry even when breastfed… when the baby cries a lot, we wake up our parents and ask them why is the baby crying a lot [then] we rock the baby till she/he fall asleep.*
> *– 20-year-old father of 4-month-old daughter*

A few parents, perceiving *mchango* to be a very serious condition, worried that withholding "medicine" could cause harm to the child or prolong pain. Several women also reported their partners negatively reacted to the baby crying:

> *The difficult part can be that when the child cries due to mchango, you might calm him down, but he refuses. You breastfeed him, but he refuses. The last option you will have is to give the medicine [gripe water] to him… Another difficulty comes along when you do not give the medicine to the child, his father gets mad and you end up giving the child the medicine.*
> *– 21-year-old mother of 1-month-old son*
> *It was difficult when the baby was crying a lot and I would ask myself with no answers as whether I should give the baby medications or not.*
> *– 22-year-old mother of 2-week-old son*

These difficulties led some participants to question the effectiveness of the recommendations and made it challenging for others to continue following them.

## DISCUSSION

Understanding the social and cultural contexts that impact how mothers and fathers interpret and practice EBF is essential to develop acceptable, feasible and effective recommendations. Our results highlight how parental concerns about *mchango* may have led to unnecessary and potentially harmful attempts to treat or manage symptoms such as crying, which interrupt EBF as defined by UNICEF/WHO. Similar to Western conceptions of colic, *mchango* symptoms in infants included perceived infant stomach/abdominal pain and excessive crying. *Mchango*, however, was also perceived as a potentially serious illness in infants including a broader set of symptoms, and was the most common rationale for giving babies gripe water or non-prescribed medicines during the first six months. Concerns and perceptions related to *mchango* and associated symptoms, including excessive crying, need to be addressed so parents feel supported and able to avoid interference with EBF. Our results highlight the importance of understanding parents' perceptions of infant health behavior as concerns about *mchango* and its associated symptoms, for example, may differ from Western conceptions of infant health in ways that are relevant for designing effective EBF programming.

Concerns about colic-like symptoms in infants, including excessive crying and perceived abdominal pain similar to *mchango,* have been reported elsewhere in Tanzania (Leshabari et al. 2006; Maonga et al. 2016; Mgongo et al. 2019) and Eastern and Southern Africa (Bland et al. 2004; Levy, Webb, and Sellen 2010; Desai et al. 2014; Kerr, Berti, and Chirwa 2007). In a study in Kilimanjaro Region, Tanzania, Mgongo and colleagues report mothers' concerns regarding what they refer to as *chango,*[2] a problem with their children occurring during or after breastfeeding. In addition to colic-like symptoms of abdominal pain, crying, and refusal to breastfeed, *chango* is associated with symptoms including "the child is born with black lips, has a black line in the middle of the tongue, and has a hard tummy," (Mgongo et al. 2019). The symptoms reported by Mgongo *et al*. and in the current study are evidence that local perceptions of *chango,* or *mchango,* in infants include symptoms broader than those of colic alone. A Swahili word meaning "worms," *mchango* is conceived as including a range of conditions across the lifespan, including infertility, menstrual pains, epileptic fits in young children and impotence in men (Roth Allen 2002); occurrence in infancy is not well described in the literature. Anthropological and ethnographic documentation of *mchango* suggests an association with spiritual origins, also in this way differing from Western conceptions of colic. Because *mchango* is perceived as a condition with supernatural aspects, treatment is often sought from traditional healers or through traditional medicines recommended by others in one's social circles rather than in clinical or commercial settings (Oberländer and Elverdan 2000; Roth Allen 2002; Mubyazi et al. 2005; Mgongo et al. 2019). To adequately address parents' concerns, additional qualitative research to elucidate perceptions of *mchango* symptoms, causality, and treatment in infants is needed.

Guidance on when medicine is appropriate for infants 0-6 months may be unclear for parents, especially when, in some cases, trained health workers prescribe medicines that are contraindicated for use in infancy (UNICEF and WHO 2021). Furthermore, some mothers believed themselves to be giving only mother's milk or exclusively breastfeeding (which translates to "feeding only mother's milk"

2 The use and spelling of "chango" and "mchango" reflect regional differences in Swahili dialects.

in Swahili), despite the provision of gripe water – a phenomenon also reported elsewhere (Levy, Webb, and Sellen 2010). This suggests important disconnects between global EBF indicators/recommendations, mothers' knowledge regarding EBF, and how that knowledge is translated into feeding and care practices, particularly in the context of *mchango* and related colic-like symptoms. Mgongo et al. highlight how differences in beliefs and understandings of the infant's condition may also contribute to miscommunication between parents and health workers, particularly if mothers perceive *mchango* in the infant but health workers do not; such disagreement may lead parents to seek help outside of trained healthcare providers (Mgongo et al. 2019).

In the current study, some parents noted that health workers recommended gripe water as a "better" remedy than traditional medicines for *mchango*. The composition of traditional herbal medicines varies widely. Particularly when given orally, these medicines may unintentionally expose the infant to harmful substances due to the composition of the medicine itself or the preparation, storage or feeding practices involved. However, this recommendation suggests to parents that gripe water is a suitable option for infants when, in fact, gripe water is listed specifically in the Tanzania Food, Drugs and Cosmetics (Marketing of Foods and Designated Products for Infants and Young Children) Regulations, 2013, as a designated product that should *not* be promoted by health workers, traders, distributors or their agents (Tanzania Food Drugs and Cosmetics 2013). Results thereby highlight how parents may receive contradictory information.

For more than half a century, extensive literature has highlighted challenges related to excessive crying during infancy, particularly during the first few months, and how this infant behavior affects parents' care and feeding decisions (Vilar-Compte et al. 2022; Hytten, Yorston, and Thomson 1958; Karaçam 2008; Howard et al. 2006). Despite its longstanding universality, no definitive cause of colicky behavior such as excessive crying has been identified, though various theories posit factors assumed to play a role, including gastrointestinal, neurological, and psychosocial considerations.

Research around the world suggests infants' excessive crying may contribute to low breastfeeding self-efficacy and mothers' and other family members' perception of mother's milk insufficiency, particularly as the infant grows older (Douglas and Hill 2011; Ejie et al. 2021). Breastfeeding self-efficacy can be a strong predictor of exclusive breastfeeding (Loke and Chan 2013; Tuthill et al. 2016; Miller et al. 2022; Dearden et al. 2002). In a study of infantile colic and breastfeeding in Turkey, mothers' breastfeeding self-efficacy and breastfeeding success were inversely related to colic severity (Aktaş and Küçük Alemdar 2019). Other evidence highlights that infant crying was a main reason why mothers considered their milk to be inadequate (Sacco et al. 2006; Mgongo et al. 2019). In our study, younger mothers reported difficulty dealing with crying more often than older mothers. Strategies are needed to address challenges related to excessive crying in sociocultural contexts, considering how maternal age, breastfeeding self-efficacy and related factors, such as presence or absence of social support, may influence breastfeeding practices. Additional research with health workers and other family members, including grandmothers and grandfathers, is needed to better understand how the wider family influences EBF practices in the context of *mchango* and associated colicky symptoms.

Messages that assure parents of the universality of colicky behavior and explain that excessive crying typically resolves with age may be effective and motivating. It is also essential to build skills for comforting and soothing a crying baby without resorting to gripe water and non-prescribed medications. Normalization of colic symptoms, like excessive crying, however, may overlook the negative effects that these symptoms can have on family relationships (Barr 1990). Studies have also found that families dealing with colic-like symptoms also report dealing with more difficulty in communication, parental anxiety and unresolved conflicts between parents (Garg 2004; Salvatore et al. 2018). In our study, several mothers reported that their partners got angry when the baby would not stop crying, suggesting that including family members in counseling on breastfeeding is advisable. Some fathers in our TIPs found it acceptable and feasible to assist their wives in calming, carrying and soothing the crying baby, contrasting with social norms and expectations in this context where it is atypical for fathers to spend time nurturing and caring for infants and young children (Matare et al. 2019). Strategies that rely on tailored counseling and include messages and skills for fathers and other family members, i.e. grandmothers and grandfathers, may increase support for exclusive breastfeeding and program success (Martin et al. 2020; Mcfadden et al. 2017).

Of note is the limited evidence on the effectiveness and safety of strategies for managing excessive crying, particularly in the context of infantile colic (Gordon, Gohil, and Banks 2019). To mitigate parenting stress and to support women to exclusively breastfeed, it is essential that families and caregivers be listened to and offered reassurance and support when dealing with infant health concerns and excessive and inconsolable crying. Empathetic counseling and reassurance to mothers and fathers may be most suitable to mitigate parenting stress related to colicky behavior and support and assist women to EBF. It is worth noting that in our study, parents' ability to reduce gripe water reflected not only recommendations to stop giving gripe water but also other recommendations to support breastfeeding practices, such as increased frequency of breastfeeding (including breastfeeding more frequently and fully) and soothing techniques (Matare et al. 2019). The combination of these behavioral changes enabled parents to experience positive results when avoiding gripe water, and also supported improvements in breastfeeding behaviors.

Ideally, health workers' role in the management of crying and other *mchango* symptoms is to exclude serious causes of the symptoms and offer sympathetic, balanced advice on treatment (Garg 2004). Supportive counseling and parental reassurance offer a foundation for treatment of the most prevalent colic-like symptoms of *mchango* and

should be included in healthcare communication for parents of infants 0-6 months. There is need for training and counseling on EBF to ensure health workers and parents alike are equipped with knowledge and skills to effectively implement national protocols and adopt recommended practices, including avoiding gripe water, using acceptable soothing techniques, responding to babies' cues, and providing responsive caregiving. Such support may reduce the potentially harmful use of gripe water and other non-prescribed medicines among infants 0-6 months in Tanzania and improve EBF behavior.

Gripe water, the most common treatment for *mchango* in this study, is typically composed of dill seed oil and sodium bicarbonate, among other substances, dissolved in, in some cases, as much as 9% alcohol (Adhisivam 2012). Despite bans and restrictions in many high-income countries (Blumenthal 2000), gripe water remains readily available around the world and is marketed to treat symptoms associated with infantile colic (Bland et al. 2004; Oshikoya, Senbanjo, and Njokanma 2009; Jain et al. 2015; Goosen, McLachlan, and Schübl 2014). Parents in this study reported varying perceptions of the efficacy of gripe water. Mothers reported it was useful because babies given gripe water slept and stopped crying, enabling mothers to complete other work. In addition, the desire to tangibly respond to uncontrollable crying may motivate parents to give gripe water. Though the effects of gripe water remain largely unknown, the pacifying properties of alcohol in its formulation can mask symptoms of other serious illnesses (Akkamamba, Padmanalini, and Sunil 2017). By increasing babies' sleep time, gripe water may also interfere with breastfeeding frequency and duration, thereby reducing mothers' milk supply and contributing to a cycle in which the baby cries more as a hunger cue, which is then perceived as symptoms of colic or *mchango*. In addition, limited knowledge about gripe water coupled with the availability and acceptability of the product result in over-utilization of gripe water to infants, thereby risking excessive exposure to alcohol. There is a need to inform parents on the lack of evidence on the efficacy and the potential risks of gripe water and to take action to restrict misleading promotion of these products.

### STRENGTHS AND LIMITATIONS

This study collected information about parents' experiences with recommendations to avoid giving non-prescribed medicines to their infants. By including both mothers' and fathers' perspectives, this study offers family-based results to strengthen fathers' engagement in exclusive breastfeeding promotion and programming as well as responsive caregiving in line with the Nurturing Care Framework (WHO, UNICEF, and World Bank 2018). In addition, this analysis was based on the emergent finding that parental concern and response to the colic-like symptoms of *mchango* interfered with full adherence to EBF recommendations in so many of the families in our sample. By following up on the challenges expressed by parents, this study provides important insights into factors that motivate infant feeding practices in this context.

Parents' positive response and reported uptake of recommended behaviors provides helpful evidence on acceptability of messages and practices, but may reflect social desirability bias, particularly as we rely on self-reported infant feeding histories and trial practices. Interviewers, however, were trained to build rapport to enhance data quality, which was aided by repeated visits to each participant. The willingness of some participants to discuss their inability to continue following some recommendations is evidence that this rapport did counteract the tendency to give socially desirable responses in at least some cases. The TIPs approach provides data from actual selection and trial of new behaviors, but the two-week duration represents only short-term change and we do not have data on longer-term adoption of behaviors. As with many qualitative research results, the small and select sample calls for caution when interpreting and applying the results more broadly.

## CONCLUSIONS

Despite national policy promoting EBF and parental reports of only giving mother's milk, the common use of gripe water and non-prescribed medicines in these regions of Tanzania is an under-recognized barrier to EBF as defined by UNICEF/WHO. Effective promotion of EBF requires understanding local perceptions of infant behavior and the challenges faced by parents. Parents concerned about excessive crying, viewed as symptomatic of a potentially serious disease state known as *mchango*, need empathetic and culturally-sensitive counseling that provides knowledge and skills for managing colic-like symptoms without the use of non-prescribed medicines. Clear guidelines, counseling tools and training for health workers is recommended, including information on Tanzania's drug regulations related to IYCF, as well as full enforcement of these regulations for more effective protection, promotion, and support of optimal breastfeeding practices.

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