BMJ Open

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Journal:	*BMJ Open*
Manuscript ID	bmjopen-2018-025471
Article Type:	Research
Date Submitted by the Author:	31-Jul-2018
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Keywords:	infant, newborn, postnatal care, QUALITATIVE RESEARCH, care seeking, Cambodia

Parent and family perspectives on home-based newborn care practices in lower-income countries: a systematic review of qualitative studies

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Keywords: infant, newborn, post-natal care, care seeking, qualitative research, health equity

Word count: 3005
Figures: 1
Tables: 3

ABSTRACT

Objectives

To understand family and parent perspectives on essential care provided to infants in the first 28 days of life, in order to inform behavioral interventions for improving home care in low income countries, where the majority of newborn deaths occur.

Design

A comprehensive, qualitative systematic review was conducted. MEDLINE/PubMed, Embase, and Cumulative Index of Nursing and Allied Health databases were systematically searched for studies examining the views of parents and family members on newborn care at home. The search period included all studies published from 2006 to 2017. Studies using qualitative approaches or mixed-methods studies with substantial use of qualitative techniques in both the methods and analysis sections were included. Studies meeting the inclusion criteria were abstracted and evaluated using Critical Appraisal Skills Programme guidelines. Following the initial selection and appraisal, barriers and facilitators to recommended care practices across several domains were synthesized.

Results

Of 411 results retrieved, 37 met both inclusion and quality appraisal criteria for methodology and reporting. Geographic representation largely reflected that of newborn health outcomes globally, with the majority of studies conducted in the region of Sub-Saharan Africa and South Asia. Specific barriers and facilitators were identified among a range of domains including: cord care, drying and wrapping, thermal control, skin to skin contact, hygiene, breast feeding, care seeking for illness, low birth weight recognition. Cross cutting facilitators, common to all domains were also evident, including delivering at a health facility, including female relatives in counseling, lower health care costs, and exposure to newborn care messaging in the community.

Conclusions

When designing behavioral interventions to address newborn mortality at scale, policy makers and practitioners must include barriers and facilitators important to families in low income settings.

Review registration number CRD42016035674.

Article Summary

Strengths and limitations:

- Strengths of the review include having had a librarian/information scientist in the research team, and multiple reviewers experienced in qualitative research, data collection, and analysis.
- Another strength of the study was the comprehensive search strategy; assessment and scoring of quality and confidence placed in the findings based on guidelines; and a comprehensive description of study findings.
- Limitations included: the exclusion of documents not available in English, and those that may have been relevant but were outside the defined date limitations.

Introduction

Approximately 46% of all under-five deaths in 2016 occurred during the neonatal period, the initial 28 days following birth. Southern Asia and sub-Saharan Africa account for nearly 80 percent of the newborn deaths. By 2030, the Sustainable Development Goals (SDG) target to reduce neonatal mortality to at least as low as 12 per 1,000 live births. However, per current trends, over 50 countries will fail to meet this target on newborn survival.[1] Yet, the majority of these deaths are preventable.[2]

During the neonatal period, care provided by parents and caregivers is critical for newborn survival.[3] In order to ensure that newborns both survive and thrive, parents and caregivers must provide nurturing care in the form of good health, adequate nutrition, safety and security, and responsive caregiving.[4] The provision of quality, effective care at the home

and community level is critical for improving newborn health outcomes and promoting optimal early childhood development. A reduction in neonatal mortality by 25% can be achieved by scaling up community interventions alone.[5] Although feasible interventions exist to reduce newborn mortality, uptake of the interventions is low.[6]

In order to increase scale up of coverage and implementation of effective home and community-based newborn care practices, providing data on research priorities for newborn health is key.[7] Researchers have identified specific domains related to caregiver perceptions and behaviors as priorities.[8] Qualitative research was deemed particularly useful for obtaining information on newborn care practices, which vary based on the sociocultural context in low-income countries.[9]

Despite the existence of multiple individual qualitative and formative research studies on home and community-based newborn care, a systematic review of the available qualitative research is lacking. Therefore, we conducted a systematic review to provide data to improve both programming and policy for home and community care for newborns.[7]

The primary objective of this study was to systematically review qualitative literature related to parent and family experiences with newborn care practice in low-income countries, synthesizing information related to barriers and facilitators to inform interventions focused on improving newborn survival, care and development.

Methods

This systematic review was registered with the International Prospective Register of Systematic Reviews (PROSPERO): registration number CRD42016035674. The review followed

guidelines from the Enhancing Transparency in Reporting the Synthesis of Qualitative Research (ENTREQ) statement.[i] Due to the emphasis on qualitative research, the review primarily employed the ENTREQ guidelines for reporting, while also drawing guidance from PRISMA, which is more specific to the requirements of quantitative literature reviews.[10,11]

Newborn care practices were defined as all actions taken by parents/caregivers that provide for the essential biological, physiological and psychological needs of the newborn infant following delivery and up to the end of the newborn period (28 days of life). These included, but were not limited to, the essential newborn care practices as defined in the international reference literature such as cord care, drying and wrapping after delivery, initiation of breast feeding, bathing, thermal control, breast feeding and care seeking for newborn illness.[12]

Inclusion and exclusion criteria

Studies were included if they used qualitative data collection methods such as interviews, focus groups, direct observation, and participatory action research. Inclusion requirements also stipulated that studies needed to have a well-described methodology section and a clear description of the qualitative data analysis methods and process (e.g., grounded theory, narrative analysis, content analysis, thematic analysis). Finally, data must have been directly obtained from parents or caregivers of newborns (infants under 28 days of age, including low birthweight or small babies), whether born at home or at a facility, with or without skilled attendance. Caregivers were defined as mothers/fathers or other adult family or community members who provided day-to-day physical and psychological support to meet the basic needs of newborn infants. Community health workers were not considered as caregivers.

Excluded studies were those for which it was difficult to extract qualitative data (e.g., mixed methods studies without clearly labeled data, or studies in settings where perceptions of parents/caregivers experiences of newborn care practices could not be clearly identified, such as summaries or aggregate data). Commentaries, protocols, and systematic reviews were not included in the analysis. Additionally, studies from countries other than those defined by the World Bank as low-income countries and lower-middle income countries (which have a Gross National Income per capita of less than $4,125) were excluded.[13]

Search strategy

Studies published in English language from 2006-2017 were explored. The following electronic databases were searched: MEDLINE (PubMed), Embase, Cumulative Index to Nursing and Allied Health Literature (CINAHL: EBSCOhost). A health sciences librarian (RH) developed the database searching strategy and conducted the final searches. The initial search strategy was developed for MEDLINE and then adapted for other databases. Medical Subject Headings (MeSH) were used followed by free-text terms using controlled vocabulary (see the Appendix for a detailed description of the search strategy). Only articles in English were included due to potential difficulties in translating and interpreting foreign language qualitative data by native English-speaking reviewers, and to ensure that the review covered the most current literature on infant and young child feeding practices.

Figure 1 presents the selection process which followed the PRISMA guidelines for reporting of systematic reviews.[11] Search results were initially imported into Endnote reference management software (Thomson Reuters (Scientific) LLC) and duplicates and irrelevant studies were removed. Four independent reviewers screened study titles and abstracts for suitability

against inclusion and exclusion criteria. The decision to include or exclude a study was required by two reviewers. If after consultation a decision wasn't reached, a third reviewer (AK) made the final decision.

Figure 1. Selection flow chart of review process

See attached figure file

Data extraction

For organization of extracted data, a unified matrix was utilized to record specific characteristics of included studies. Extracted data included reference details (author/data/publication), methodological approach (e.g., interviews/focus groups), conceptual framework (e.g., Grounded Theory), objectives or aims of the study, sampling methodology, socio-demographic characteristics of participants, country/region, and analysis method(s). The initial results of the selection process and data abstraction, with selected characteristics, are presented in **Table 1**.

Quality appraisal

Each selected article was initially assessed according to the Critical Appraisal Skills Program checklist [14] to ensure quality and internal validity. Selected studies met minimum criteria defined through the checklist including domains such as appropriateness of study design, data collection techniques, and analysis methods. Appraisal results are presented in Table 2 using the following questions for analysis:

1. Was there a clear statement of the aims of the research?
2. Is a qualitative methodology appropriate?
3. Was the research design appropriate to address the aims of the research?
4. Was the recruitment strategy appropriate to the aims of the research?
5. Was the data collected in a way that addressed the research issue?
6. Has the relationship between researcher and participants been adequately considered?
7. Have ethical issues been taken into consideration?
8. Was the data analysis sufficiently rigorous?
9. Is there a clear statement of findings?
10. How valuable is the research?

Possible Responses: Yes, No, and Cannot assess due to missing information

Table 2. CASP Criteria Analysis

Following data abstraction, data from the results, discussion and conclusion sections were imported into NVivo 11 qualitative software (NVivo qualitative data analysis software; QSR International Pty Ltd. Version 11, 2015). Content analysis was employed to identify domains for investigation and presentation. A narrative summary of the identified domains and themes was reviewed by the research team (SE, ANB, EFK) to produce a consensus-based listing including barriers and facilitators to recommended newborn care practices.

RESULTS

Geographic overview of studies reviewed

The vast majority of studies identified emerged from research carried out in the Sub-Saharan region, while the South Asian region was also well represented in the qualitative literature relating to newborn care practices at home.

Sub-Saharan Africa

Studies from the African region comprised 24 of 37 included for review, and information presented in the studies described the full range of home based newborn care practices.

South Asia

From the South Asian region, 8 of 37 studies presented information on newborn care practices, covering more general rather than specific domains of newborn care, though one focused on breastfeeding.

Southeast Asia

Three studies, two related to breastfeeding in Cambodia and Lao PDR, along with another from Cambodia related to skin care, were identified from the Southeast Asian region.

Latin America / Caribbean

Two qualitative studies were identified from the Latin America/Caribbean region, from Guatemala and Haiti, related to breastfeeding and cord care respectively.

Barriers and facilitators

A comprehensive list of barriers and facilitators stratified by the recommended care practice that were generated through the data synthesis exercise appears in **Table 3**. For each domain of newborn care, study findings were extracted, and information on barriers and facilitators synthesized. Among the 37 studies in this review, many of the reported barriers and facilitators were cross-cutting for recommended newborn care practices (i.e. cord care, drying and wrapping after delivery, prompt initiation of breast feeding, bathing, thermal control, breast feeding and care seeking for newborn illness). Across all practices, delivering at a health facility, including grandmothers in decision-making processes during and after pregnancy, low health care costs, and exposure to newborn care messaging in the community were reported as important facilitators for adoption of recommended newborn care practices. Common barriers

across the recommended practices included traditional and historical beliefs and practices, cultural and gender norms, geographic location, conflicting health messaging, and societal pressures.

Barriers that influenced adoption of recommended **cord care practices** included lack of resources (e.g. clean water and razor blades), misinformation on timeliness of cord cutting, religious and cultural beliefs, and untrained birth attendants. Facilitators included institutional delivery, exposure to educational campaigns on safe and hygienic cord cutting practices, community outreach activities promoting handwashing and provision of clean razor blades, decision-making by grandmothers and women leaders, and cord-care counseling by TBAs.

Barriers to timely **drying and wrapping** included perceptions of newborn vulnerability and dirtiness, conflicting advice household stakeholders, and waiting for delivery of the placenta. Facilitators included institutional delivery, exposure to educational campaigns on newborn thermal regulation, traditional wrapping practices, and the presence of two TBAs during delivery.

Factors impeding **delayed bathing** included societal pressure for cleanliness, preference for immediate bathing due to concerns about ritual pollution and hypothermia, negative perceptions of the vernix, and immediate bathing at health facilities. Factors that facilitated delayed bathing after delivery included hospital-based birth, exposure to newborn care messaging on the radio during pregnancy, communication between health care workers in the

community and at the facility during pregnancy, and social support from other women in the household.

Factors inhibiting **skin-to-skin care** and **thermal control** practices included use of blankets instead of skin-to-skin contact, not immediately releasing baby to mother following delivery, early bathing, concerns of disease transmission, and maternal household duties. Facilitators included exposure to kangaroo care messaging during pregnancy, observing positive newborn health outcomes of other mothers who used kangaroo care practices, medical advice from health care providers, and prior participation in behavior change interventions.

Barriers to **care-seeking for illness** included lack of transport, minimal financial resources, distances to health facility, gender norms, prior negative experiences at health facilities, and cultural norms such as protective isolation during the postpartum period. Facilitators included family knowledge and recognition of danger signs and illness symptoms, lower health care costs, community education and support from religious leaders, and exposure to newborn health campaigns.

Barriers to **initiating breastfeed**ing included spatial/physical isolation, conflicting health messages, mother exhaustion, baby not crying for milk, historical and traditional beliefs to discard colostrum, and education. Facilitating factors included community and family member knowledge, information provided during health facility-based birth, attendance by trained TBAs, being a first time mother, and exposure to breast feeding education and policy

campaigns.

DISCUSSION

This systematic review of qualitative research is an important step to providing data specifically relevant to behavior change in settings where high newborn mortality continues. Effective behavior change interventions to improve newborn survival and development require information on a number of complex factors related to essential newborn care. Policy recommendations and current approaches to reducing newborn mortality have not yet been appropriately scaled to reduce newborn mortality to levels targeted by the Sustainable Development Goals.[15] Behavioral interventions are ideally targeted to specific populations and knowledge of those populations is best informed by the type of qualitative data synthesized in this review.[16]

Conclusions

This systematic review identified studies related to the experiences and first-hand accounts of family members and caregivers responsible for providing essential newborn care services following delivery up to the first 28 days of life. The review identified barriers and facilitators commonly reported in studies related to newborn care best practices. The findings presented here are directly applicable to social and behavioral change initiatives aimed at improving newborn care practices for better newborn health outcomes in low resource settings.

Table 1. Results of literature selection process

No.	Author(s)	Year	Qualitative Methods	Participants	Country (s)	Newborn Care Practices
1	Aborigo, Moyer, Rominski, et al.	2012	In depth interviews (IDI), Focus Group Discussions (FGD)	Mothers, health care providers, TBA, community leaders, grandmothers, compound heads, heads of households	Ghana	Breastfeeding practices
2	Adejuyigbe, Bee, Amare et al.	2015	IDI, Narrative Interviews, and Observations (O)	Mothers, fathers, health workers, grandmothers, TBA	Nigeria, Tanzania, Ethiopia	Thermal care and bathing
3	Alam, Ali, Sultana et al.	2008	IDI, O	Mothers, fathers, grandmother, family members, TBA	Bangladesh	Cord care practices
4	Amare	2014	IDI	Mothers, grandmothers, TBA	Ethiopia	Cord care practices
5	Amare, Shamba, Manzi, et al.	2015	IDI, FGD, (O)	Mothers, fathers, health workers, TBA, grandmothers, merchants	Four African sites	Emollient use for skin care
6	Atyeo, Frank, Vail et al.	2017	Semi structured interviews (SSI)	Mothers	Guatemala	Breastfeeding practices
7	Bazzano, Kirkwood, Tawiah-Agyeman, et al.	2008	IDI, FGD, Participant Observation, Case Study (CS), SSI	Mothers, grandmothers, health providers, community members	Ghana	Care seeking behaviors
8	Bazzano, Oberhelman, Potts et al.	2015	IDI, O, FGD, visual media	Mothers, grandmothers, fathers	Cambodia	Breastfeeding practices
9	Bazzano, Var, Grossman, et al.	2017	O, SSI	Mothers	Cambodia	Newborn care practices with emphasis on use of emollients
10	Byaruhanga, Nsungwa-Sabiiti, Kiguli, et al.	2011	IDI, FGD	Mothers, TBA, elderly care takers	Uganda	Care seeking behaviors
11	Degefie, Amare, and Mulligan	2014	IDI, Key informant interviews (KII)	Mothers, grandmothers, TBA, fathers	Ethiopia	General care practices
12	Dhinga, Gittelsohn, Suleiman, et al.	2014	IDI, FGD	Mothers, fathers, TBA, grandmothers, health care providers	Tanzania	Cord care practices
13	Engmann et al.	2013	IDI, FGD	Mothers, grandmothers, health care providers	Ghana	Newborn illness, danger signs, and care seeking behavior
14	Gondwe, Munthali, Ashorn, et al.	2014	IDI, FGD	Mothers, fathers, TBA, grandmothers, traditional healers,	Malawi	Pre-term birth and care seeking practices
15	Herlihy, Shaikh, Mazimba, et al.	2013	IDI, FGD	Mothers, grandmothers, TBA, community members	Zambia	Cord care practices
16	Hill, Tawaiah-Agyemang, Manu et al.	2010	IDI, FGD, and Narratives (N)	Mothers, grandmothers, TBA, fathers, pregnant women	Ghana	Thermal care practices
17	Hunter, Callaghan-Koru, Mahmud, et al.	2014	IDI, FGD	Pregnant women, mothers, husbands, grandmothers, traditional healers, community leaders, religious leaders, health care providers	Bangladesh	Skin to Skin practices
18	Kesterton and Cleland	2009	IDI, FGD	Mothers, grandmothers, TBA	India	General care practices
19	Khadduri, Marsh, Rasmussen et al.	2008	SSI, FGD	Women of reproductive age, health service providers, mothers, fathers	Pakistan	General care practices
20	Lee, Durham, Booth, et al.		IDI, FGD	Mothers, health care staff, key informants	Lao PDR	Breastfeeding practices

21	Lunze, Yeboah-Antwi, and Marsh	2014	IDI, FGD	Mothers, community leaders, health officers, grandmothers	Zambia	Neonatal hypothermia and thermal care practices
22	Melesse-Salasibew, Filteau, and Marchant	2014	IDI, SSI, FGD	Mothers, local experts on newborn care practices	Ethiopia	General care practices following home births
23	Moran, Choudhury, Khan, et al.	2009	IDI	Pregnant women, mothers	Bangladesh	General care practices
24	Moyer, Aborgio, Logonia et al.	2012	IDI, FGD	Women with newborns, grandmothers, compound heads, community leaders, TBA, health care providers	Ghana	Cord care practices
25	Mrisho, Schellenberg, Mushi et al.	2008	IDI, FGD, CS	Female community informants	Tanzania	Home-based care practices
26	Nabiwemba, Atuyambe, Criel, et al.	2014	IDI	Mothers	Uganda	Care practices for LBW babies
27	Nalwadda, Waiswa, Guwatudde, et al.	2015	IDI, FGD	Mothers, fathers, TBA	Uganda	General care practices with emphasis on cord care
28	Newbrander, Natiq, Shahim, et al.	2014	IDI, FGD, O	Household members of perinatal woman, community members	Afghanistan	General care practices
29	Okeyere, Tawiah-Agyemang, Manu, et al.	2010	IDI, FGD, Birth Narratives (BN)	Mothers, TBAs, grandmothers, husbands, *asram* healers	Ghana	Traditional illness
30	Pati, Chauhan, Panda, et al.	2014	IDI	Mothers, TBA	India	General care practices with an emphasis on breastfeeding
31	Premji, Khowaja, Meherali, et al.	2014	IDI, FGD	Mothers, fathers, grandmothers	Pakistan	General care practices
32	Sacks, Moss, Winch et al.	2015	IDI, FGD, O	Mothers, TBA, hospital staff	Zambia	Skin, thermal, and cord care
33	Shamba, Schellenberg, Hildon et al.	2014	IDI, FGD, BN	Mothers, TBA	Tanzania	Bathing, thermal, and skin to skin care practices
34	Tawiah-Agyemang, Kirkwood, Edmond, et al.	2008	SSI, FGD	Mother, women of child bearing age, health workers, policy makers	Ghana	Initiation of breastfeeding
35	Thairu and Pelto	2008	IDI	Mothers	Tanzania	General care practices
36	Waiswa, Kemigisa, Kiguli, et al.	2008	IDI, FGD	Mothers, fathers, grandparents	Uganda	General care practices
37	Walsh, Norr, Sankar, et al.	2014	FGD	TBA, pregnant women, stakeholders, traditional healers	Haiti	Cord care practices

Table 2. Critical Appraisal Skills Program (CASP) Assessment

No.	Author(s)	Year	CASP 1	CASP 2	CASP 3	CASP 4	CASP 5	CASP 6	CASP 7	CASP 8	CASP 9	CASP 10	Overall Score
1	Aborigo, Moyer, Rominski et al.	2012	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
2	Adejuyigbe, Bee, Amare et al.	2015	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
3	Alam, Ali, Sultana et al.	2008	Y	Y	Y	Y	Y	N	Y	Y	C	Y	8/9
4	Amare	2014	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10
5	Amare, Shamba, Manzi, et al.	2015	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10
6	Atyeo, Frank, Vail et al.	2017	Y	Y	N	C	N	Y	Y	Y	Y	Y	7/9
7	Bazzano, Kirkwood, Tawiah-Agyemang, et al.	2008	Y	Y	Y	Y	Y	N	N	Y	Y	Y	8/10
8	Bazzano, Oberhelman, Potts, et al.	2015	Y	Y	Y	Y	Y	C	Y	Y	Y	Y	9/9
9	Bazzano, Var, Grossman, et al.	2017	Y	Y	Y	Y	Y	C	Y	Y	Y	Y	9/9
10	Byaruhanga, Nsungwa-Sabiti, Kiguli, et al.	2011	Y	Y	N	Y	Y	N	Y	Y	Y	C	7/9
11	Degefie, Amare, and Mulligan	2014	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
12	Dhingra, Gittelsohn, Suleiman, et al.	2014	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10
13	Engmann, Adongo, Akawire, et al.	2013	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
14	Gondwe, Munthali, Ashorn, et al.	2014	Y	Y	Y	Y	C	N	Y	Y	Y	Y	8/9
15	Herlihy, Shaikh, Mazimba, et al.	2013	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
16	Hill, Tawiah-Agyemang, Manu, et al.	2010	Y	Y	Y	Y	Y	N	N	C	Y	Y	7/9
17	Hunter, Callaghan-Koru, Mahmud, et al.	2014	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
18	Kesterton and Cleland	2009	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
19	Khadduri, Marsh, Rasmussen, et al.	2008	Y	Y	Y	Y	C	N	N	C	Y	Y	7/9
20	Lee, Durham, Booth, et al.	2013	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
21	Lunze, Yeboah-Antwi, Marsh, et al.	2014	Y	Y	Y	Y	Y	N	Y	C	Y	Y	8/9
22	Melesse-Salasibew, Filteau, and Marchant	2014	Y	Y	Y	N	Y	N	Y	N	Y	C	7/9
23	Moran, Choudhury, Khan, et al.	2009	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
24	Moyer, Aborigo, Logonia, et al.	2012	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
25	Mrisho, Schellenberg, Mushi, et al.	2008	Y	Y	Y	Y	C	N	Y	N	Y	Y	7/9
26	Nabiwemba, Atuyambe, Criel, et al.	2014	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8

27	Nalwadda, Waiswa, Guwatudde, et al.	2012	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
28	Newbrander, Natiq, Shahim, et al.	2010	Y	Y	Y	Y	C	N	Y	N	Y	Y	7/9
29	Okyere, Tawaiah-Agyeman, Manu, et al.	2006	Y	Y	Y	Y	C	N	Y	N	Y	Y	7/9
30	Pati, Chauhan, Panda, et al.	2014	Y	Y	Y	Y	N	N	Y	N	N	C	5/10
31	Premji, Khowaja, Meherali, et al.	2014	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
32	Sacks, Moss, Winch, et al.	2015	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10
33	Shamba, Schellenberg, Hildon, et al.	2014	Y	Y	Y	Y	Y	C	Y	Y	Y	Y	8/9
34	Tawiah-Agyemang, Kirkwood, Edmond, et al.	2008	Y	Y	Y	Y	Y	N	N	Y	C	Y	7/9
35	Thairu and Pelto	2008	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10
36	Waiswa, Kemigisa, Kiguli, et al.	2008	Y	Y	Y	N	Y	N	Y	Y	Y	Y	8/10
37	Walsh, Norr, Sankar, et al.	2015	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10

Table 3. Barriers and facilitators described in articles reviewed

Domain of newborn care	Barriers	Facilitators	Article Number per Table 2, Year	Total Number of Article Mentions
Cord care	Lack of supplies, including water or infection prevention supplies Using surgical spirits and powder Unhygienic cutting practices, including used, unsterilized razor blades or scissors Unskilled attendants Delayed cord cutting, resulting in infection Mixed perception about the length at which cord should detach and heal Use of topical applications to the cord, including herbs, butter, and indigenously-made substances, for medicinal/protective purposes Application of traditional remedies and substances on the cord to moisturize or dry it and facilitate its separation and promote healing Belief that cord infections caused by mother's diet Lack of understanding about cord cleaning Lack of understanding of risks and infections affecting the cord and certain signs of infection, such as redness Cultural belief and newborn care practices not conforming to recommended practices Cost of supplies, including CHX solution Religious and cultural beliefs about cord cutting and cleaning Umbilical cord thought to make baby vulnerable to witchcraft Mothers cutting the cord themselves Umbilical cord not tied prior to cutting, can lead to tetanus Practice of only tying to cord on the side of the baby Recontamination of washed hands before	Knowledge about cord care Community stakeholder recognition that infants are susceptible to cord infection Delivery in hospital Informed at health facility Tailored behavior change communication Appropriate compromises between existing and recommended practices Community education Outreach education Inclusion of grandmothers and other female household members, who are key decision makers and caregivers Participatory health promotion techniques, such as women's groups Programs targeting TBAs and community women Sterile instrument use by TBAs Use of new razor blades Cutting cord before the emergence of the placenta Special thread provided by hospital to tie cord Educational messages about using sterile thread and ensuring dry cord care Boiling the cutting instruments Importance of cord care and tying recognized in community and understood culturally Recognition of cord problems, such as delayed healing, bleeding, or swelling TBAs counsel mothers to protect the cord from infections Consensus regarding liquid cord	3, 2018 4, 2014 9, 2017 10, 2011 11, 2014 12, 2014 15, 2013 18, 2009 19, 2008 22, 2014 23, 2009 24, 2012 25, 2008 26, 2014 27, 2015 30, 2014 32, 2015 36, 2008 37, 2014	19/37

	attending to newborn Seclusion of mother and baby in postpartum period may lead to late identification of illness and delay to seeking care Utilizing materials, such as rope and twigs, in cord tying Disconnect between healthcare providers and community Local conceptions regarding role of cord tying in stemming blood flow Concerns regarding the length of time until cord detachment Presence of blood clots associated with curses	cleaning Raising awareness about usefulness of CHX in cord cleaning Willingness to adopt practices that would protect the newborn and alter traditional cord care practices Behavior change communication messages beginning at pregnancy Prescribed practices making their way into traditional care Efforts to promote hand-washing and to avoid recontamination Promotion of efforts to avoid unclean home applications to the cord Programs, promoting cord cleansing with antiseptics, should provide educational messages about the balance between the benefits and the likelihood that separation of umbilical cord may be slightly delayed Using materials, such as clean cotton, other than fingers to apply medicine/antiseptic Programs in urban slum areas Interventions to improve social support to women, especially first-time mothers Educating healthcare providers about harmful, traditional practices so they are specifically addressed Explaining rationale for tying the cord on both sides of the cut Cultural health systems model that depicts all stakeholders Presence of blood clots leading to seeking medical treatment at health centers Promotion of chlorhexidine in place of commonly-reported application of harmful substances Scale-up of evidenced based practices Health promotion programs taking into account health system barriers and financial burden		
Drying and wrapping	Behaviors vary among home deliveries Perception of dirtiness of baby	Knowledge about drying and wrapping Understanding that baby should be	2, 2015 8, 2011	11/37

	Perception of birthing process as polluting Vulnerability of baby Opinions of other household stakeholders, such as the mother-in-law Home and hospital delivery Not attending to baby until placenta delivered Prioritization of the mothers	kept warm Delivery in hospital Informed at health facility Tailored behavior change communication Appropriate compromises between existing and recommended practices Community education Outreach education Inclusion of grandmothers who are key decision makers Participatory health promotion techniques, such as women's groups Traditional practice of wrapping in new clean cloth Use of warm water and traditional herbs to protect baby Behavior change communication messages beginning at pregnancy Babies dried and wrapped due to awareness of reduction of cold Having more than one attendant to help both the mother and baby Programs in urban slum areas Interventions to improve social support to women, especially first-time mothers	10, 2014 14, 2010 16, 2009 19, 2014 20, 2014 21, 2009 28, 2014 30, 2015 31, 2014	

Bathing	Traditional or historical practice Lack of knowledge of when to bathe baby, especially in home deliveries Early bathing due to societal pressure Cultural norm of frequent bathing Cultural belief and newborn care practices not conforming to recommended practices Negative perception of vernix, including association with sperm Vernix considered dangerous for HIV-exposed infants Bathing in close proximity to smoking fires Early bathing due to association with dirtiness as well as body odor later in life Differences in practice by untrained TBAs Spiritual beliefs attached to use of local herbs for bathing Bathing practices, such as using pond water Substances added to water, including Dettol or Savlon Bathing immediately after birth due to concerns about 'ritual pollution' can cause hypothermia Early bathing linked to shaping the baby's head Early bathing to help the baby sleep and feel clean Early bathing in facilities	Delayed bathing when delivery in hospital Informed at health facility Quality of care in health facility Health worker advice Tailored behavior change communication, addressing community norms and based on formative research Appreciation of newborn vulnerability to encourage behavior change Appropriate compromises between existing and recommended practices Community education Outreach education Inclusion of grandmothers who are key decision makers Participatory health promotion techniques, such as women's groups Behavior change communication messages beginning at pregnancy Having more than one attendant to help both the mother and baby Delayed bathing due to concerns about pneumonia Identifying and addressing cultural rationales that underlie negative practices Reinforcing ad protecting beliefs that support positive practices Improving health worker communication skills and social	2, 2015 3, 2008 8, 2011 9, 2014 10, 2014 14, 2010 16, 2009 19, 2014 20, 2014 21, 2009 24, 2014 26, 2014 28, 2014 30, 2015 31, 2014 33, 2008 34, 2008	17/37
Thermal control	Lack of practice when delivery at home or with TBA Lack of knowledge of keeping baby indoors Suboptimal practices Early bathing Length of time baby undressed during bathing Bathing with warm water Use of blankets, rather than skin-to-skin care	Informed at health facility Beliefs about importance of thermal care Quality of care in health facility Tailored behavior change communication based on formative research Appropriate compromises between existing and recommended practices Community education Outreach education	2, 2015 3, 2008 8, 2011 9, 2014 10, 2014 14, 2010 17, 2008 19, 2014 24, 2014	12/37

	Newborn massage, including use of mustard oil, can compromise the skin barrier function Cultural belief and newborn care practices not conforming to recommended practices Lack of maintaining thermoprotective practices in the first few hours postpartum, when newborns are at greatest risk	Inclusion of grandmothers who are key decision makers Participatory health promotion techniques, such as women's groups Behavior change communication messages beginning at pregnancy Knowledge and practice that baby should be kept warm Having more than one attendant to help both the mother and baby Use of low-cost newborn warmers Community-based practices on hypothermia prevention and management	28, 2014 30, 2015 31, 2014	
Skin to skin contact	Few mothers given baby immediately after birth Concerns of disease transmission, harm to umbilicus Perception of dirtiness after birth Maternal rest Concerns of baby becoming cold Delayed due to early bathing Perception that it might be harmful to fragile newborns Lack of understanding that kangaroo mother care is a protective method of caring for healthy newborns Use of blankets, rather than skin-to-skin care Lack of continued skin to skin contact Cultural belief and newborn care practices not conforming to recommended practices Women feeling responsible for household duties	Behavior change interventions based on formative research Quality of care in health facility Tailored behavior change communication Appropriate compromises between existing and recommended practices Community education Outreach education Inclusion of grandmothers who are key decision makers Participatory health promotion techniques, such as women's groups Behavior change communication messages beginning at pregnancy Association with reduced risk of cord infection Concept easily understood and women willing to try if good for the baby Appreciation of kangaroo mother care as an appropriate treatment for ill babies Biomedical advice from healthcare providers reaching community through word-of-mouth and television campaigns Receiving help from family members Witnessing other women perform	2, 2015 3, 2008 8, 2011 9, 2014 14, 2010 15, 2014 16, 2009 19, 2014 31, 2014	9/37

		kangaroo mother care with positive outcomes Focusing intervention messages on building supportive a environment for kangaroo mother care practice		
Hygiene	Lack of knowledge on hand-washing with soap Recontamination of washed hands before attending to the newborn Cultural belief and newborn care practices not conforming to recommended practices	Health education Tailored behavior change communication Appropriate compromises between existing and recommended practices Community education Outreach education Inclusion of grandmothers who are key decision makers Participatory health promotion techniques, such as women's groups Efforts to promote hand-washing and to avoid recontamination Understanding of keeping babies and their surroundings clean Educating healthcare providers about harmful, traditional practices so they are specifically addressed	3, 2008 9, 2014 16, 2009 17, 2008 22, 2012 24, 2014	6/37
Breast feeding (initiation of and provision of colostrum)	Traditional or historical practice Belief that it is unhealthy Mother's exhaustion Limited knowledge Maternal education status Geographic isolation Inconsistency in health education Learning from relatives Pre-lacteal feeds given on fingertip, increasing risk of infection Low urgency in initiating breastfeeding as mother and child believed to be polluted after birth Negative beliefs regarding colostrum	Community members knowledgeable about importance of breast-feeding Delivery in a health facility, where staff encouraged early breast-feeding Culturally-tailored health education Targeting isolated villages Cross-generational education interventions Interventions through community health clinic workers Appropriate compromises between existing and recommended practices Community education Outreach education Inclusion of grandmothers/mother-in-laws and religious leaders who are key	1, 2012 6, 2017 9, 2017 10, 2011 11, 2014 12, 2014 18, 2009 19, 2008 20, 2013 22, 2014 23, 2009 25, 2008 26, 2014	18/37

	Traditional practices to test colostrum for bitterness Perception of a lack of breast milk Onset of post-birth activities, such as bathing Perception that baby needs rest Baby not crying for milk Perception of inadequate maternal nutrition and breast milk Premature breast milk supplementation (water and other fluids), which may expose newborns to pathogens Work served as a barrier Difference in advice received from different people by first-time mothers Cultural belief and newborn care practices not conforming to recommended practices Perception that hunger is not met or satisfied by breast-milk alone	decision makers Participatory health promotion techniques, such as women's groups Awareness of nutritive value of breast milk Positive perception regarding infant feeding TBAs trained by Ministry of Health Raising awareness of early initiation of breast-feeding in the policy arena Cultural belief and practices Identifying and addressing cultural rationales that underlie negative practices Reinforcing ad protecting beliefs that support positive practices Improving health worker communication skills and social management of patients Lowering healthcare costs Programs in urban slum areas Interventions to improve social support to women, especially first-time mothers First-time mothers' mothers Working with employers and developing supportive employment policies Providing postnatal support and working with lay people and health professionals Research to identify optimal combination of interventions Using religious leaders, trained health workers, family health action groups, and radio to disseminate messages	28, 2014 30, 2014 31, 2014 33, 2008 35, 2008	
Care seeking for illness	Lack of transportation Geographic isolation/remoteness from health facilities Financial ability/constraints Seclusion of mother and baby in postpartum period may lead to late identification of illness and delay to seeking care	Addressing locally existing cultural beliefs Strengthening facility care Urging families to seek medical care for any symptom of illness in a newborn Addressing financial barriers Recognition of danger signs	7, 2008 8, 2011 11, 2013 17, 2008 25, 2015 26, 2014	7/37

	Community understanding of the newborn period and cultural expectations Caretaker knowledge about newborn sickness Individual experiences in household and caretaker autonomy Women's inability to seek care without being accompanied by a male relative Healthcare decisions influenced by community members Perceived health system gaps Confidence in healthcare providers is issue-specific Sequential care-seeking practices, with traditional medicine as first-line of treatment for 7 days Untimely action after recognition of danger signs Previous negative experiences with health services facilities Local understanding of illness affects treatment practices Mothers blamed for infant illness Use of traditional home remedies and self-medication instead of care in health facilities Shame about utilization of maternal and neonatal services Care-seeking for local community members for serious health concerns Post-partum depression 'Asram' perceived as common illness which cannot be treated at health facilities 'Asram' treatments including frequent cold herbal baths, air-dying, and oral treatments Modification of 'asram' treatment required the sanction of a healer	Targeted behavior-change communication programs Using religious leaders, trained health workers, family health action groups, and radio to disseminate messages Understanding traditional illnesses in designing care-seeking interventions	27, 2010	
Other newborn care	Cultural perception of emollients as improving the skin, keeping the baby warm, and shaping the baby	Association of emollient therapy in reduction of mortality among preterm infants	4, 2014 20, 2014	4/37

	Social pressure to use emollients Emollient choice influenced by cost, availability, and traditional norms Massage, associated with application of emollients, is potentially damaging to skin Potential impact of emollients, such as engine oil, on harm and even mortality TBAs applying mild pressure inside baby's mouth on the soft palate with water and local herb Application of powders directly into dermal incisions of ill children to ward off malevolent spirits	Newborn emollient trials, specifically designed to reflect contextual differences If emollients are proven effective, policy makers deciding whether to provide emollients free of charge or through social marketing Improving practice of massage associated with emollient application Understanding traditional illnesses in designing care-seeking interventions	26, 2010 30, 2015	
Low birth weight recognition	Babies not weighed Belief in supernatural powers Less knowledge of home care practices when baby delivered at home or in lower level health facility Lack of knowledge of how to provide care or when to take baby to health facility Perceptions of preterm birth, including young and old maternal age, heredity, sexual impurity, and maternal illness during pregnancy Poverty Women placed with main responsibility for preterm newborns High time burden of care for preterm babies leading to neglect of household, farming, and business duties	Better knowledge of home care practices when delivery at health facility Health education at community level to reach mothers that deliver at home Mechanisms to support mothers Provision of warmth to preterm newborns Addressing cultural practices for preterm babies among community members Vernix considered important for preterm newborns	9, 2014 12, 2014 24, 2014	3/37

Contibutorship statement

All authors meet ICMJE criteria for authorship, and all have read and approved the final manuscript.

Competing interests: All authors declare they have no conflicts of interest.
Funding: The study received no financial support.
Data sharing statement: All data came from published articles available from electronic databases which are openly accessible.

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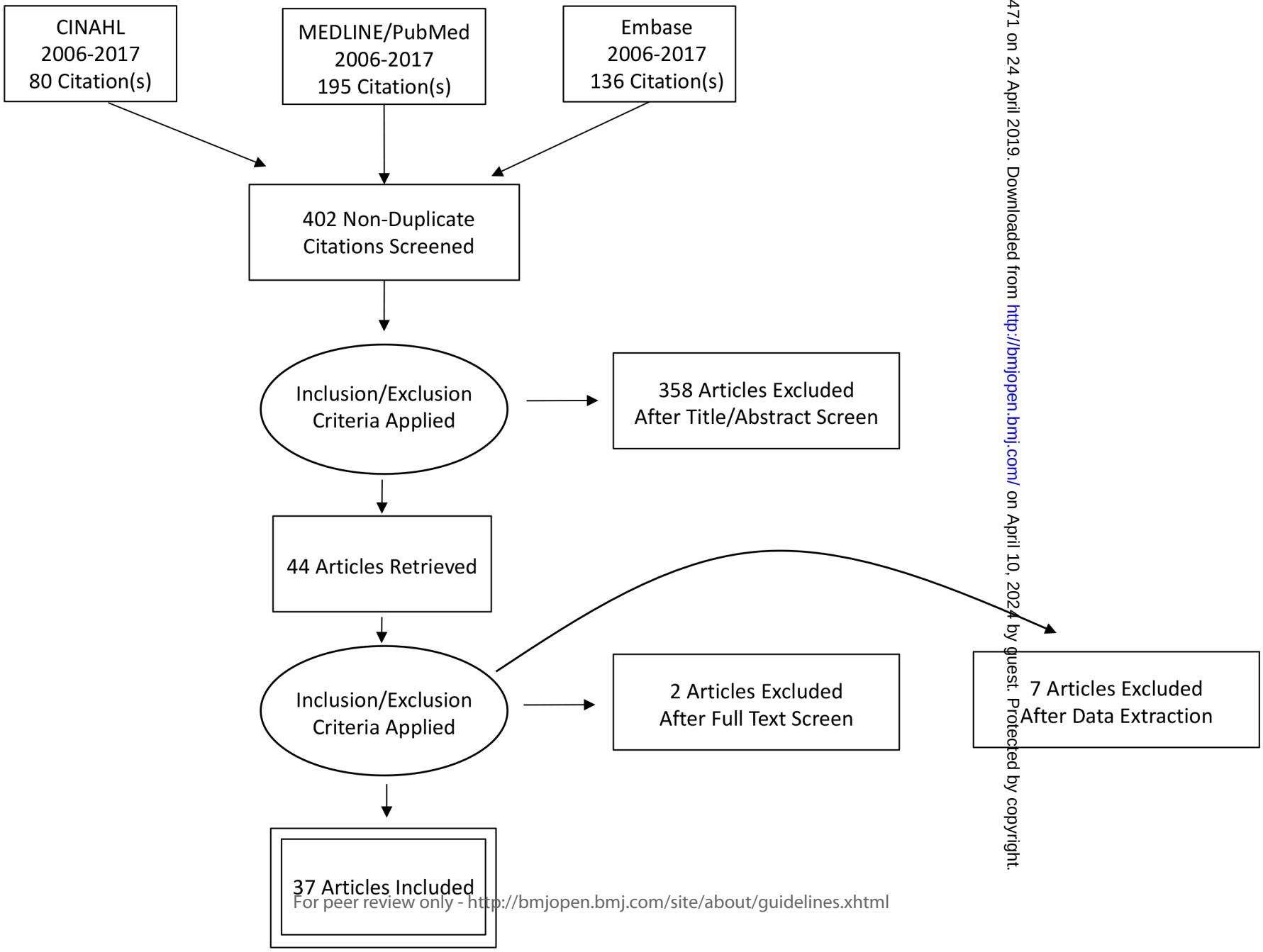

Appendix 1. Search Strategy

Search String	Notes
"infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab])) AND ("breast feeding"[MeSH Terms] OR "immediate breastfeeding"[Title/Abstract] OR "exclusive breastfeeding"[tiab] OR "exclusive breast feeding"[tiab] OR "initiation of breastfeeding"[tiab] OR "thermal care"[tiab] OR "cord care"[tiab]) OR "Thermal care"[tiab] OR "Thermal care"[ot] OR "bathing"[tiab] OR bathing[ot] OR "cord care"[tiab] OR "cord care"[OT] OR "umbilical cord care"[tiab] OR "umbilical cord care"[ot] OR "health knowledge, attitudes, practice"[MeSH Terms]	Includes "health knowledge, attitudes, practices"
"mothers"[MeSH Terms] OR mothers[Title/Abstract] OR mother[Title/Abstract] OR "fathers"[MeSH Terms] OR fathers[Title/Abstract] OR "parents"[MeSH Terms] OR parents[Tiab] OR parent[Tiab] OR "Grandparents"[MeSH] OR grandmother[Tiab] OR grandmother's[Tiab] OR grandmothers[Tiab] OR grandmothers'[Tiab)	Parent Perspective Concept
(("Qualitative Research"[Mesh] OR "qualitative research"[TIAB] OR "qualitative research"[OT] OR "qualitative studies"[tiab] OR "qualitative study"[tiab] OR "qualitative studies"[OT] OR "qualitative studies"[OT] OR "qualitative study"[OT] OR "Interviews as Topic"[Mesh] OR "semi structured interview"[TIAB] OR "semi structured interviewer"[TIAB] OR "semi structured interviewing"[TIAB] OR "semi structured interviews"[TIAB] OR "semi structured interview"[OT] OR "semi structured interviews"[OT] OR "semistructured interview"[TIAB] OR "semistructured	Qualitative concept (w/o exclusions)

interview"[OT] OR "unstructured interview"[TIAB] OR "unstructured interviewing"[TIAB] OR "unstructured interviews"[TIAB] OR "unstructured interview"[OT] OR "in depth interview"[TIAB] OR "in depth interviewees"[TIAB] OR" in depth interviewing"[TIAB] OR "in depth interviews"[TIAB] OR "in depth interview"[OT] OR "in depth interviewing"[OT] OR "in depth interviews"[OT] OR "Focus Groups"[Mesh] OR "focus group"[TIAB] OR "focus groups"[TIAB] OR "focus group"[OT] OR "focus groups"[OT] OR "group interview"[OT] OR "group interview"[TIAB] OR "Direct observation"[tiab] OR "Participant observation"[tiab] OR "Non-participant observation"[tiab] OR "Direct observation"[OT] OR "Participant observation"[ot] OR "Non-participant observation"[OT] OR "Ethnology"[Mesh] OR "ethnographic research"[OT] OR "ethnographic research"[TIAB] OR ethnology[OT] OR ethnology[TIAB] OR "ethnographic study"[tiab] OR "ethnographic study"[ot] OR "Community-Based Participatory Research"[Mesh] OR "community-based participatory research"[OT] OR "community-based participatory research"[TIAB] OR "action research"[TIAB] OR "action research"[OT] OR "Formative research"[tiab] OR "Formative research"[ot] OR "Key informant"[tiab] OR "Key informant"[OT] OR "Interpretative perspective"[TIAB] OR "Phenomenological Research"[TIAB] OR Phenomenology[tiab] OR Phenomenology[ot] OR "Phenomenological Research"[OT]))	
ALL countries names (not pig OR hen) OR Developing country/LMIC terms (see above)	ALL LMIC terms and Country names

"infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab]	This is our main concept and prioirity. Reintroduced within context of other concepts
(("infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab])) AND ((#110 AND #93 AND #94 AND #101))	
(("infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab])) AND ((#110 AND #93 AND #94 AND #101)) Filters: Publication date from 2016/01/01 to 2017/12/31	Published Jan 1, 2016 - Dec 31, 2017
(("infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab])) AND ((#110 AND #93 AND #94 AND #101)) Filters: Publication date from 2016/01/01 to 2017/12/31; English	Published English Jan 1, 2016 -Dec 31, 2017
(("infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab])) AND ((#110 AND #93 AND #94 AND #101)) Sort by: Relevance Filters: published in the last 10 years; Humans; English	

Reporting checklist for systematic review and meta-analysis.

Based on the PRISMA guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

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		Reporting Item	Page Number
	#1	Identify the report as a systematic review, meta-analysis, or both.	0-1
Structured summary	#2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number	0-1
Rationale	#3	Describe the rationale for the review in the context of what is already known.	1
Objectives	#4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	2
Protocol and registration	#5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address) and, if available, provide registration information including the registration number.	0-1

Eligibility criteria	#6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rational	3
Information sources	#7	Describe all information sources in the search (e.g., databases with dates of coverage, contact with study authors to identify additional studies) and date last searched.	3
Search	#8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	See note 1
Study selection	#9	State the process for selecting studies (i.e., for screening, for determining eligibility, for inclusion in the systematic review, and, if applicable, for inclusion in the meta-analysis).	4-5
Data collection process	#10	Describe the method of data extraction from reports (e.g., piloted forms, independently by two reviewers) and any processes for obtaining and confirming data from investigators.	5
Data items	#11	List and define all variables for which data were sought (e.g., PICOS, funding sources), and any assumptions and simplifications made.	5-6
Risk of bias in individual studies	#12	Describe methods used for assessing risk of bias in individual studies (including specification of whether this was done at the study or outcome level, or both), and how this information is to be used in any data synthesis.	6-7
Summary measures	#13	State the principal summary measures (e.g., risk ratio, difference in means).	6-7
Planned methods of analyis	#14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I2) for each meta-analysis.	6-7
Risk of bias across studies	#15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	6-7
Additional analyses	#16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	6-7
Study selection	#17	Give numbers of studies screened, assessed for eligibility, and	7-8

		included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	
Study characteristics	#18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citation.	7-8
Risk of bias within studies	#19	Present data on risk of bias of each study and, if available, any outcome-level assessment (see Item 12).	7
Results of individual studies	#20	For all outcomes considered (benefits and harms), present, for each study: (a) simple summary data for each intervention group and (b) effect estimates and confidence intervals, ideally with a forest plot.	7
Synthesis of results	#21	Present the main results of the review. If meta-analyses are done, include for each, confidence intervals and measures of consistency.	8-10
Risk of bias across studies	#22	Present results of any assessment of risk of bias across studies (see Item 15).	7
Additional analysis	#23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	8-10
Summary of Evidence	#24	Summarize the main findings, including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., health care providers, users, and policy makers	11
Limitations	#25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review level (e.g., incomplete retrieval of identified research, reporting bias).	11
Conclusions	#26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	12
Funding	#27	Describe sources of funding or other support (e.g., supply of data) for the systematic review; role of funders for the systematic review.	12

Author notes

1. 4, Appendix

BMJ Open

Parent and family perspectives on home-based newborn care practices in lower-income countries: a systematic review of qualitative studies

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2018-025471.R1
Article Type:	Research
Date Submitted by the Author:	26-Nov-2018
Complete List of Authors:	Bazzano, Alessandra; Tulane University School of Public Health, Global Community Health and Behavioral Sciences Felker-Kantor, Erica; Tulane University School of Public Health, Global Community Health and Behavioral Sciences Eragoda, Shalini; Tulane University School of Public Health, Global Community Health and Behavioral Sciences Kaji, Aiko; Tulane University School of Public Health, Global Community Health and Behavioral Sciences Horlick, Raquel; Tulane University, Howard Tilton Memorial Library
Primary Subject Heading:	Global health
Secondary Subject Heading:	Public health, Paediatrics
Keywords:	infant, newborn, postnatal care, QUALITATIVE RESEARCH, care seeking, Cambodia

Parent and family perspectives on home-based newborn care practices in lower-income countries: a systematic review of qualitative studies

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Keywords: infant, newborn, post-natal care, care seeking, qualitative research, health equity

Word count: 3005
Figures: 1
Tables: 3

ABSTRACT

Objectives

To understand family and parent perspectives on newborn care provided at home to infants in the first 28 days of life, in order to inform behavioral interventions for improving care in low income countries, where the majority of newborn deaths occur.

Design

A comprehensive, qualitative systematic review was conducted. MEDLINE/PubMed, Embase, and Cumulative Index of Nursing and Allied Health databases were systematically searched for studies examining the views of parents and family members on newborn care at home. The search period included all studies published from 2006 to 2017. Studies using qualitative approaches or mixed-methods studies with substantial use of qualitative techniques in both the methods and analysis sections were included. Studies meeting the inclusion criteria were extracted and evaluated using Critical Appraisal Skills Programme guidelines. Following the initial selection and appraisal, barriers and facilitators to recommended care practices across several domains were synthesized.

Results

Of 411 results retrieved, 37 met both inclusion and quality appraisal criteria for methodology and reporting. Geographic representation largely reflected that of newborn health outcomes globally, with the majority of studies conducted in the region of Sub-Saharan Africa and South Asia. Specific barriers and facilitators were identified among a range of domains including: cord care, drying and wrapping, thermal control, skin to skin contact, hygiene, breast feeding, care seeking for illness, low birth weight recognition. Cross cutting facilitators, common to all domains were also evident, including delivering at a health facility, including female relatives in counseling, lower health care costs, and exposure to newborn care messaging in the community.

Conclusions

When designing behavioral interventions to address newborn mortality at scale, policy makers and practitioners must include barriers and facilitators important to families in low income settings.

Review registration number CRD42016035674.

Article Summary

Strengths and limitations:

- Strengths of the review include having had a librarian/information scientist in the research team, and multiple reviewers experienced in qualitative research in low-income countries, primary qualitative data collection, and analysis.
- Other strengths of the study was the comprehensive search strategy covering multiple relevant databases; appraisal of quality among included studies based on critical appraisal skills guidelines; and a comprehensive description of study findings.
- Limitations included: the exclusion of documents not available in English, and those that may have been relevant, but were outside the defined date limitations.

Introduction

Approximately 46% of all under-five deaths in 2016 occurred during the neonatal period, the initial 28 days following birth. Southern Asia and sub-Saharan Africa account for nearly 80 percent of the newborn deaths. By 2030, the Sustainable Development Goals (SDG) target to reduce neonatal mortality to at least as low as 12 per 1,000 live births. However, per current trends, over 50 countries will fail to meet this target on newborn survival.[1] Yet, the majority of these deaths are preventable.[2]

During the neonatal period, care provided by parents and caregivers is critical for newborn survival.[3] Optimal or essential newborn care practices as defined by the World Health Organization include immediate drying and wrapping of newborns after birth, initiating skin-to-skin (STS) contact, clean cord care, dry cord care, immediate initiation of breastfeeding and

exclusive breastfeeding until 6 months of age, as well as ensuring warmth (thermal control) of the newborn through delayed bathing.[4] In addition, parents or caregivers at home must also provide nurturing care, safety and security, and responsiveness to the newborn's needs. The provision of quality, effective care at the home and community level is critical for improving newborn health outcomes and promoting optimal early childhood development. A reduction in neonatal mortality by 25% can be achieved by scaling up community interventions, including provision of optimal home care.[5] Although feasible interventions exist to reduce newborn mortality, uptake of these interventions is low.[6]

In order to increase scale up of coverage and implementation of effective home and community-based newborn care practices, providing data on research priorities for newborn health is key.[7] Researchers have identified specific domains related to caregiver perceptions and behaviors as priorities.[8] Qualitative research was deemed particularly useful for obtaining information on newborn care practices at home, which vary based on the sociocultural context in low-income countries.[9]

Despite the existence of multiple individual qualitative and formative research studies on home and community-based newborn care, a systematic review of the available qualitative research is lacking. Therefore, we conducted a systematic review to provide data to improve both programming and policy for home and community care for newborns.[7]

The primary objective of this study was to systematically review qualitative literature to understand parent and family experiences with home newborn care practice in low-income countries, presenting information related to barriers and facilitators to inform behavioral interventions focused on improving newborn survival and care.

Methods

This systematic review was registered with the International Prospective Register of Systematic Reviews (PROSPERO): registration number CRD42016035674. The review followed guidelines from the Enhancing Transparency in Reporting the Synthesis of Qualitative Research (ENTREQ) statement.[i] Due to the emphasis on qualitative research, the review primarily employed the ENTREQ guidelines for reporting, while also drawing guidance from PRISMA, which is more specific to the requirements of quantitative literature reviews.[10,11]

Newborn care practices were defined as all actions taken by parents/caregivers that provide for the essential biological, physiological and psychological needs of the newborn infant following delivery and up to the end of the newborn period (28 days of life). These included, but were not limited to, the essential newborn care practices as defined by WHO: cord care, drying and wrapping after delivery, initiation of breast feeding, bathing, thermal control, breast feeding and care seeking for newborn illness.[12]

Four of five researchers involved in conducting the review, analyzing the results, and writing up the manuscript had strong experience in qualitative research methods, and hold graduate and/or doctoral level qualification in public health, with a specialization in research methods (ANB, EFK, AK, and SE). One researcher (RH) is an information scientist with a qualification in library sciences and specialization in support to research in science and biomedicine.

Inclusion and exclusion criteria

Studies were included if they used qualitative data collection methods such as

interviews, focus groups, direct observation, and participatory action research. Inclusion requirements also stipulated that studies needed to have a well-described methodology section and a clear description of the qualitative data analysis methods and process (e.g., grounded theory, narrative analysis, content analysis, thematic analysis). Finally, data on newborn care at home must have been directly obtained from parents or caregivers of newborns (infants under 28 days of age, including low birthweight or small babies), whether born at home or at a facility, with or without skilled attendance, and regardless of whether the study also included additional data from non-family members or health workers such as TBAs (which data was not used for this review). Caregivers were defined as mothers/fathers or other adult family or community members who provided day-to-day physical and psychological support to meet the basic needs of newborn infants. Data gathered from community health workers, and from professional or non-professional health care providers, were not used or included in this study although it may have been presented in one of the articles included in the review.

Excluded studies were those for which it was difficult to extract qualitative data (e.g., mixed methods studies without clearly labeled data, or studies in settings where perceptions of parents'/caregivers' experiences of newborn care practices could not be clearly identified, such as summaries or aggregate data). Commentaries, protocols, and systematic reviews were not included in the analysis. Additionally, studies from countries other than those defined by the World Bank as low-income countries and lower-middle income countries (which have a Gross National Income per capita of less than $4,125) were excluded.[13]

Search strategy

The review was begun in 2016 and targeted to the previous ten years and was then

extended a further year due to delays in the publication process to encompass the timeframe 2006-2017. The following electronic databases were searched: MEDLINE (PubMed), Embase, Cumulative Index to Nursing and Allied Health Literature (CINAHL: EBSCOhost). A health sciences librarian (RH) developed the database searching strategy and conducted the final searches. The initial search strategy was developed for MEDLINE and then adapted for other databases. Medical Subject Headings (MeSH) were used followed by free-text terms using controlled vocabulary (see the Appendix for a detailed description of the search strategy). Only articles in English were included due to potential difficulties in translating and interpreting foreign language qualitative data by native English-speaking reviewers, and to ensure that the review covered the most current literature on infant and young child feeding practices.

Figure 1 presents the selection process which followed the PRISMA guidelines for reporting of systematic reviews.[11] Search results were initially imported into Endnote reference management software (Thomson Reuters (Scientific) LLC) and duplicates and irrelevant studies were removed. Four independent reviewers screened study titles and abstracts for suitability against inclusion and exclusion criteria. The decision to include or exclude a study was required by two reviewers. If after consultation a decision wasn't reached, a third reviewer (AK) made the final decision.

Figure 1. Selection flow chart of review process

See attached figure file

Data extraction

For organization of extracted data, a unified matrix was utilized to record specific characteristics of included studies. Extracted data included reference details (author/data/publication), methodological approach (e.g., interviews/focus groups), conceptual framework (e.g., Grounded Theory), objectives or aims of the study, sampling methodology, socio-demographic characteristics of participants, country/region, and analysis method(s). The initial results of the selection process and data extraction, with selected characteristics, are presented in **Table 1**.

Quality appraisal

Each selected article was initially assessed by two reviewers (AB, AK) according to the Critical Appraisal Skills Program checklist[14] to ensure quality and internal validity. Where reviewers had any differing opinions a third reviewer was consulted for consensus (EFK). Selected studies met minimum criteria defined through the checklist including domains such as appropriateness of study design, data collection techniques, and analysis methods. Appraisal results are presented in Table 2 using the following questions for analysis:

1. Was there a clear statement of the aims of the research?
2. Is a qualitative methodology appropriate?
3. Was the research design appropriate to address the aims of the research?
4. Was the recruitment strategy appropriate to the aims of the research?
5. Was the data collected in a way that addressed the research issue?
6. Has the relationship between researcher and participants been adequately considered?
7. Have ethical issues been taken into consideration?
8. Was the data analysis sufficiently rigorous?
9. Is there a clear statement of findings?
10. How valuable is the research?

Possible Responses: Yes, No, and Cannot assess due to missing information

Table 2. CASP Criteria Analysis

Following data extraction, relevant text from the results, discussion and conclusion sections, which provided information directly pertinent to home care of newborns from the perspectives of family caregivers, were imported into NVivo 11 qualitative software (NVivo qualitative data analysis software; QSR International Pty Ltd. Version 11, 2015).

Following the appraisal, content analysis[15] was employed to identify domains for investigation and presentation within a framework analysis approach [16] using the WHO guidelines. The focus of analysis was on manifest content rather than latent content [17]. A narrative summary of the identified domains and themes, developed according to content, was reviewed by the research team (SE, ANB, EFK) to produce a consensus-based listing including barriers and facilitators to recommended newborn care practices. This review was undertaken by the authors alone and no patients or public participants were involved.

RESULTS

Geographic overview of studies reviewed

The vast majority of studies identified emerged from research carried out in the Sub-Saharan

region, while the South Asian region was also well represented in the qualitative literature relating to newborn care practices at home.

Sub-Saharan Africa

Studies from the African region comprised 24 of 37 included for review, and information presented in the studies described the full range of home based newborn care practices.

South Asia

From the South Asian region, 8 of 37 studies presented information on newborn care practices, covering more general rather than specific domains of newborn care, though one focused on breastfeeding.

Southeast Asia

Three studies, two related to breastfeeding in Cambodia and Lao PDR, along with another from Cambodia related to skin care, were identified from the Southeast Asian region.

Latin America / Caribbean

Two qualitative studies were identified from the Latin America/Caribbean region, from Guatemala and Haiti, related to breastfeeding and cord care respectively.

Barriers and facilitators

A comprehensive list of barriers and facilitators stratified by the recommended care practice that were generated through the data synthesis exercise appears in **Table 3**. For each domain of newborn care, study findings were extracted, and information on barriers and facilitators synthesized. Among the 37 studies in this review, many of the reported barriers and facilitators

were cross-cutting for recommended newborn care practices (i.e. cord care, drying and wrapping after delivery, prompt initiation of breast feeding, bathing, thermal control, breast feeding and care seeking for newborn illness). Across all practices, delivering at a health facility, including grandmothers in decision-making processes during and after pregnancy, low health care costs, and exposure to newborn care messaging in the community were reported as important facilitators for adoption of recommended newborn care practices. Common barriers across the recommended practices included traditional and historical beliefs and practices, cultural and gender norms, geographic location, conflicting health messaging, and societal pressures.

Barriers that influenced adoption of recommended **cord care practices** included lack of resources (e.g. clean water and razor blades), misinformation on timeliness of cord cutting, religious and cultural beliefs, and untrained birth attendants. Facilitators included institutional delivery, exposure to educational campaigns on safe and hygienic cord cutting practices, community outreach activities promoting handwashing and provision of clean razor blades, decision-making by grandmothers and women leaders, and cord-care counseling by TBAs.

Barriers to timely **drying and wrapping** included perceptions of newborn vulnerability and dirtiness, conflicting advice household stakeholders, and waiting for delivery of the placenta. Facilitators included institutional delivery, exposure to educational campaigns on newborn thermal regulation, traditional wrapping practices, and the presence of two TBAs during delivery.

Factors impeding **delayed bathing** included societal pressure for cleanliness, preference for immediate bathing due to concerns about ritual pollution and hypothermia, negative perceptions of the vernix, and immediate bathing at health facilities. Factors that facilitated delayed bathing after delivery included hospital-based birth, exposure to newborn care messaging on the radio during pregnancy, communication between health care workers in the community and at the facility during pregnancy, and social support from other women in the household.

Factors inhibiting **skin-to-skin care** and **thermal control** practices included use of blankets instead of skin-to-skin contact, not immediately releasing baby to mother following delivery, early bathing, concerns of disease transmission, and maternal household duties. Facilitators included exposure to kangaroo care messaging during pregnancy, observing positive newborn health outcomes of other mothers who used kangaroo care practices, medical advice from health care providers, and prior participation in behavior change interventions.

Barriers to **care-seeking for illness** included lack of transport, minimal financial resources, distances to health facility, gender norms, prior negative experiences at health facilities, and cultural norms such as protective isolation during the postpartum period. Facilitators included family knowledge and recognition of danger signs and illness symptoms, lower health care costs, community education and support from religious leaders, and exposure to newborn health campaigns.

Barriers to **initiating breastfeed**ing included spatial/physical isolation, conflicting health messages, mother exhaustion, baby not crying for milk, historical and traditional beliefs to discard colostrum, and education. Facilitating factors included community and family member knowledge, information provided during health facility-based birth, attendance by trained TBAs, being a first time mother, and exposure to breast feeding education and policy campaigns.

DISCUSSION

Effective interventions to improve newborn survival require information on a number of complex factors related to essential newborn care [18]. In addition to collecting improved quantitative data for neonatal survival, qualitative data are essential for behavioral interventions targeted to specific populations.[19] Few qualitative systematic reviews exist to synthesize information from perspectives of parents on newborn care. One review from 2014 focused on skin-to-skin contact and included 29 studies containing data from 9 countries[20]. Findings from that review centred on the experience of becoming a parent under unfamiliar circumstances, and thoughtfully considered the experiences of parents in the unique practice of skin-to-skin care. The authors did not restrict the review to low income settings, though studies from Uganda, Brazil, and South Africa were included. Our findings add further information to the peer reviewed literature from low income countries, where the majority of newborn deaths occur.

Another review was recently conducted in relation to thermal care for newborns in Sub-Saharan Africa[21]. The review focused on sociocultural factors and identified a number of potentially harmful cultural norms and traditions which influence care across African settings. As in the present review, caregiver factors and contextual barriers as well as facilitating factors were identified, but these were specific to thermal control, which may not represent the full range perspectives for other newborn care practices. Further, the restriction to Sub-Saharan Africa settings limits the potential for transferability of the findings to other geographic settings and data from parents or family caregivers was not the focus.

A systematic review covering neonatal care practices in Sub-Saharan Africa was recently undertaken[22]. The authors of that review included both quantitative data and qualitative data published from 2001-2014, whereas our review focused on qualitative data only, and covered the period 2006-2017. Bee et al. also included studies of facility-based and home-based care (unlike our study which focused on data from parents regarding home care) and noted the limitation of data having come mainly from 5 countries, highlighting a need for research from a wider geographic area, such as has been provided in the present review. Given that birth at home presents unique risks to the newborn[23], information from these settings is key. Whereas the present review focused on barriers and facilitators identified through qualitative research, the review by Bee et al. centered on the prevalence of key immediate newborn care practices.[22]

Policy recommendations and current approaches to reducing newborn mortality have not yet been appropriately scaled to reduce newborn mortality to levels targeted by the Sustainable

Development Goals[24]. In the context of international calls for reduction of newborn mortality and stillbirths[25], it will be essential for interventions to meet the needs of families and parents caring for newborns. This systematic review of qualitative research, drawn from the literature across low income countries, is an important step to providing data on the range of newborn care practices at home, which is specifically relevant to behavior change in settings where high newborn mortality continues.

Conclusions

This systematic review identified qualitative studies reporting on the experiences and first-hand accounts of family members and caregivers in low income countries who are responsible for providing essential newborn care for their infants up to the first 28 days of life. The review identified barriers and facilitators commonly reported in studies of newborn care practices. The findings presented here are directly applicable to social and behavioral change initiatives aimed at improving care practices for better newborn health outcomes in low resource settings.

Table 1. Characteristics of included studies*

No.	Author(s)	Year	Qualitative Methods	Participants**	Country (s)	Newborn Care Practices
1	Aborigo, Moyer, Rominski, et al.	2012	In depth interviews (IDI), Focus Group Discussions (FGD)	Mothers, health care providers, TBA, community leaders, grandmothers, compound heads, heads of households	Ghana	Breastfeeding practices
2	Adejuyigbe, Bee, Amare et al.	2015	IDI, Narrative Interviews, and Observations (O)	Mothers, fathers, health workers, grandmothers, TBA	Nigeria, Tanzania, Ethiopia	Thermal care and bathing
3	Alam, Ali, Sultana et al.	2008	IDI, O	Mothers, fathers, grandmother, family members, TBA	Bangladesh	Cord care practices
4	Amare	2014	IDI	Mothers, grandmothers, TBA	Ethiopia	Cord care practices
5	Amare, Shamba, Manzi, et al.	2015	IDI, FGD, (O)	Mothers, fathers, health workers, TBA, grandmothers, merchants	Four African sites	Emollient use for skin care
6	Atyeo, Frank, Vail et al.	2017	Semi structured interviews (SSI)	Mothers	Guatemala	Breastfeeding practices
7	Bazzano, Kirkwood, Tawiah-Agyeman, et al.	2008	IDI, FGD, Participant Observation, Case Study (CS), SSI	Mothers, grandmothers, health providers, community members	Ghana	Care seeking behaviors
8	Bazzano, Oberhelman, Potts et al.	2015	IDI, O, FGD, visual media	Mothers, grandmothers, fathers	Cambodia	Breastfeeding practices
9	Bazzano, Var, Grossman, et al.	2017	O, SSI	Mothers	Cambodia	Newborn care practices with emphasis on use of emollients
10	Byaruhanga, Nsungwa-Sabiiti, Kiguli, et al.	2011	IDI, FGD	Mothers, TBA, elderly care takers	Uganda	Care seeking behaviors
11	Degefie, Amare, and Mulligan	2014	IDI, Key informant interviews (KII)	Mothers, grandmothers, TBA, fathers	Ethiopia	General care practices
12	Dhinga, Gittelsohn, Suleiman, et al.	2014	IDI, FGD	Mothers, fathers, TBA, grandmothers, health care providers	Tanzania	Cord care practices
13	Engmann et al.	2013	IDI, FGD	Mothers, grandmothers, health care providers	Ghana	Newborn illness, danger signs, and care seeking behavior
14	Gondwe, Munthali, Ashorn, et al.	2014	IDI, FGD	Mothers, fathers, TBA, grandmothers, traditional healers,	Malawi	Pre-term birth and care seeking practices
15	Herlihy, Shaikh, Mazimba, et al.	2013	IDI, FGD	Mothers, grandmothers, TBA, community members	Zambia	Cord care practices
16	Hill, Tawaiah-Agyemang, Manu et al.	2010	IDI, FGD, and Narratives (N)	Mothers, grandmothers, TBA, fathers, pregnant women	Ghana	Thermal care practices
17	Hunter, Callaghan-Koru, Mahmud, et al.	2014	IDI, FGD	Pregnant women, mothers, husbands, grandmothers, traditional healers, community leaders, religious leaders, health care providers	Bangladesh	Skin to Skin practices
18	Kesterton and Cleland	2009	IDI, FGD	Mothers, grandmothers, TBA	India	General care practices
19	Khadduri, Marsh, Rasmussen et al.	2008	SSI, FGD	Women of reproductive age, health service providers, mothers, fathers	Pakistan	General care practices
20	Lee, Durham, Booth, et al.		IDI, FGD	Mothers, health care staff, key informants	Lao PDR	Breastfeeding practices

21	Lunze, Yeboah-Antwi, and Marsh	2014	IDI, FGD	Mothers, community leaders, health officers, grandmothers	Zambia	Neonatal hypothermia and thermal care practices
22	Melesse-Salasibew, Filteau, and Marchant	2014	IDI, SSI, FGD	Mothers, local experts on newborn care practices	Ethiopia	General care practices following home births
23	Moran, Choudhury, Khan, et al.	2009	IDI	Pregnant women, mothers	Bangladesh	General care practices
24	Moyer, Aborgio, Logonia et al.	2012	IDI, FGD	Women with newborns, grandmothers, compound heads, community leaders, TBA, health care providers	Ghana	Cord care practices
25	Mrisho, Schellenberg, Mushi et al.	2008	IDI, FGD, CS	Female community informants	Tanzania	Home-based care practices
26	Nabiwemba, Atuyambe, Criel, et al.	2014	IDI	Mothers	Uganda	Care practices for LBW babies
27	Nalwadda, Waiswa, Guwatudde, et al.	2015	IDI, FGD	Mothers, fathers, TBA	Uganda	General care practices with emphasis on cord care
28	Newbrander, Natiq, Shahim, et al.	2014	IDI, FGD, O	Household members of perinatal woman, community members	Afghanistan	General care practices
29	Okeyere, Tawiah-Agyemang, Manu, et al.	2010	IDI, FGD, Birth Narratives (BN)	Mothers, TBAs, grandmothers, husbands, *asram* healers	Ghana	Traditional illness
30	Pati, Chauhan, Panda, et al.	2014	IDI	Mothers, TBA	India	General care practices with an emphasis on breastfeeding
31	Premji, Khowaja, Meherali, et al.	2014	IDI, FGD	Mothers, fathers, grandmothers	Pakistan	General care practices
32	Sacks, Moss, Winch et al.	2015	IDI, FGD, O	Mothers, TBA, hospital staff	Zambia	Skin, thermal, and cord care
33	Shamba, Schellenberg, Hildon et al.	2014	IDI, FGD, BN	Mothers, TBA	Tanzania	Bathing, thermal, and skin to skin care practices
34	Tawiah-Agyemang, Kirkwood, Edmond, et al.	2008	SSI, FGD	Mother, women of child bearing age, health workers, policy makers	Ghana	Initiation of breastfeeding
35	Thairu and Pelto	2008	IDI	Mothers	Tanzania	General care practices
36	Waiswa, Kemigisa, Kiguli, et al.	2008	IDI, FGD	Mothers, fathers, grandparents	Uganda	General care practices
37	Walsh, Norr, Sankar, et al.	2014	FGD	TBA, pregnant women, stakeholders, traditional healers	Haiti	Cord care practices

*Color coding indicates geographic regions

**Data for the review were only extracted from participants who were family members (including mothers of newborns or mothers-to-be) and non-professionals who provided care at home to the newborn.

Table 2. Critical Appraisal Skills Program (CASP) Assessment

No.	Author(s)	Year	CASP 1	CASP 2	CASP 3	CASP 4	CASP 5	CASP 6	CASP 7	CASP 8	CASP 9	CASP 10	Overall Score
1	Aborigo, Moyer, Rominski et al.	2012	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
2	Adejuyigbe, Bee, Amare et al.	2015	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
3	Alam, Ali, Sultana et al.	2008	Y	Y	Y	Y	Y	N	Y	Y	C	Y	8/9
4	Amare	2014	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10
5	Amare, Shamba, Manzi, et al.	2015	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10
6	Atyeo, Frank, Vail et al.	2017	Y	Y	N	C	N	Y	Y	Y	Y	Y	7/9
7	Bazzano, Kirkwood, Tawiah-Agyemang, et al.	2008	Y	Y	Y	Y	Y	N	N	Y	Y	Y	8/10
8	Bazzano, Oberhelman, Potts, et al.	2015	Y	Y	Y	Y	Y	C	Y	Y	Y	Y	9/9
9	Bazzano, Var, Grossman, et al.	2017	Y	Y	Y	Y	Y	C	Y	Y	Y	Y	9/9
10	Byaruhanga, Nsungwa-Sabiti, Kiguli, et al.	2011	Y	Y	N	Y	Y	N	Y	Y	Y	C	7/9
11	Degefie, Amare, and Mulligan	2014	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
12	Dhingra, Gittelsohn, Suleiman, et al.	2014	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10
13	Engmann, Adongo, Akawire, et al.	2013	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
14	Gondwe, Munthali, Ashorn, et al.	2014	Y	Y	Y	Y	C	N	Y	Y	Y	Y	8/9
15	Herlihy, Shaikh, Mazimba, et al.	2013	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
16	Hill, Tawiah-Agyemang, Manu, et al.	2010	Y	Y	Y	Y	Y	N	N	C	Y	Y	7/9
17	Hunter, Callaghan-Koru, Mahmud, et al.	2014	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
18	Kesterton and Cleland	2009	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
19	Khadduri, Marsh, Rasmussen, et al.	2008	Y	Y	Y	Y	C	N	N	C	Y	Y	7/9
20	Lee, Durham, Booth, et al.	2013	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
21	Lunze, Yeboah-Antwi, Marsh, et al.	2014	Y	Y	Y	Y	Y	N	Y	C	Y	Y	8/9
22	Melesse-Salasibew, Filteau, and Marchant	2014	Y	Y	Y	N	Y	N	Y	N	Y	C	7/9
23	Moran, Choudhury, Khan, et al.	2009	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
24	Moyer, Aborigo, Logonia, et al.	2012	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
25	Mrisho, Schellenberg,	2008	Y	Y	Y	Y	C	N	Y	N	Y	Y	7/9

	Mushi, et al.												
26	Nabiwemba, Atuyambe, Criel, et al.	2014	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
27	Nalwadda, Waiswa, Guwatudde, et al.	2012	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
28	Newbrander, Natiq, Shahim, et al.	2010	Y	Y	Y	Y	C	N	Y	N	Y	Y	7/9
29	Okyere, Tawaiah-Agyeman, Manu, et al.	2006	Y	Y	Y	Y	C	N	Y	N	Y	Y	7/9
30	Pati, Chauhan, Panda, et al.	2014	Y	Y	Y	Y	N	N	Y	N	N	C	5/10
31	Premji, Khowaja, Meherali, et al.	2014	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
32	Sacks, Moss, Winch, et al.	2015	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10
33	Shamba, Schellenberg, Hildon, et al.	2014	Y	Y	Y	Y	Y	C	Y	Y	Y	Y	8/9
34	Tawiah-Agyemang, Kirkwood, Edmond, et al.	2008	Y	Y	Y	Y	Y	N	N	Y	C	Y	7/9
35	Thairu and Pelto	2008	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10
36	Waiswa, Kemigisa, Kiguli, et al.	2008	Y	Y	Y	N	Y	N	Y	Y	Y	Y	8/10
37	Walsh, Norr, Sankar, et al.	2015	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10

Table 3. Barriers and facilitators described in articles reviewed

Domain of newborn care	Barriers	Facilitators	Article Number per Table 2, Year	Total Number of Article Mentions
Cord care	Lack of supplies, including water or infection prevention supplies Using surgical spirits and powder Unhygienic cutting practices, including used, unsterilized razor blades or scissors Unskilled attendants Delayed cord cutting, resulting in infection Mixed perception about the length at which cord should detach and heal Use of topical applications to the cord, including herbs, butter, and indigenously-made substances, for medicinal/protective purposes Application of traditional remedies and substances on the cord to moisturize or dry it and facilitate its separation and promote healing Belief that cord infections caused by mother's diet Lack of understanding about cord cleaning Lack of understanding of risks and infections affecting the cord and certain signs of infection, such as redness Cultural belief and newborn care practices not conforming to recommended practices Cost of supplies, including CHX solution Religious and cultural beliefs about cord cutting and cleaning Umbilical cord thought to make baby vulnerable to witchcraft Mothers cutting the cord themselves Umbilical cord not tied prior to cutting, can lead to tetanus Practice of only tying to cord on the side of the baby	Knowledge about cord care Community stakeholder recognition that infants are susceptible to cord infection Delivery in hospital Informed at health facility Tailored behavior change communication Appropriate compromises between existing and recommended practices Community education Outreach education Inclusion of grandmothers and other female household members, who are key decision makers and caregivers Participatory health promotion techniques, such as women's groups Programs targeting Traditional Birth Attendants (TBAs) and community mothers Importance of cord care and tying recognized in community and understood culturally Recognition of cord problems, such as delayed healing, bleeding, or swelling TBAs counselling mothers to protect the cord from infections Consensus regarding liquid cord cleaning Raising awareness about usefulness of CHX in cord cleaning Willingness to adopt practices that would protect the newborn and alter traditional cord care practices Behavior change communication messages beginning at pregnancy Prescribed practices making their way into traditional care	3, 2018 4, 2014 9, 2017 10, 2011 11, 2014 12, 2014 15, 2013 18, 2009 19, 2008 22, 2014 23, 2009 24, 2012 25, 2008 26, 2014 27, 2015 30, 2014 32, 2015 36, 2008 37, 2014	19/37

	Recontamination of washed hands before attending to newborn Seclusion of mother and baby in postpartum period may lead to late identification of illness and delay to seeking care Utilizing materials, such as rope and twigs, in cord tying Disconnect between healthcare providers and community Local conceptions regarding role of cord tying in stemming blood flow Concerns regarding the length of time until cord detachment Presence of blood clots associated with curses	Efforts to promote hand-washing and to avoid recontamination Promotion of efforts to avoid unclean home applications to the cord Programs, promoting cord cleansing with antiseptics, should provide educational messages about the balance between the benefits and the likelihood that separation of umbilical cord may be slightly delayed Using materials, such as clean cotton, other than fingers to apply medicine/antiseptic Programs in urban slum areas Interventions to improve social support to women, especially first-time mothers Educating healthcare providers about harmful, traditional practices so they are specifically addressed Explaining rationale for tying the cord on both sides of the cut Cultural health systems model that depicts all stakeholders Presence of blood clots leading to seeking medical treatment at health centers Promotion of chlorhexidine in place of commonly-reported application of harmful substances Scale-up of evidenced based practices Health promotion programs taking into account health system barriers and financial burden		
Drying and wrapping	Behaviors vary among home deliveries Perception of dirtiness of baby Perception of birthing process as polluting Vulnerability of baby Opinions of other household stakeholders, such as the mother-in-law Home and hospital delivery Not attending to baby until placenta delivered	Knowledge about drying and wrapping Understanding that baby should be kept warm Delivery in hospital Informed at health facility Tailored behavior change communication Appropriate compromises between existing and recommended practices Community education	2, 2015 8, 2011 10, 2014 14, 2010 16, 2009 19, 2014 20, 2014 21, 2009 28, 2014	11/37

	Prioritization of the mothers	Outreach education Inclusion of grandmothers who are key decision makers Participatory health promotion techniques, such as women's groups Traditional practice of wrapping in new clean cloth Use of warm water and traditional herbs to protect baby Behavior change communication messages beginning at pregnancy Babies dried and wrapped due to awareness of reduction of cold Having more than one attendant to help both the mother and baby Programs in urban slum areas Interventions to improve social support to women, especially first-time mothers	30, 2015 31, 2014	

Bathing	Traditional or historical practice Lack of knowledge of when to bathe baby, especially in home deliveries Early bathing due to societal pressure Cultural norm of frequent bathing Cultural belief and newborn care practices not conforming to recommended practices Negative perception of vernix, including association with sperm Vernix considered dangerous for HIV-exposed infants Bathing in close proximity to smoking fires Early bathing due to association with dirtiness as well as body odor later in life Differences in practice by untrained TBAs Spiritual beliefs attached to use of local herbs for bathing Bathing practices, such as using pond water Substances added to water, including Dettol or Savlon Bathing immediately after birth due to concerns about 'ritual pollution' can cause hypothermia Early bathing linked to shaping the baby's head Early bathing to help the baby sleep and feel clean Early bathing in facilities	Delayed bathing when delivery in hospital Informed at health facility Quality of care in health facility Health worker advice Tailored behavior change communication, addressing community norms and based on formative research Appreciation of newborn vulnerability to encourage behavior change Appropriate compromises between existing and recommended practices Community education Outreach education Inclusion of grandmothers who are key decision makers Participatory health promotion techniques, such as women's groups Behavior change communication messages beginning at pregnancy Having more than one attendant to help both the mother and baby Delayed bathing due to concerns about pneumonia Identifying and addressing cultural rationales that underlie negative practices Reinforcing ad protecting beliefs that support positive practices Improving health worker communication skills and social	2, 2015 3, 2008 8, 2011 9, 2014 10, 2014 14, 2010 16, 2009 19, 2014 20, 2014 21, 2009 24, 2014 26, 2014 28, 2014 30, 2015 31, 2014 33, 2008 34, 2008	17/37
Thermal control	Lack of practice when delivery at home or with TBA Lack of knowledge of keeping baby indoors Suboptimal practices Early bathing Length of time baby undressed during bathing Bathing with warm water Use of blankets, rather than skin-to-skin care	Informed at health facility Beliefs about importance of thermal care Quality of care in health facility Tailored behavior change communication based on formative research Appropriate compromises between existing and recommended practices Community education Outreach education	2, 2015 3, 2008 8, 2011 9, 2014 10, 2014 14, 2010 17, 2008 19, 2014 24, 2014	12/37

	Newborn massage, including use of mustard oil, can compromise the skin barrier function Cultural belief and newborn care practices not conforming to recommended practices Lack of maintaining thermoprotective practices in the first few hours postpartum, when newborns are at greatest risk	Inclusion of grandmothers who are key decision makers Participatory health promotion techniques, such as women's groups Behavior change communication messages beginning at pregnancy Knowledge and practice that baby should be kept warm Having more than one attendant to help both the mother and baby Use of low-cost newborn warmers Community-based practices on hypothermia prevention and management	28, 2014 30, 2015 31, 2014	
Skin to skin contact	Few mothers given baby immediately after birth Concerns of disease transmission, harm to umbilicus Perception of dirtiness after birth Maternal rest Concerns of baby becoming cold Delayed due to early bathing Perception that it might be harmful to fragile newborns Lack of understanding that kangaroo mother care is a protective method of caring for healthy newborns Use of blankets, rather than skin-to-skin care Lack of continued skin to skin contact Cultural belief and newborn care practices not conforming to recommended practices Women feeling responsible for household duties	Behavior change interventions based on formative research Quality of care in health facility Tailored behavior change communication Appropriate compromises between existing and recommended practices Community education Outreach education Inclusion of grandmothers who are key decision makers Participatory health promotion techniques, such as women's groups Behavior change communication messages beginning at pregnancy Association with reduced risk of cord infection Concept easily understood and women willing to try if good for the baby Appreciation of kangaroo mother care as an appropriate treatment for ill babies Biomedical advice from healthcare providers reaching community through word-of-mouth and television campaigns Receiving help from family members	2, 2015 3, 2008 8, 2011 9, 2014 14, 2010 15, 2014 16, 2009 19, 2014 31, 2014	9/37

		Witnessing other women perform kangaroo mother care with positive outcomes Focusing intervention messages on building supportive a environment for kangaroo mother care practice		
Hygiene	Lack of knowledge on hand-washing with soap Recontamination of washed hands before attending to the newborn Cultural belief and newborn care practices not conforming to recommended practices	Health education Tailored behavior change communication Appropriate compromises between existing and recommended practices Community education Outreach education Inclusion of grandmothers who are key decision makers Participatory health promotion techniques, such as women's groups Efforts to promote hand-washing and to avoid recontamination Understanding of keeping babies and their surroundings clean Educating healthcare providers about harmful, traditional practices so they are specifically addressed	3, 2008 9, 2014 16, 2009 17, 2008 22, 2012 24, 2014	6/37
Breast feeding (initiation of and provision of colostrum)	Traditional or historical practice Belief that it is unhealthy Mother's exhaustion Limited knowledge Maternal education status Geographic isolation Inconsistency in health education Learning from relatives Pre-lacteal feeds given on fingertip, increasing risk of infection Low urgency in initiating breastfeeding as mother and child believed to be polluted after birth Negative beliefs regarding colostrum	Community members knowledgeable about importance of breast-feeding Delivery in a health facility, where staff encouraged early breast-feeding Culturally-tailored health education Targeting isolated villages Cross-generational education interventions Interventions through community health clinic workers Appropriate compromises between existing and recommended practices Community education Outreach education	1, 2012 6, 2017 9, 2017 10, 2011 11, 2014 12, 2014 18, 2009 19, 2008 20, 2013 22, 2014 23, 2009 25, 2008	18/37

	Traditional practices to test colostrum for bitterness Perception of a lack of breast milk Onset of post-birth activities, such as bathing Perception that baby needs rest Baby not crying for milk Perception of inadequate maternal nutrition and breast milk Premature breast milk supplementation (water and other fluids), which may expose newborns to pathogens Work served as a barrier Difference in advice received from different people by first-time mothers Cultural belief and newborn care practices not conforming to recommended practices Perception that hunger is not met or satisfied by breast-milk alone	Inclusion of grandmothers/mother-in-laws and religious leaders who are key decision makers Participatory health promotion techniques, such as women's groups Awareness of nutritive value of breast milk Positive perception regarding infant feeding TBAs trained by Ministry of Health Raising awareness of early initiation of breast-feeding in the policy arena Cultural belief and practices Identifying and addressing cultural rationales that underlie negative practices Reinforcing ad protecting beliefs that support positive practices Improving health worker communication skills and social management of patients Lowering healthcare costs Programs in urban slum areas Interventions to improve social support to women, especially first-time mothers First-time mothers' mothers Working with employers and developing supportive employment policies Providing postnatal support and working with lay people and health professionals Research to identify optimal combination of interventions Using religious leaders, trained health workers, family health action groups, and radio to disseminate messages	26, 2014 28, 2014 30, 2014 31, 2014 33, 2008 35, 2008	
Care seeking for illness	Lack of transportation Geographic isolation/remoteness from health facilities Financial ability/constraints Seclusion of mother and baby in postpartum period may lead to late	Addressing locally existing cultural beliefs Strengthening facility care Urging families to seek medical care for any symptom of illness in a newborn	7, 2008 8, 2011 11, 2013 17, 2008 25, 2015	7/37

	identification of illness and delay to seeking care Community understanding of the newborn period and cultural expectations Caretaker knowledge about newborn sickness Individual experiences in household and caretaker autonomy Women's inability to seek care without being accompanied by a male relative Healthcare decisions influenced by community members Perceived health system gaps Confidence in healthcare providers is issue-specific Sequential care-seeking practices, with traditional medicine as first-line of treatment for 7 days Untimely action after recognition of danger signs Previous negative experiences with health services facilities Local understanding of illness affects treatment practices Mothers blamed for infant illness Use of traditional home remedies and self-medication instead of care in health facilities Shame about utilization of maternal and neonatal services Care-seeking for local community members for serious health concerns Post-partum depression 'Asram' perceived as common illness which cannot be treated at health facilities 'Asram' treatments including frequent cold herbal baths, air-dying, and oral treatments Modification of 'asram' treatment required the sanction of a healer	Addressing financial barriers Recognition of danger signs Targeted behavior-change communication programs Using religious leaders, trained health workers, family health action groups, and radio to disseminate messages Understanding traditional illnesses in designing care-seeking interventions	26, 2014 27, 2010	

Other newborn care	Cultural perception of emollients as improving the skin, keeping the baby warm, and shaping the baby Social pressure to use emollients Emollient choice influenced by cost, availability, and traditional norms Massage, associated with application of emollients, is potentially damaging to skin Potential impact of emollients, such as engine oil, on harm and even mortality TBAs applying mild pressure inside baby's mouth on the soft palate with water and local herb Application of powders directly into dermal incisions of ill children to ward off malevolent spirits	Association of emollient therapy in reduction of mortality among preterm infants Newborn emollient trials, specifically designed to reflect contextual differences If emollients are proven effective, policy makers deciding whether to provide emollients free of charge or through social marketing Improving practice of massage associated with emollient application Understanding traditional illnesses in designing care-seeking interventions	4, 2014 20, 2014 26, 2010 30, 2015	4/37
Low birth weight recognition	Babies not weighed Belief in supernatural powers Less knowledge of home care practices when baby delivered at home or in lower level health facility Lack of knowledge of how to provide care or when to take baby to health facility Perceptions of preterm birth, including young and old maternal age, heredity, sexual impurity, and maternal illness during pregnancy Poverty Women placed with main responsibility for preterm newborns High time burden of care for preterm babies leading to neglect of household, farming, and business duties	Better knowledge of home care practices when delivery at health facility Health education at community level to reach mothers that deliver at home Mechanisms to support mothers Provision of warmth to preterm newborns Addressing cultural practices for preterm babies among community members Vernix considered important for preterm newborns	9, 2014 12, 2014 24, 2014	3/37

Contributorship statement:

Authors have contributed as follows to this work. Conception and design of the work: ANB, RH**;** Data collection: ANB, AK, EFK, RH**;** Data analysis and interpretation: ANB, AK, EFK**;** Drafting the article: ANB, AK, EFK, SE, RH**;** Critical revision of the article: ANB, AK, EFK, SE, RH**;** Final approval of the version to be published: ANB, AK, EFK, SE, RH.

Competing interests: All authors declare they have no conflicts of interest.

Funding: The study received no financial support.

Data sharing statement: All data came from published articles available from electronic databases which are openly accessible.

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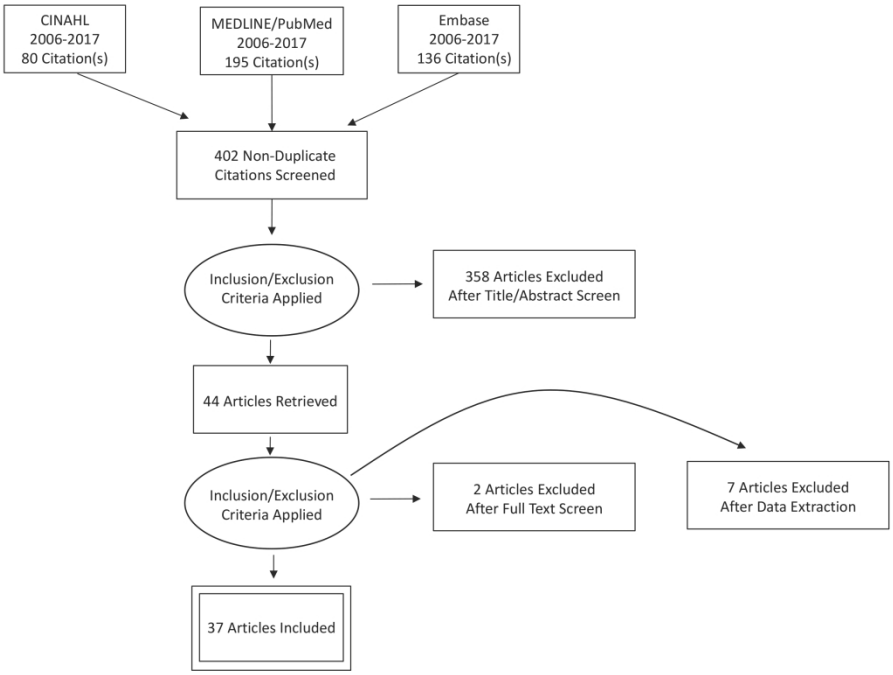

Figure 1

264x190mm (300 x 300 DPI)

Appendix 1. Search Strategy

Search String	Notes
"infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab])) AND ("breast feeding"[MeSH Terms] OR "immediate breastfeeding"[Title/Abstract] OR "exclusive breastfeeding"[tiab] OR "exclusive breast feeding"[tiab] OR "initiation of breastfeeding"[tiab] OR "thermal care"[tiab] OR "cord care"[tiab]) OR "Thermal care"[tiab] OR "Thermal care"[ot] OR "bathing"[tiab] OR bathing[ot] OR "cord care"[tiab] OR "cord care"[OT] OR "umbilical cord care"[tiab] OR "umbilical cord care"[ot] OR "health knowledge, attitudes, practice"[MeSH Terms]	Includes "health knowledge, attitudes, practices"
"mothers"[MeSH Terms] OR mothers[Title/Abstract] OR mother[Title/Abstract] OR "fathers"[MeSH Terms] OR fathers[Title/Abstract] OR "parents"[MeSH Terms] OR parents[Tiab] OR parent[Tiab] OR "Grandparents"[MeSH] OR grandmother[Tiab] OR grandmother's[Tiab] OR grandmothers[Tiab] OR grandmothers'[Tiab)	Parent Perspective Concept
(("Qualitative Research"[Mesh] OR "qualitative research"[TIAB] OR "qualitative research"[OT] OR "qualitative studies"[tiab] OR "qualitative study"[tiab] OR "qualitative studies"[OT] OR "qualitative studies"[OT] OR "qualitative study"[OT] OR "Interviews as Topic"[Mesh] OR "semi structured interview"[TIAB] OR "semi structured interviewer"[TIAB] OR "semi structured interviewing"[TIAB] OR "semi structured interviews"[TIAB] OR "semi structured interview"[OT] OR "semi structured interviews"[OT] OR "semistructured interview"[TIAB] OR "semistructured	Qualitative concept (w/o exclusions)

interview"[OT] OR "unstructured interview"[TIAB] OR "unstructured interviewing"[TIAB] OR "unstructured interviews"[TIAB] OR "unstructured interview"[OT] OR "in depth interview"[TIAB] OR "in depth interviewees"[TIAB] OR" in depth interviewing"[TIAB] OR "in depth interviews"[TIAB] OR "in depth interview"[OT] OR "in depth interviewing"[OT] OR "in depth interviews"[OT] OR "Focus Groups"[Mesh] OR "focus group"[TIAB] OR "focus groups"[TIAB] OR "focus group"[OT] OR "focus groups"[OT] OR "group interview"[OT] OR "group interview"[TIAB] OR "Direct observation"[tiab] OR "Participant observation"[tiab] OR "Non-participant observation"[tiab] OR "Direct observation"[OT] OR "Participant observation"[ot] OR "Non-participant observation"[OT] OR "Ethnology"[Mesh] OR "ethnographic research"[OT] OR "ethnographic research"[TIAB] OR ethnology[OT] OR ethnology[TIAB] OR "ethnographic study"[tiab] OR "ethnographic study"[ot] OR "Community-Based Participatory Research"[Mesh] OR "community-based participatory research"[OT] OR "community-based participatory research"[TIAB] OR "action research"[TIAB] OR "action research"[OT] OR "Formative research"[tiab] OR "Formative research"[ot] OR "Key informant"[tiab] OR "Key informant"[OT] OR "Interpretative perspective"[TIAB] OR "Phenomenological Research"[TIAB] OR Phenomenology[tiab] OR Phenomenology[ot] OR "Phenomenological Research"[OT]))	
ALL countries names (not pig OR hen) OR Developing country/LMIC terms (see above)	ALL LMIC terms and Country names

"infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab]	This is our main concept and prioirity. Reintroduced within context of other concepts
(("infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab])) AND ((#110 AND #93 AND #94 AND #101))	
(("infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab])) AND ((#110 AND #93 AND #94 AND #101)) Filters: Publication date from 2016/01/01 to 2017/12/31	Published Jan 1, 2016 - Dec 31, 2017
(("infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab])) AND ((#110 AND #93 AND #94 AND #101)) Filters: Publication date from 2016/01/01 to 2017/12/31; English	Published English Jan 1, 2016 -Dec 31, 2017
(("infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab])) AND ((#110 AND #93 AND #94 AND #101)) Sort by: Relevance Filters: published in the last 10 years; Humans; English	

Reporting checklist for systematic review and meta-analysis.

Based on the PRISMA guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

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In your methods section, say that you used the PRISMA reporting guidelines, and cite them as:

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		Reporting Item	Page Number
	#1	Identify the report as a systematic review, meta-analysis, or both.	0-1
Structured summary	#2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number	0-1
Rationale	#3	Describe the rationale for the review in the context of what is already known.	1
Objectives	#4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	2
Protocol and registration	#5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address) and, if available, provide registration information including the registration number.	0-1

Eligibility criteria	#6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rational	3
Information sources	#7	Describe all information sources in the search (e.g., databases with dates of coverage, contact with study authors to identify additional studies) and date last searched.	3
Search	#8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	See note 1
Study selection	#9	State the process for selecting studies (i.e., for screening, for determining eligibility, for inclusion in the systematic review, and, if applicable, for inclusion in the meta-analysis).	4-5
Data collection process	#10	Describe the method of data extraction from reports (e.g., piloted forms, independently by two reviewers) and any processes for obtaining and confirming data from investigators.	5
Data items	#11	List and define all variables for which data were sought (e.g., PICOS, funding sources), and any assumptions and simplifications made.	5-6
Risk of bias in individual studies	#12	Describe methods used for assessing risk of bias in individual studies (including specification of whether this was done at the study or outcome level, or both), and how this information is to be used in any data synthesis.	6-7
Summary measures	#13	State the principal summary measures (e.g., risk ratio, difference in means).	6-7
Planned methods of analyis	#14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I2) for each meta-analysis.	6-7
Risk of bias across studies	#15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	6-7
Additional analyses	#16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	6-7
Study selection	#17	Give numbers of studies screened, assessed for eligibility, and	7-8

		included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	
Study characteristics	#18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citation.	7-8
Risk of bias within studies	#19	Present data on risk of bias of each study and, if available, any outcome-level assessment (see Item 12).	7
Results of individual studies	#20	For all outcomes considered (benefits and harms), present, for each study: (a) simple summary data for each intervention group and (b) effect estimates and confidence intervals, ideally with a forest plot.	7
Synthesis of results	#21	Present the main results of the review. If meta-analyses are done, include for each, confidence intervals and measures of consistency.	8-10
Risk of bias across studies	#22	Present results of any assessment of risk of bias across studies (see Item 15).	7
Additional analysis	#23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	8-10
Summary of Evidence	#24	Summarize the main findings, including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., health care providers, users, and policy makers	11
Limitations	#25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review level (e.g., incomplete retrieval of identified research, reporting bias).	11
Conclusions	#26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	12
Funding	#27	Describe sources of funding or other support (e.g., supply of data) for the systematic review; role of funders for the systematic review.	12

Author notes

1. 4, Appendix

BMJ Open

Parent and family perspectives on home-based newborn care practices in lower-income countries: a systematic review of qualitative studies

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2018-025471.R2
Article Type:	Research
Date Submitted by the Author:	07-Feb-2019
Complete List of Authors:	Bazzano, Alessandra; Tulane University School of Public Health, Global Community Health and Behavioral Sciences Felker-Kantor, Erica; Tulane University School of Public Health, Global Community Health and Behavioral Sciences Eragoda, Shalini; Tulane University School of Public Health, Global Community Health and Behavioral Sciences Kaji, Aiko; Tulane University School of Public Health, Global Community Health and Behavioral Sciences Horlick, Raquel; Tulane University, Howard Tilton Memorial Library
Primary Subject Heading:	Global health
Secondary Subject Heading:	Public health, Paediatrics
Keywords:	infant, newborn, postnatal care, QUALITATIVE RESEARCH, care seeking, Cambodia

Parent and family perspectives on home-based newborn care practices in lower-income countries: a systematic review of qualitative studies

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Keywords: infant, newborn, post-natal care, care seeking, qualitative research, health equity

Word count: 3005
Figures: 1
Tables: 3

ABSTRACT

Objectives

To understand family and parent perspectives on newborn care provided at home to infants in the first 28 days of life, in order to inform behavioral interventions for improving care in low income countries, where the majority of newborn deaths occur.

Design

A comprehensive, qualitative systematic review was conducted. MEDLINE/PubMed, Embase, and Cumulative Index of Nursing and Allied Health databases were systematically searched for studies examining the views of parents and family members on newborn care at home. The search period included all studies published from 2006 to 2017. Studies using qualitative approaches or mixed-methods studies with substantial use of qualitative techniques in both the methods and analysis sections were included. Studies meeting the inclusion criteria were extracted and evaluated using Critical Appraisal Skills Programme guidelines. Following the initial selection and appraisal, barriers and facilitators to recommended care practices across several domains were synthesized.

Results

Of 411 results retrieved, 37 met both inclusion and quality appraisal criteria for methodology and reporting. Geographic representation largely reflected that of newborn health outcomes globally, with the majority of studies conducted in the region of Sub-Saharan Africa and South Asia. Specific barriers and facilitators were identified among a range of domains including: cord care, drying and wrapping, thermal control, skin to skin contact, hygiene, breast feeding, care seeking for illness, low birth weight recognition. Cross cutting facilitators, common to all domains were also evident, including delivering at a health facility, including female relatives in counseling, lower health care costs, and exposure to newborn care messaging in the community.

Conclusions

When designing behavioral interventions to address newborn mortality at scale, policy makers and practitioners must include barriers and facilitators important to families in low income settings.

Review registration number CRD42016035674.

Article Summary

Strengths and limitations:

- Strengths of the review include having had a librarian/information scientist in the research team, and multiple reviewers experienced in qualitative research in low-income countries, primary qualitative data collection, and analysis.
- Other strengths of the study was the comprehensive search strategy covering multiple relevant databases; appraisal of quality among included studies based on critical appraisal skills guidelines; and a comprehensive description of study findings.
- Limitations included: the exclusion of documents not available in English, and those that may have been relevant, but were outside the defined date limitations. A further limitation is that because findings are presented in the aggregate, care practices from different geographic areas may require different interventions.

Introduction

Approximately 46% of all under-five deaths in 2016 occurred during the neonatal period, the initial 28 days following birth (global incidence). Southern Asia and sub-Saharan Africa account for nearly 80 percent of the newborn deaths. By 2030, the Sustainable Development Goals (SDG) target is to reduce neonatal mortality to at least as low as 12 deaths per 1,000 live births. However, per current trends, over 50 countries will fail to meet this target on newborn survival.[1] Yet, the majority of these deaths are preventable.[2]

During the neonatal period, care provided by parents and caregivers is critical for newborn survival.[3] Optimal or essential newborn care practices as defined by the World Health

Organization (WHO) include immediate drying and wrapping of newborns after birth, initiating skin-to-skin (STS) contact, clean cord care, dry cord care, immediate initiation of breastfeeding and exclusive breastfeeding until 6 months of age, as well as ensuring warmth (thermal control) of the newborn through delayed bathing.[4] In addition, parents or caregivers at home must also provide nurturing care, safety and security, and responsiveness to the newborn's needs. The provision of quality, effective care at the home and community level is critical for improving newborn health outcomes and promoting optimal early childhood development. A reduction in neonatal mortality by 25% can be achieved by scaling up community interventions, including provision of optimal home care.[5] Although feasible interventions exist to reduce newborn mortality, uptake of these interventions is low.[6]

In order to increase scale up of coverage and implementation of effective home and community-based newborn care practices, providing data on research priorities for newborn health is key.[7] Researchers have identified specific domains related to caregiver perceptions and behaviors as priorities.[8] Qualitative research has been particularly useful for obtaining information on newborn care practices at home, which often vary based on the sociocultural context in low-income countries.[9]

Despite the existence of multiple individual qualitative and formative research studies on home and community-based newborn care, a systematic review of the available qualitative research is lacking. Therefore, we conducted a systematic review to provide data to improve both programming and policy for home and community care for newborns.[7]

The primary objective of this study was to systematically review qualitative literature to understand parent and family experiences with home newborn care practice in low-income

countries, presenting information related to barriers and facilitators to inform behavioral interventions focused on improving newborn survival and care.

Methods

This systematic review was registered with the International Prospective Register of Systematic Reviews (PROSPERO): registration number CRD42016035674. The review followed guidelines from the Enhancing Transparency in Reporting the Synthesis of Qualitative Research (ENTREQ) statement.[i] Due to the emphasis on qualitative research, the review primarily employed the ENTREQ guidelines for reporting, while also drawing guidance from PRISMA, which is more specific to the requirements of quantitative literature reviews.[10,11]

Newborn care practices were defined as all actions taken by parents/caregivers that provide for the essential biological, physiological and psychological needs of the newborn infant following delivery and up to the end of the newborn period (28 days of life). These included, but were not limited to, the essential newborn care practices as defined by WHO: cord care, drying and wrapping after delivery, initiation of breast feeding, bathing, thermal control, breast feeding and care seeking for newborn illness.[12]

Four of five researchers involved in conducting the review, analyzing the results, and writing up the manuscript had strong experience in qualitative research methods, and hold graduate and/or doctoral level qualification in public health, with a specialization in research methods (ANB, EFK, AK, and SE). One researcher (RH) is an information scientist with a qualification in library sciences and specialization in support to research in science and biomedicine.

Patient and public involvement

No medical patients and or members of the public were involved in this systematic review of existing published research.

Inclusion and exclusion criteria

Studies were included if they used qualitative data collection methods such as interviews, focus groups, direct observation, and participatory action research. Inclusion requirements also stipulated that studies needed to have a well-described methodology section and a clear description of the qualitative data analysis methods and process (e.g., grounded theory, narrative analysis, content analysis, thematic analysis). Finally, data on newborn care at home must have been directly obtained from parents or caregivers of newborns (infants under 28 days of age, including low birthweight or small babies), whether born at home or at a facility, with or without skilled attendance, and regardless of whether the study also included additional data from non-family members or health workers such as TBAs (which data was not used for this review). Caregivers were defined as mothers/fathers or other adult family or community members who provided day-to-day physical and psychological support to meet the basic needs of newborn infants. Data gathered from community health workers, and from professional or non-professional health care providers, were not used or included in this study although it may have been presented in one of the articles included in the review.

Excluded studies were those for which it was difficult to extract qualitative data (e.g., mixed methods studies without clearly labeled data, or studies in settings where perceptions of parents'/caregivers' experiences of newborn care practices could not be clearly identified, such

as summaries or aggregate data). Commentaries, protocols, and systematic reviews were not included in the analysis. Additionally, studies from countries other than those defined by the World Bank as low-income countries and lower-middle income countries (which have a Gross National Income per capita of less than $4,125) were excluded.[13]

Search strategy

The review began in 2016 and initially targeted literature published in the previous ten years. Due to delays in the publication process , however, we extended a further year to encompass the timeframe 2006-2017. The following electronic databases were searched: MEDLINE (PubMed), Embase, Cumulative Index to Nursing and Allied Health Literature (CINAHL: EBSCOhost). A health sciences librarian (RH) developed the database searching strategy and conducted the final searches. The initial search strategy was developed for MEDLINE and then adapted for other databases. Medical Subject Headings (MeSH) were used followed by free-text terms using controlled vocabulary (see the Appendix for a detailed description of the search strategy). Only articles in English were included due to potential difficulties in translating and interpreting foreign language qualitative data by native English-speaking reviewers, and to ensure that the review covered the most current literature on infant and young child feeding practices.

Figure 1 presents the selection process which followed the PRISMA guidelines for reporting of systematic reviews.[11] Search results were initially imported into Endnote reference management software (Thomson Reuters (Scientific) LLC) and duplicates and irrelevant studies were removed. Four independent reviewers screened study titles and abstracts for suitability against inclusion and exclusion criteria. The decision to include or exclude a study was required

by two reviewers. If after consultation a decision was not reached, a third reviewer (made the final decision.

Figure 1. Selection flow chart of review process

See attached figure file

Data extraction

For organization of extracted data, a unified matrix was utilized to record specific characteristics of included studies. Extracted data included reference details (author/data/publication), methodological approach (e.g., interviews/focus groups), conceptual framework (e.g., Grounded Theory), objectives or aims of the study, sampling methodology, socio-demographic characteristics of participants, country/region, and analysis method(s). The results of the selection process and data extraction, with selected characteristics, are presented in **Table 1. Characteristics of included studies**.

Quality appraisal

Each selected article was initially assessed by two reviewers (AB, EFK) according to the Critical Appraisal Skills Program checklist[14] to ensure quality and internal validity. Where reviewers had any differing opinions a third reviewer was consulted for consensus (AK). Selected studies met minimum criteria defined through the checklist including domains such as appropriateness of study design, data collection techniques, and analysis methods. Findings from the quality appraisal are presented in Table 2 using the following questions for analysis:

1. Was there a clear statement of the aims of the research?
2. Is a qualitative methodology appropriate?
3. Was the research design appropriate to address the aims of the research?
4. Was the recruitment strategy appropriate to the aims of the research?
5. Was the data collected in a way that addressed the research issue?
6. Has the relationship between researcher and participants been adequately considered?
7. Have ethical issues been taken into consideration?
8. Was the data analysis sufficiently rigorous?
9. Is there a clear statement of findings?
10. How valuable is the research?

Possible Responses: Yes, No, and Cannot assess due to missing information

Table 2. CASP Criteria Analysis

Following data extraction, relevant text from the results, discussion and conclusion sections, which provided information directly pertinent to home care of newborns from the perspectives of family caregivers, were imported into NVivo 11 qualitative software (NVivo qualitative data analysis software; QSR International Pty Ltd. Version 11, 2015).

Following the appraisal, deductive content analysis based on the WHO guidelines[15] was employed to identify domains for investigation and presentation within a framework analysis approach[16]. The focus of analysis was on manifest content rather than latent content [17]. For each domain of newborn care, study findings were extracted, and information on barriers and facilitators synthesized. Then, a narrative summary of the identified domains and themes, developed according to content, was reviewed by the research team (SE, ANB, EFK) to produce a consensus-based listing including barriers and facilitators to recommended newborn care practices. This review was undertaken by the authors alone and no patients or public participants were involved.

RESULTS

Geographic overview of studies reviewed

The vast majority of studies identified emerged from research carried out in the Sub-Saharan region, while the South Asian region was also well represented in the qualitative literature relating to newborn care practices at home.

Sub-Saharan Africa

Studies from the African region comprised 24 of 37 included for review, and information presented in the studies described the full range of home based newborn care practices.

South Asia

From the South Asian region, 8 of 37 studies presented information on newborn care practices, covering more general rather than specific domains of newborn care, though one focused on breastfeeding.

Southeast Asia

Three studies, two related to breastfeeding in Cambodia and Lao PDR, along with another from Cambodia related to skin care, were identified from the Southeast Asian region.

Latin America / Caribbean

Two qualitative studies were identified from the Latin America/Caribbean region, from Guatemala and Haiti, related to breastfeeding and cord care respectively.

Barriers and facilitators

A comprehensive list of barriers and facilitators stratified by the recommended care practice that were generated through the data synthesis exercise appears in **Table 3**. Among the 37 studies in this review, many of the reported barriers and facilitators were cross-cutting for recommended newborn care practices (i.e. cord care, drying and wrapping after delivery, prompt initiation of breast feeding, bathing, thermal control, breast feeding and care seeking for newborn illness). Across all practices, delivering at a health facility, including grandmothers in decision-making processes during and after pregnancy, low health care costs, and exposure to newborn care messaging in the community were reported as important facilitators for adoption of recommended newborn care practices. Common barriers across the recommended practices included traditional and historical beliefs and practices, cultural and gender norms, geographic location, conflicting health messaging, and societal pressures.

Barriers that influenced adoption of recommended **cord care practices** included lack of resources (e.g. clean water and razor blades), misinformation on timeliness of cord cutting, religious and cultural beliefs, and untrained birth attendants. Facilitators included institutional delivery, exposure to educational campaigns on safe and hygienic cord cutting practices, community outreach activities promoting handwashing and provision of clean razor blades, decision-making by grandmothers and women leaders, and cord-care counseling by TBAs.

Barriers to timely **drying and wrapping** included perceptions of newborn vulnerability and dirtiness, conflicting advice household stakeholders, and waiting for delivery of the placenta. Facilitators included institutional delivery, exposure to educational campaigns on

newborn thermal regulation, traditional wrapping practices, and the presence of two TBAs during delivery.

Factors impeding **delayed bathing** included societal pressure for cleanliness, preference for immediate bathing due to concerns about ritual pollution and hypothermia, negative perceptions of the vernix, and immediate bathing at health facilities. Factors that facilitated delayed bathing after delivery included hospital-based birth, exposure to newborn care messaging on the radio during pregnancy, communication between health care workers in the community and at the facility during pregnancy, and social support from other women in the household.

Factors inhibiting **skin-to-skin care** and **thermal control** practices included use of blankets instead of skin-to-skin contact, not immediately releasing baby to mother following delivery, early bathing, concerns of disease transmission, and maternal household duties. Facilitators included exposure to kangaroo care messaging during pregnancy, observing positive newborn health outcomes of other mothers who used kangaroo care practices, medical advice from health care providers, and prior participation in behavior change interventions.

Barriers to **care-seeking for illness** included lack of transport, minimal financial resources, distances to health facility, gender norms, prior negative experiences at health facilities, and cultural norms such as protective isolation during the postpartum period. Facilitators included family knowledge and recognition of danger signs and illness symptoms, lower health care costs, community education and support from religious leaders, and exposure to newborn health campaigns.

Barriers to **initiating breastfeed**ing included spatial/physical isolation, conflicting health messages, mother exhaustion, baby not crying for milk, historical and traditional beliefs to discard colostrum, and education. Facilitating factors included community and family member knowledge, information provided during health facility-based birth, attendance by trained TBAs, being a first time mother, and exposure to breast feeding education and policy campaigns.

DISCUSSION

Effective interventions to improve newborn survival require information on a number of complex factors related to essential newborn care [18]. In addition to collecting improved quantitative data for neonatal survival, qualitative data are essential for behavioral interventions targeted to specific populations.[19] Few qualitative systematic reviews exist to synthesize information from perspectives of parents on newborn care. One review from 2014 focused on skin-to-skin contact and included 29 studies containing data from 9 countries[20]. Findings from that review centred on the experience of becoming a parent under unfamiliar circumstances, and thoughtfully considered the experiences of parents in the unique practice of skin-to-skin care. The authors did not restrict the review to low income settings, though studies from Uganda, Brazil, and South Africa were included. Our findings add further information to the peer reviewed literature from low income countries, where the majority of newborn deaths occur.

Another review was recently conducted in relation to thermal care for newborns in Sub-Saharan Africa[21]. The review focused on sociocultural factors and identified a number of

potentially harmful cultural norms and traditions which influence care across African settings. Similar to what has been found in the present review, that review identified caregiver factors and contextual barriers as well as facilitating factors, but in contrast to this review these were specific to thermal control, which may not represent the full range perspectives for other newborn care practices. In contrast to this review, that review's restriction to Sub-Saharan Africa settings limits the potential for transferability of the findings to other geographic settings, and data from parents or family caregivers was not the focus.

A systematic review covering neonatal care practices in Sub-Saharan Africa was recently undertaken[22]. The authors of that review included both quantitative data and qualitative data published from 2001-2014, whereas our review focused on qualitative data only, and covered the period 2006-2017, though similar findings were identified in both reviews in relation to care practices, confirming the findings. Bee et al. also included studies of facility-based and home-based care (unlike our study which focused on data from parents regarding home care) and noted the limitation of data having come mainly from 5 countries, highlighting a need for research from a wider geographic area, such as has been provided in the present review. Given that birth at home presents unique risks to the newborn[23], information from these settings is key. Whereas the present review focused on barriers and facilitators identified through qualitative research, the review by Bee et al. centered on the prevalence of key immediate newborn care practices, however, the findings of both reviews are concordant.[22]

Policy recommendations and current approaches to reducing newborn mortality have not yet been appropriately scaled to reduce newborn mortality to levels targeted by the Sustainable Development Goals[24]. In the context of international calls for reduction of newborn

mortality and stillbirths[25], it will be essential for interventions to meet the needs of families and parents caring for newborns. This systematic review of qualitative research, drawn from the literature across low income countries, is an important step to providing data on the range of newborn care practices at home, which is specifically relevant to behavior change in settings where high newborn mortality continues.

Conclusions

This systematic review identified qualitative studies reporting on the experiences and first-hand accounts of family members and caregivers in low income countries who are responsible for providing essential newborn care for their infants up to the first 28 days of life. The review identified barriers and facilitators commonly reported in studies of newborn care practices. The findings presented here are directly applicable to social and behavioral change initiatives aimed at improving care practices for better newborn health outcomes in low resource settings.

Table 1. Characteristics of included studies*

No.	Author(s)	Year	Qualitative Methods	Participants**	Country (s)	Newborn Care Practices
1	Aborigo, Moyer, Rominski, et al.	2012	In depth interviews (IDI), Focus Group Discussions (FGD)	Mothers, health care providers, TBA, community leaders, grandmothers, compound heads, heads of households	Ghana	Breastfeeding practices
2	Adejuyigbe, Bee, Amare et al.	2015	IDI, Narrative Interviews, and Observations (O)	Mothers, fathers, health workers, grandmothers, TBA	Nigeria, Tanzania, Ethiopia	Thermal care and bathing
3	Alam, Ali, Sultana et al.	2008	IDI, O	Mothers, fathers, grandmother, family members, TBA	Bangladesh	Cord care practices
4	Amare	2014	IDI	Mothers, grandmothers, TBA	Ethiopia	Cord care practices
5	Amare, Shamba, Manzi, et al.	2015	IDI, FGD, (O)	Mothers, fathers, health workers, TBA, grandmothers, merchants	Four African sites	Emollient use for skin care
6	Atyeo, Frank, Vail et al.	2017	Semi structured interviews (SSI)	Mothers	Guatemala	Breastfeeding practices
7	Bazzano, Kirkwood, Tawiah-Agyeman, et al.	2008	IDI, FGD, Participant Observation, Case Study (CS), SSI	Mothers, grandmothers, health providers, community members	Ghana	Care seeking behaviors
8	Bazzano, Oberhelman, Potts et al.	2015	IDI, O, FGD, visual media	Mothers, grandmothers, fathers	Cambodia	Breastfeeding practices
9	Bazzano, Var, Grossman, et al.	2017	O, SSI	Mothers	Cambodia	Newborn care practices with emphasis on use of emollients
10	Byaruhanga, Nsungwa-Sabiiti, Kiguli, et al.	2011	IDI, FGD	Mothers, TBA, elderly care takers	Uganda	Care seeking behaviors
11	Degefie, Amare, and Mulligan	2014	IDI, Key informant interviews (KII)	Mothers, grandmothers, TBA, fathers	Ethiopia	General care practices
12	Dhinga, Gittelsohn, Suleiman, et al.	2014	IDI, FGD	Mothers, fathers, TBA, grandmothers, health care providers	Tanzania	Cord care practices
13	Engmann et al.	2013	IDI, FGD	Mothers, grandmothers, health care providers	Ghana	Newborn illness, danger signs, and care seeking behavior
14	Gondwe, Munthali, Ashorn, et al.	2014	IDI, FGD	Mothers, fathers, TBA, grandmothers, traditional healers,	Malawi	Pre-term birth and care seeking practices
15	Herlihy, Shaikh, Mazimba, et al.	2013	IDI, FGD	Mothers, grandmothers, TBA, community members	Zambia	Cord care practices
16	Hill, Tawaiah-Agyemang, Manu et al.	2010	IDI, FGD, and Narratives (N)	Mothers, grandmothers, TBA, fathers, pregnant women	Ghana	Thermal care practices
17	Hunter, Callaghan-Koru, Mahmud, et al.	2014	IDI, FGD	Pregnant women, mothers, husbands, grandmothers, traditional healers, community leaders, religious leaders, health care providers	Bangladesh	Skin to Skin practices
18	Kesterton and Cleland	2009	IDI, FGD	Mothers, grandmothers, TBA	India	General care practices
19	Khadduri, Marsh, Rasmussen et al.	2008	SSI, FGD	Women of reproductive age, health service providers, mothers, fathers	Pakistan	General care practices
20	Lee, Durham, Booth, et al.		IDI, FGD	Mothers, health care staff, key informants	Lao PDR	Breastfeeding practices

21	Lunze, Yeboah-Antwi, and Marsh	2014	IDI, FGD	Mothers, community leaders, health officers, grandmothers	Zambia	Neonatal hypothermia and thermal care practices
22	Melesse-Salasibew, Filteau, and Marchant	2014	IDI, SSI, FGD	Mothers, local experts on newborn care practices	Ethiopia	General care practices following home births
23	Moran, Choudhury, Khan, et al.	2009	IDI	Pregnant women, mothers	Bangladesh	General care practices
24	Moyer, Aborgio, Logonia et al.	2012	IDI, FGD	Women with newborns, grandmothers, compound heads, community leaders, TBA, health care providers	Ghana	Cord care practices
25	Mrisho, Schellenberg, Mushi et al.	2008	IDI, FGD, CS	Female community informants	Tanzania	Home-based care practices
26	Nabiwemba, Atuyambe, Criel, et al.	2014	IDI	Mothers	Uganda	Care practices for LBW babies
27	Nalwadda, Waiswa, Guwatudde, et al.	2015	IDI, FGD	Mothers, fathers, TBA	Uganda	General care practices with emphasis on cord care
28	Newbrander, Natiq, Shahim, et al.	2014	IDI, FGD, O	Household members of perinatal woman, community members	Afghanistan	General care practices
29	Okeyere, Tawiah-Agyemang, Manu, et al.	2010	IDI, FGD, Birth Narratives (BN)	Mothers, TBAs, grandmothers, husbands, *asram* healers	Ghana	Traditional illness
30	Pati, Chauhan, Panda, et al.	2014	IDI	Mothers, TBA	India	General care practices with an emphasis on breastfeeding
31	Premji, Khowaja, Meherali, et al.	2014	IDI, FGD	Mothers, fathers, grandmothers	Pakistan	General care practices
32	Sacks, Moss, Winch et al.	2015	IDI, FGD, O	Mothers, TBA, hospital staff	Zambia	Skin, thermal, and cord care
33	Shamba, Schellenberg, Hildon et al.	2014	IDI, FGD, BN	Mothers, TBA	Tanzania	Bathing, thermal, and skin to skin care practices
34	Tawiah-Agyemang, Kirkwood, Edmond, et al.	2008	SSI, FGD	Mother, women of child bearing age, health workers, policy makers	Ghana	Initiation of breastfeeding
35	Thairu and Pelto	2008	IDI	Mothers	Tanzania	General care practices
36	Waiswa, Kemigisa, Kiguli, et al.	2008	IDI, FGD	Mothers, fathers, grandparents	Uganda	General care practices
37	Walsh, Norr, Sankar, et al.	2014	FGD	TBA, pregnant women, stakeholders, traditional healers	Haiti	Cord care practices

*Color coding indicates geographic regions

**Data for the review were only extracted from participants who were family members (including mothers of newborns or mothers-to-be) and non-professionals who provided care at home to the newborn.

Table 2. Critical Appraisal Skills Program (CASP) Assessment

No.	Author(s)	Year	CASP 1	CASP 2	CASP 3	CASP 4	CASP 5	CASP 6	CASP 7	CASP 8	CASP 9	CASP 10	Overall Score
1	Aborigo, Moyer, Rominski et al.	2012	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
2	Adejuyigbe, Bee, Amare et al.	2015	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
3	Alam, Ali, Sultana et al.	2008	Y	Y	Y	Y	Y	N	Y	Y	C	Y	8/9
4	Amare	2014	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10
5	Amare, Shamba, Manzi, et al.	2015	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10
6	Atyeo, Frank, Vail et al.	2017	Y	Y	N	C	N	Y	Y	Y	Y	Y	7/9
7	Bazzano, Kirkwood, Tawiah-Agyemang, et al.	2008	Y	Y	Y	Y	Y	N	N	Y	Y	Y	8/10
8	Bazzano, Oberhelman, Potts, et al.	2015	Y	Y	Y	Y	Y	C	Y	Y	Y	Y	9/9
9	Bazzano, Var, Grossman, et al.	2017	Y	Y	Y	Y	Y	C	Y	Y	Y	Y	9/9
10	Byaruhanga, Nsungwa-Sabiti, Kiguli, et al.	2011	Y	Y	N	Y	Y	N	Y	Y	Y	C	7/9
11	Degefie, Amare, and Mulligan	2014	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
12	Dhingra, Gittelsohn, Suleiman, et al.	2014	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10
13	Engmann, Adongo, Akawire, et al.	2013	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
14	Gondwe, Munthali, Ashorn, et al.	2014	Y	Y	Y	Y	C	N	Y	Y	Y	Y	8/9
15	Herlihy, Shaikh, Mazimba, et al.	2013	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
16	Hill, Tawiah-Agyemang, Manu, et al.	2010	Y	Y	Y	Y	Y	N	N	C	Y	Y	7/9
17	Hunter, Callaghan-Koru, Mahmud, et al.	2014	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
18	Kesterton and Cleland	2009	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
19	Khadduri, Marsh, Rasmussen, et al.	2008	Y	Y	Y	Y	C	N	N	C	Y	Y	7/9
20	Lee, Durham, Booth, et al.	2013	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
21	Lunze, Yeboah-Antwi, Marsh, et al.	2014	Y	Y	Y	Y	Y	N	Y	C	Y	Y	8/9
22	Melesse-Salasibew, Filteau, and Marchant	2014	Y	Y	Y	N	Y	N	Y	N	Y	C	7/9
23	Moran, Choudhury, Khan, et al.	2009	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
24	Moyer, Aborigo, Logonia, et al.	2012	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
25	Mrisho, Schellenberg,	2008	Y	Y	Y	Y	C	N	Y	N	Y	Y	7/9

	Mushi, et al.												
26	Nabiwemba, Atuyambe, Criel, et al.	2014	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
27	Nalwadda, Waiswa, Guwatudde, et al.	2012	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
28	Newbrander, Natiq, Shahim, et al.	2010	Y	Y	Y	Y	C	N	Y	N	Y	Y	7/9
29	Okyere, Tawaiah-Agyeman, Manu, et al.	2006	Y	Y	Y	Y	C	N	Y	N	Y	Y	7/9
30	Pati, Chauhan, Panda, et al.	2014	Y	Y	Y	Y	N	N	Y	N	N	C	5/10
31	Premji, Khowaja, Meherali, et al.	2014	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
32	Sacks, Moss, Winch, et al.	2015	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10
33	Shamba, Schellenberg, Hildon, et al.	2014	Y	Y	Y	Y	Y	C	Y	Y	Y	Y	8/9
34	Tawiah-Agyemang, Kirkwood, Edmond, et al.	2008	Y	Y	Y	Y	Y	N	N	Y	C	Y	7/9
35	Thairu and Pelto	2008	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10
36	Waiswa, Kemigisa, Kiguli, et al.	2008	Y	Y	Y	N	Y	N	Y	Y	Y	Y	8/10
37	Walsh, Norr, Sankar, et al.	2015	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10

Table 3. Barriers and facilitators described in articles reviewed

Domain of newborn care	Barriers	Facilitators	Article Number per Table 2, Year	Total Number of Article Mentions
Cord care	Lack of supplies, including water or infection prevention supplies Using surgical spirits and powder Unhygienic cutting practices, including used, unsterilized razor blades or scissors Unskilled attendants Delayed cord cutting, resulting in infection Mixed perception about the length at which cord should detach and heal Use of topical applications to the cord, including herbs, butter, and indigenously-made substances, for medicinal/protective purposes Application of traditional remedies and substances on the cord to moisturize or dry it and facilitate its separation and promote healing Belief that cord infections caused by mother's diet Lack of understanding about cord cleaning Lack of understanding of risks and infections affecting the cord and certain signs of infection, such as redness Cultural belief and newborn care practices not conforming to recommended practices Cost of supplies, including CHX solution Religious and cultural beliefs about cord cutting and cleaning Umbilical cord thought to make baby vulnerable to witchcraft Mothers cutting the cord themselves Umbilical cord not tied prior to cutting, can lead to tetanus Practice of only tying to cord on the side of the baby	Knowledge about cord care Community stakeholder recognition that infants are susceptible to cord infection Delivery in hospital Informed at health facility Tailored behavior change communication Appropriate compromises between existing and recommended practices Community education Outreach education Inclusion of grandmothers and other female household members, who are key decision makers and caregivers Participatory health promotion techniques, such as women's groups Programs targeting Traditional Birth Attendants (TBAs) and community mothers Importance of cord care and tying recognized in community and understood culturally Recognition of cord problems, such as delayed healing, bleeding, or swelling TBAs counselling mothers to protect the cord from infections Consensus regarding liquid cord cleaning Raising awareness about usefulness of CHX in cord cleaning Willingness to adopt practices that would protect the newborn and alter traditional cord care practices Behavior change communication messages beginning at pregnancy Prescribed practices making their way into traditional care	3, 2018 4, 2014 9, 2017 10, 2011 11, 2014 12, 2014 15, 2013 18, 2009 19, 2008 22, 2014 23, 2009 24, 2012 25, 2008 26, 2014 27, 2015 30, 2014 32, 2015 36, 2008 37, 2014	19/37

	Recontamination of washed hands before attending to newborn Seclusion of mother and baby in postpartum period may lead to late identification of illness and delay to seeking care Utilizing materials, such as rope and twigs, in cord tying Disconnect between healthcare providers and community Local conceptions regarding role of cord tying in stemming blood flow Concerns regarding the length of time until cord detachment Presence of blood clots associated with curses	Efforts to promote hand-washing and to avoid recontamination Promotion of efforts to avoid unclean home applications to the cord Programs, promoting cord cleansing with antiseptics, should provide educational messages about the balance between the benefits and the likelihood that separation of umbilical cord may be slightly delayed Using materials, such as clean cotton, other than fingers to apply medicine/antiseptic Programs in urban slum areas Interventions to improve social support to women, especially first-time mothers Educating healthcare providers about harmful, traditional practices so they are specifically addressed Explaining rationale for tying the cord on both sides of the cut Cultural health systems model that depicts all stakeholders Presence of blood clots leading to seeking medical treatment at health centers Promotion of chlorhexidine in place of commonly-reported application of harmful substances Scale-up of evidenced based practices Health promotion programs taking into account health system barriers and financial burden		
Drying and wrapping	Behaviors vary among home deliveries Perception of dirtiness of baby Perception of birthing process as polluting Vulnerability of baby Opinions of other household stakeholders, such as the mother-in-law Home and hospital delivery Not attending to baby until placenta delivered	Knowledge about drying and wrapping Understanding that baby should be kept warm Delivery in hospital Informed at health facility Tailored behavior change communication Appropriate compromises between existing and recommended practices Community education	2, 2015 8, 2011 10, 2014 14, 2010 16, 2009 19, 2014 20, 2014 21, 2009 28, 2014	11/37

	Prioritization of the mothers	Outreach education Inclusion of grandmothers who are key decision makers Participatory health promotion techniques, such as women's groups Traditional practice of wrapping in new clean cloth Use of warm water and traditional herbs to protect baby Behavior change communication messages beginning at pregnancy Babies dried and wrapped due to awareness of reduction of cold Having more than one attendant to help both the mother and baby Programs in urban slum areas Interventions to improve social support to women, especially first-time mothers	30, 2015 31, 2014	

Bathing	Traditional or historical practice Lack of knowledge of when to bathe baby, especially in home deliveries Early bathing due to societal pressure Cultural norm of frequent bathing Cultural belief and newborn care practices not conforming to recommended practices Negative perception of vernix, including association with sperm Vernix considered dangerous for HIV-exposed infants Bathing in close proximity to smoking fires Early bathing due to association with dirtiness as well as body odor later in life Differences in practice by untrained TBAs Spiritual beliefs attached to use of local herbs for bathing Bathing practices, such as using pond water Substances added to water, including Dettol or Savlon Bathing immediately after birth due to concerns about 'ritual pollution' can cause hypothermia Early bathing linked to shaping the baby's head Early bathing to help the baby sleep and feel clean Early bathing in facilities	Delayed bathing when delivery in hospital Informed at health facility Quality of care in health facility Health worker advice Tailored behavior change communication, addressing community norms and based on formative research Appreciation of newborn vulnerability to encourage behavior change Appropriate compromises between existing and recommended practices Community education Outreach education Inclusion of grandmothers who are key decision makers Participatory health promotion techniques, such as women's groups Behavior change communication messages beginning at pregnancy Having more than one attendant to help both the mother and baby Delayed bathing due to concerns about pneumonia Identifying and addressing cultural rationales that underlie negative practices Reinforcing ad protecting beliefs that support positive practices Improving health worker communication skills and social	2, 2015 3, 2008 8, 2011 9, 2014 10, 2014 14, 2010 16, 2009 19, 2014 20, 2014 21, 2009 24, 2014 26, 2014 28, 2014 30, 2015 31, 2014 33, 2008 34, 2008	17/37
Thermal control	Lack of practice when delivery at home or with TBA Lack of knowledge of keeping baby indoors Suboptimal practices Early bathing Length of time baby undressed during bathing Bathing with warm water Use of blankets, rather than skin-to-skin care	Informed at health facility Beliefs about importance of thermal care Quality of care in health facility Tailored behavior change communication based on formative research Appropriate compromises between existing and recommended practices Community education Outreach education	2, 2015 3, 2008 8, 2011 9, 2014 10, 2014 14, 2010 17, 2008 19, 2014 24, 2014	12/37

	Newborn massage, including use of mustard oil, can compromise the skin barrier function Cultural belief and newborn care practices not conforming to recommended practices Lack of maintaining thermoprotective practices in the first few hours postpartum, when newborns are at greatest risk	Inclusion of grandmothers who are key decision makers Participatory health promotion techniques, such as women's groups Behavior change communication messages beginning at pregnancy Knowledge and practice that baby should be kept warm Having more than one attendant to help both the mother and baby Use of low-cost newborn warmers Community-based practices on hypothermia prevention and management	28, 2014 30, 2015 31, 2014	
Skin to skin contact	Few mothers given baby immediately after birth Concerns of disease transmission, harm to umbilicus Perception of dirtiness after birth Maternal rest Concerns of baby becoming cold Delayed due to early bathing Perception that it might be harmful to fragile newborns Lack of understanding that kangaroo mother care is a protective method of caring for healthy newborns Use of blankets, rather than skin-to-skin care Lack of continued skin to skin contact Cultural belief and newborn care practices not conforming to recommended practices Women feeling responsible for household duties	Behavior change interventions based on formative research Quality of care in health facility Tailored behavior change communication Appropriate compromises between existing and recommended practices Community education Outreach education Inclusion of grandmothers who are key decision makers Participatory health promotion techniques, such as women's groups Behavior change communication messages beginning at pregnancy Association with reduced risk of cord infection Concept easily understood and women willing to try if good for the baby Appreciation of kangaroo mother care as an appropriate treatment for ill babies Biomedical advice from healthcare providers reaching community through word-of-mouth and television campaigns Receiving help from family members	2, 2015 3, 2008 8, 2011 9, 2014 14, 2010 15, 2014 16, 2009 19, 2014 31, 2014	9/37

		Witnessing other women perform kangaroo mother care with positive outcomes Focusing intervention messages on building supportive a environment for kangaroo mother care practice		
Hygiene	Lack of knowledge on hand-washing with soap Recontamination of washed hands before attending to the newborn Cultural belief and newborn care practices not conforming to recommended practices	Health education Tailored behavior change communication Appropriate compromises between existing and recommended practices Community education Outreach education Inclusion of grandmothers who are key decision makers Participatory health promotion techniques, such as women's groups Efforts to promote hand-washing and to avoid recontamination Understanding of keeping babies and their surroundings clean Educating healthcare providers about harmful, traditional practices so they are specifically addressed	3, 2008 9, 2014 16, 2009 17, 2008 22, 2012 24, 2014	6/37
Breast feeding (initiation of and provision of colostrum)	Traditional or historical practice Belief that it is unhealthy Mother's exhaustion Limited knowledge Maternal education status Geographic isolation Inconsistency in health education Learning from relatives Pre-lacteal feeds given on fingertip, increasing risk of infection Low urgency in initiating breastfeeding as mother and child believed to be polluted after birth Negative beliefs regarding colostrum	Community members knowledgeable about importance of breast-feeding Delivery in a health facility, where staff encouraged early breast-feeding Culturally-tailored health education Targeting isolated villages Cross-generational education interventions Interventions through community health clinic workers Appropriate compromises between existing and recommended practices Community education Outreach education	1, 2012 6, 2017 9, 2017 10, 2011 11, 2014 12, 2014 18, 2009 19, 2008 20, 2013 22, 2014 23, 2009 25, 2008	18/37

	Traditional practices to test colostrum for bitterness Perception of a lack of breast milk Onset of post-birth activities, such as bathing Perception that baby needs rest Baby not crying for milk Perception of inadequate maternal nutrition and breast milk Premature breast milk supplementation (water and other fluids), which may expose newborns to pathogens Work served as a barrier Difference in advice received from different people by first-time mothers Cultural belief and newborn care practices not conforming to recommended practices Perception that hunger is not met or satisfied by breast-milk alone	Inclusion of grandmothers/mother-in-laws and religious leaders who are key decision makers Participatory health promotion techniques, such as women's groups Awareness of nutritive value of breast milk Positive perception regarding infant feeding TBAs trained by Ministry of Health Raising awareness of early initiation of breast-feeding in the policy arena Cultural belief and practices Identifying and addressing cultural rationales that underlie negative practices Reinforcing ad protecting beliefs that support positive practices Improving health worker communication skills and social management of patients Lowering healthcare costs Programs in urban slum areas Interventions to improve social support to women, especially first-time mothers First-time mothers' mothers Working with employers and developing supportive employment policies Providing postnatal support and working with lay people and health professionals Research to identify optimal combination of interventions Using religious leaders, trained health workers, family health action groups, and radio to disseminate messages	26, 2014 28, 2014 30, 2014 31, 2014 33, 2008 35, 2008	
Care seeking for illness	Lack of transportation Geographic isolation/remoteness from health facilities Financial ability/constraints Seclusion of mother and baby in postpartum period may lead to late	Addressing locally existing cultural beliefs Strengthening facility care Urging families to seek medical care for any symptom of illness in a newborn	7, 2008 8, 2011 11, 2013 17, 2008 25, 2015	7/37

	identification of illness and delay to seeking care Community understanding of the newborn period and cultural expectations Caretaker knowledge about newborn sickness Individual experiences in household and caretaker autonomy Women's inability to seek care without being accompanied by a male relative Healthcare decisions influenced by community members Perceived health system gaps Confidence in healthcare providers is issue-specific Sequential care-seeking practices, with traditional medicine as first-line of treatment for 7 days Untimely action after recognition of danger signs Previous negative experiences with health services facilities Local understanding of illness affects treatment practices Mothers blamed for infant illness Use of traditional home remedies and self-medication instead of care in health facilities Shame about utilization of maternal and neonatal services Care-seeking for local community members for serious health concerns Post-partum depression 'Asram' perceived as common illness which cannot be treated at health facilities 'Asram' treatments including frequent cold herbal baths, air-dying, and oral treatments Modification of 'asram' treatment required the sanction of a healer	Addressing financial barriers Recognition of danger signs Targeted behavior-change communication programs Using religious leaders, trained health workers, family health action groups, and radio to disseminate messages Understanding traditional illnesses in designing care-seeking interventions	26, 2014 27, 2010	

Other newborn care	Cultural perception of emollients as improving the skin, keeping the baby warm, and shaping the baby Social pressure to use emollients Emollient choice influenced by cost, availability, and traditional norms Massage, associated with application of emollients, is potentially damaging to skin Potential impact of emollients, such as engine oil, on harm and even mortality TBAs applying mild pressure inside baby's mouth on the soft palate with water and local herb Application of powders directly into dermal incisions of ill children to ward off malevolent spirits	Association of emollient therapy in reduction of mortality among preterm infants Newborn emollient trials, specifically designed to reflect contextual differences If emollients are proven effective, policy makers deciding whether to provide emollients free of charge or through social marketing Improving practice of massage associated with emollient application Understanding traditional illnesses in designing care-seeking interventions	4, 2014 20, 2014 26, 2010 30, 2015	4/37
Low birth weight recognition	Babies not weighed Belief in supernatural powers Less knowledge of home care practices when baby delivered at home or in lower level health facility Lack of knowledge of how to provide care or when to take baby to health facility Perceptions of preterm birth, including young and old maternal age, heredity, sexual impurity, and maternal illness during pregnancy Poverty Women placed with main responsibility for preterm newborns High time burden of care for preterm babies leading to neglect of household, farming, and business duties	Better knowledge of home care practices when delivery at health facility Health education at community level to reach mothers that deliver at home Mechanisms to support mothers Provision of warmth to preterm newborns Addressing cultural practices for preterm babies among community members Vernix considered important for preterm newborns	9, 2014 12, 2014 24, 2014	3/37

Contributorship statement:

Authors have contributed as follows to this work. Conception and design of the work: ANB, RH**;** Data collection: ANB, AK, EFK, RH**;** Data analysis and interpretation: ANB, AK, EFK**;** Drafting the article: ANB, AK, EFK, SE, RH**;** Critical revision of the article: ANB, AK, EFK, SE, RH**;** Final approval of the version to be published: ANB, AK, EFK, SE, RH.

Competing interests: All authors declare they have no conflicts of interest.

Funding: The study received no financial support.

Data sharing statement: All data came from published articles available from electronic databases which are openly accessible.

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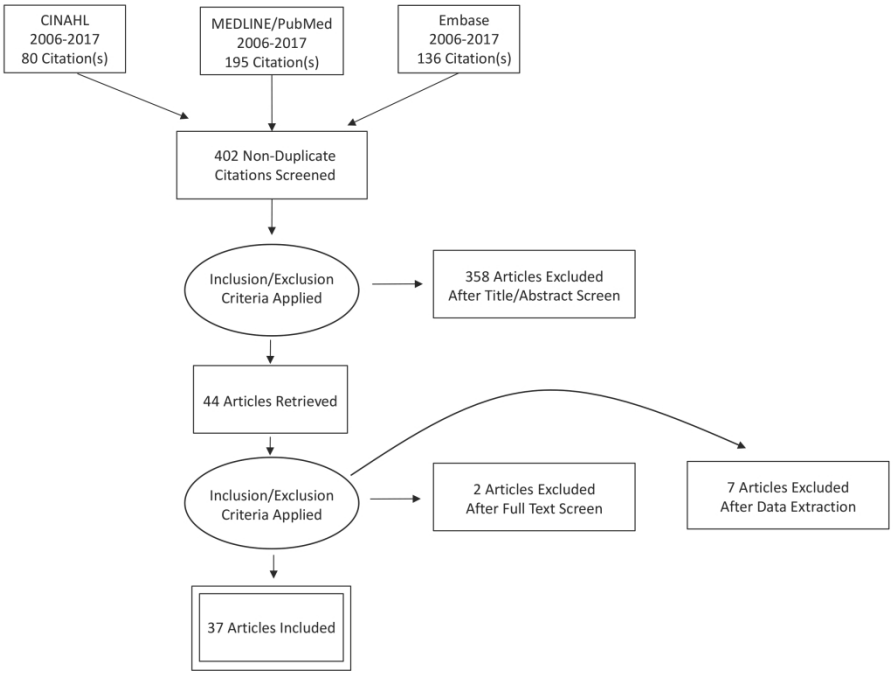

Figure 1

264x190mm (300 x 300 DPI)

Appendix 1. Search Strategy

Search String	Notes
"infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab])) AND ("breast feeding"[MeSH Terms] OR "immediate breastfeeding"[Title/Abstract] OR "exclusive breastfeeding"[tiab] OR "exclusive breast feeding"[tiab] OR "initiation of breastfeeding"[tiab] OR "thermal care"[tiab] OR "cord care"[tiab]) OR "Thermal care"[tiab] OR "Thermal care"[ot] OR "bathing"[tiab] OR bathing[ot] OR "cord care"[tiab] OR "cord care"[OT] OR "umbilical cord care"[tiab] OR "umbilical cord care"[ot] OR "health knowledge, attitudes, practice"[MeSH Terms]	Includes "health knowledge, attitudes, practices"
"mothers"[MeSH Terms] OR mothers[Title/Abstract] OR mother[Title/Abstract] OR "fathers"[MeSH Terms] OR fathers[Title/Abstract] OR "parents"[MeSH Terms] OR parents[Tiab] OR parent[Tiab] OR "Grandparents"[MeSH] OR grandmother[Tiab] OR grandmother's[Tiab] OR grandmothers[Tiab] OR grandmothers'[Tiab)	Parent Perspective Concept
(("Qualitative Research"[Mesh] OR "qualitative research"[TIAB] OR "qualitative research"[OT] OR "qualitative studies"[tiab] OR "qualitative study"[tiab] OR "qualitative studies"[OT] OR "qualitative studies"[OT] OR "qualitative study"[OT] OR "Interviews as Topic"[Mesh] OR "semi structured interview"[TIAB] OR "semi structured interviewer"[TIAB] OR "semi structured interviewing"[TIAB] OR "semi structured interviews"[TIAB] OR "semi structured interview"[OT] OR "semi structured interviews"[OT] OR "semistructured interview"[TIAB] OR "semistructured	Qualitative concept (w/o exclusions)

interview"[OT] OR "unstructured interview"[TIAB] OR "unstructured interviewing"[TIAB] OR "unstructured interviews"[TIAB] OR "unstructured interview"[OT] OR "in depth interview"[TIAB] OR "in depth interviewees"[TIAB] OR" in depth interviewing"[TIAB] OR "in depth interviews"[TIAB] OR "in depth interview"[OT] OR "in depth interviewing"[OT] OR "in depth interviews"[OT] OR "Focus Groups"[Mesh] OR "focus group"[TIAB] OR "focus groups"[TIAB] OR "focus group"[OT] OR "focus groups"[OT] OR "group interview"[OT] OR "group interview"[TIAB] OR "Direct observation"[tiab] OR "Participant observation"[tiab] OR "Non-participant observation"[tiab] OR "Direct observation"[OT] OR "Participant observation"[ot] OR "Non-participant observation"[OT] OR "Ethnology"[Mesh] OR "ethnographic research"[OT] OR "ethnographic research"[TIAB] OR ethnology[OT] OR ethnology[TIAB] OR "ethnographic study"[tiab] OR "ethnographic study"[ot] OR "Community-Based Participatory Research"[Mesh] OR "community-based participatory research"[OT] OR "community-based participatory research"[TIAB] OR "action research"[TIAB] OR "action research"[OT] OR "Formative research"[tiab] OR "Formative research"[ot] OR "Key informant"[tiab] OR "Key informant"[OT] OR "Interpretative perspective"[TIAB] OR "Phenomenological Research"[TIAB] OR Phenomenology[tiab] OR Phenomenology[ot] OR "Phenomenological Research"[OT]))	
ALL countries names (not pig OR hen) OR Developing country/LMIC terms (see above)	ALL LMIC terms and Country names

"infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab]	This is our main concept and prioirity. Reintroduced within context of other concepts
(("infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab])) AND ((#110 AND #93 AND #94 AND #101))	
(("infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab])) AND ((#110 AND #93 AND #94 AND #101)) Filters: Publication date from 2016/01/01 to 2017/12/31	Published Jan 1, 2016 - Dec 31, 2017
(("infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab])) AND ((#110 AND #93 AND #94 AND #101)) Filters: Publication date from 2016/01/01 to 2017/12/31; English	Published English Jan 1, 2016 -Dec 31, 2017
(("infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab])) AND ((#110 AND #93 AND #94 AND #101)) Sort by: Relevance Filters: published in the last 10 years; Humans; English	

Reporting checklist for systematic review and meta-analysis.

Based on the PRISMA guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

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In your methods section, say that you used the PRISMA reporting guidelines, and cite them as:

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		Reporting Item	Page Number
	#1	Identify the report as a systematic review, meta-analysis, or both.	0-1
Structured summary	#2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number	0-1
Rationale	#3	Describe the rationale for the review in the context of what is already known.	1
Objectives	#4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	2
Protocol and registration	#5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address) and, if available, provide registration information including the registration number.	0-1

Eligibility criteria	#6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rational	3
Information sources	#7	Describe all information sources in the search (e.g., databases with dates of coverage, contact with study authors to identify additional studies) and date last searched.	3
Search	#8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	See note 1
Study selection	#9	State the process for selecting studies (i.e., for screening, for determining eligibility, for inclusion in the systematic review, and, if applicable, for inclusion in the meta-analysis).	4-5
Data collection process	#10	Describe the method of data extraction from reports (e.g., piloted forms, independently by two reviewers) and any processes for obtaining and confirming data from investigators.	5
Data items	#11	List and define all variables for which data were sought (e.g., PICOS, funding sources), and any assumptions and simplifications made.	5-6
Risk of bias in individual studies	#12	Describe methods used for assessing risk of bias in individual studies (including specification of whether this was done at the study or outcome level, or both), and how this information is to be used in any data synthesis.	6-7
Summary measures	#13	State the principal summary measures (e.g., risk ratio, difference in means).	6-7
Planned methods of analyis	#14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I2) for each meta-analysis.	6-7
Risk of bias across studies	#15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	6-7
Additional analyses	#16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	6-7
Study selection	#17	Give numbers of studies screened, assessed for eligibility, and	7-8

		included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	
Study characteristics	#18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citation.	7-8
Risk of bias within studies	#19	Present data on risk of bias of each study and, if available, any outcome-level assessment (see Item 12).	7
Results of individual studies	#20	For all outcomes considered (benefits and harms), present, for each study: (a) simple summary data for each intervention group and (b) effect estimates and confidence intervals, ideally with a forest plot.	7
Synthesis of results	#21	Present the main results of the review. If meta-analyses are done, include for each, confidence intervals and measures of consistency.	8-10
Risk of bias across studies	#22	Present results of any assessment of risk of bias across studies (see Item 15).	7
Additional analysis	#23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	8-10
Summary of Evidence	#24	Summarize the main findings, including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., health care providers, users, and policy makers	11
Limitations	#25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review level (e.g., incomplete retrieval of identified research, reporting bias).	11
Conclusions	#26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	12
Funding	#27	Describe sources of funding or other support (e.g., supply of data) for the systematic review; role of funders for the systematic review.	12

Author notes

1. 4, Appendix

BMJ Open

Parent and family perspectives on home-based newborn care practices in lower-income countries: a systematic review of qualitative studies

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2018-025471.R3
Article Type:	Research
Date Submitted by the Author:	18-Mar-2019
Complete List of Authors:	Bazzano, Alessandra; Tulane University School of Public Health, Global Community Health and Behavioral Sciences Felker-Kantor, Erica; Tulane University School of Public Health, Global Community Health and Behavioral Sciences Eragoda, Shalini; Tulane University School of Public Health, Global Community Health and Behavioral Sciences Kaji, Aiko; Tulane University School of Public Health, Global Community Health and Behavioral Sciences Horlick, Raquel; Tulane University, Howard Tilton Memorial Library
Primary Subject Heading:	Global health
Secondary Subject Heading:	Public health, Paediatrics
Keywords:	infant, newborn, postnatal care, QUALITATIVE RESEARCH, care seeking, Cambodia

Parent and family perspectives on home-based newborn care practices in lower-income countries: a systematic review of qualitative studies

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Keywords: infant, newborn, post-natal care, care seeking, qualitative research, health equity

Word count: 3005
Figures: 1
Tables: 3

ABSTRACT

Objectives

To understand family and parent perspectives on newborn care provided at home to infants in the first 28 days of life, in order to inform behavioral interventions for improving care in low income countries, where the majority of newborn deaths occur.

Design

A comprehensive, qualitative systematic review was conducted. MEDLINE/PubMed, Embase, and Cumulative Index of Nursing and Allied Health databases were systematically searched for studies examining the views of parents and family members on newborn care at home. The search period included all studies published from 2006 to 2017. Studies using qualitative approaches or mixed-methods studies with substantial use of qualitative techniques in both the methods and analysis sections were included. Studies meeting the inclusion criteria were extracted and evaluated using Critical Appraisal Skills Programme guidelines. Following the initial selection and appraisal, barriers and facilitators to recommended care practices across several domains were synthesized.

Results

Of 411 results retrieved, 37 met both inclusion and quality appraisal criteria for methodology and reporting. Geographic representation largely reflected that of newborn health outcomes globally, with the majority of studies conducted in the region of Sub-Saharan Africa and South Asia. Specific barriers and facilitators were identified among a range of domains including: cord care, drying and wrapping, thermal control, skin to skin contact, hygiene, breast feeding, care seeking for illness, low birth weight recognition. Cross cutting facilitators, common to all domains were also evident, including delivering at a health facility, including female relatives in counseling, lower health care costs, and exposure to newborn care messaging in the community.

Conclusions

When designing behavioral interventions to address newborn mortality at scale, policy makers and practitioners must include barriers and facilitators important to families in low income settings.

Review registration number CRD42016035674.

Article Summary

Strengths and limitations:

- Strengths of the review include having had a librarian/information scientist in the research team, and multiple reviewers experienced in qualitative research in low-income countries, primary qualitative data collection, and analysis.
- Other strengths of the study was the comprehensive search strategy covering multiple relevant databases; appraisal of quality among included studies based on critical appraisal skills guidelines; and a comprehensive description of study findings.
- Limitations included: the exclusion of documents not available in English, and those that may have been relevant, but were outside the defined date limitations. A further limitation is that because findings are presented in the aggregate, care practices from different geographic areas may require different interventions.

Introduction

Approximately 46% of all under-five deaths in 2016 occurred during the neonatal period, the initial 28 days following birth (global incidence). Southern Asia and sub-Saharan Africa account for nearly 80 percent of the newborn deaths. By 2030, the Sustainable Development Goals (SDG) target is to reduce neonatal mortality to at least as low as 12 deaths per 1,000 live births. However, per current trends, over 50 countries will fail to meet this target on newborn survival.[1] Yet, the majority of these deaths are preventable.[2]

During the neonatal period, care provided by parents and caregivers is critical for newborn survival.[3] Optimal or essential newborn care practices as defined by the World Health

Organization (WHO) include immediate drying and wrapping of newborns after birth, initiating skin-to-skin (STS) contact, clean cord care, dry cord care, immediate initiation of breastfeeding and exclusive breastfeeding until 6 months of age, as well as ensuring warmth (thermal control) of the newborn through delayed bathing.[4] In addition, parents or caregivers at home must also provide nurturing care, safety and security, and responsiveness to the newborn's needs. The provision of quality, effective care at the home and community level is critical for improving newborn health outcomes and promoting optimal early childhood development. A reduction in neonatal mortality by 25% can be achieved by scaling up community interventions, including provision of optimal home care.[5] Although feasible interventions exist to reduce newborn mortality, uptake of these interventions is low.[6]

In order to increase scale up of coverage and implementation of effective home and community-based newborn care practices, providing data on research priorities for newborn health is key.[7] Researchers have identified specific domains related to caregiver perceptions and behaviors as priorities.[8] Qualitative research has been particularly useful for obtaining information on newborn care practices at home, which often vary based on the sociocultural context in low-income countries.[9]

Despite the existence of multiple individual qualitative and formative research studies on home and community-based newborn care, a systematic review of the available qualitative research is lacking. Therefore, we conducted a systematic review to provide data to improve both programming and policy for home and community care for newborns.[7]

The primary objective of this study was to systematically review qualitative literature to understand parent and family experiences with home newborn care practice in low-income

countries, presenting information related to barriers and facilitators to inform behavioral interventions focused on improving newborn survival and care.

Methods

This systematic review was registered with the International Prospective Register of Systematic Reviews (PROSPERO): registration number CRD42016035674. The review followed guidelines from the Enhancing Transparency in Reporting the Synthesis of Qualitative Research (ENTREQ) statement.[i] Due to the emphasis on qualitative research, the review primarily employed the ENTREQ guidelines for reporting, while also drawing guidance from PRISMA, which is more specific to the requirements of quantitative literature reviews.[10,11]

Newborn care practices were defined as all actions taken by parents/caregivers that provide for the essential biological, physiological and psychological needs of the newborn infant following delivery and up to the end of the newborn period (28 days of life). These included, but were not limited to, the essential newborn care practices as defined by WHO: cord care, drying and wrapping after delivery, initiation of breast feeding, bathing, thermal control, breast feeding and care seeking for newborn illness.[12]

Four of five researchers involved in conducting the review, analyzing the results, and writing up the manuscript had strong experience in qualitative research methods, and hold graduate and/or doctoral level qualification in public health, with a specialization in research methods (ANB, EFK, AK, and SE). One researcher (RH) is an information scientist with a qualification in library sciences and specialization in support to research in science and biomedicine. **Patient and public involvement**: No patients and or public were involved in this

systematic review.

Inclusion and exclusion criteria

Studies were included if they used qualitative data collection methods such as interviews, focus groups, direct observation, and participatory action research. Inclusion requirements also stipulated that studies needed to have a well-described methodology section and a clear description of the qualitative data analysis methods and process (e.g., grounded theory, narrative analysis, content analysis, thematic analysis). Finally, data on newborn care at home must have been directly obtained from parents or caregivers of newborns (infants under 28 days of age, including low birthweight or small babies), whether born at home or at a facility, with or without skilled attendance, and regardless of whether the study also included additional data from non-family members or health workers such as traditional birth attendants (TBAs) (which data was not used for this review). Caregivers were defined as mothers/fathers or other adult family or community members who provided day-to-day physical and psychological support to meet the basic needs of newborn infants. Data gathered from community health workers, and from professional or non-professional health care providers, were not used or included in this study although it may have been presented in one of the articles included in the review.

Excluded studies were those for which it was difficult to extract qualitative data (e.g., mixed methods studies without clearly labeled data, or studies in settings where perceptions of parents'/caregivers' experiences of newborn care practices could not be clearly identified, such as summaries or aggregate data). Commentaries, protocols, and systematic reviews were not included in the analysis. Additionally, studies from countries other than those defined by the

World Bank as low-income countries and lower-middle income countries (which have a Gross National Income per capita of less than $4,125) were excluded.[13]

Search strategy

The review began in 2016 and initially targeted literature published in the previous ten years. Due to delays in the publication process , however, we extended a further year to encompass the timeframe 2006-2017. The following electronic databases were searched: MEDLINE (PubMed), Embase, Cumulative Index to Nursing and Allied Health Literature (CINAHL: EBSCOhost). A health sciences librarian (RH) developed the database searching strategy and conducted the final searches. The initial search strategy was developed for MEDLINE and then adapted for other databases. Medical Subject Headings (MeSH) were used followed by free-text terms using controlled vocabulary (see the Appendix for a detailed description of the search strategy). Only articles in English were included due to potential difficulties in translating and interpreting foreign language qualitative data by native English-speaking reviewers, and to ensure that the review covered the most current literature on infant and young child feeding practices.

Figure 1 presents the selection process which followed the PRISMA guidelines for reporting of systematic reviews.[11] Search results were initially imported into Endnote reference management software (Thomson Reuters (Scientific) LLC) and duplicates and irrelevant studies were removed. Four independent reviewers screened study titles and abstracts for suitability against inclusion and exclusion criteria. The decision to include or exclude a study was required by two reviewers. If after consultation a decision was not reached, a third reviewer (made the final decision.

Figure 1. Selection flow chart of review process

See attached figure file

Data extraction

For organization of extracted data, a unified matrix was utilized to record specific characteristics of included studies. Extracted data included reference details (author/data/publication), methodological approach (e.g., interviews/focus groups), conceptual framework (e.g., Grounded Theory), objectives or aims of the study, sampling methodology, socio-demographic characteristics of participants, country/region, and analysis method(s). The results of the selection process and data extraction, with selected characteristics, are presented in **Table 1. Characteristics of included studies**.

Quality appraisal

After all articles were selected for review inclusion, each article was assessed and scored by two reviewers (AB, EFK) according to the Critical Appraisal Skills Program (CASP) checklist[14] to appraise quality and internal validity. All the selected studies met at least half of criteria defined by the CASP checklist (see 1-10 below) including domains such as appropriateness of study design, data collection techniques, and analysis methods. The detailed CASP criteria are as follows:

1. Was there a clear statement of the aims of the research?
2. Is a qualitative methodology appropriate?
3. Was the research design appropriate to address the aims of the research?
4. Was the recruitment strategy appropriate to the aims of the research?
5. Was the data collected in a way that addressed the research issue?
6. Has the relationship between researcher and participants been adequately considered?
7. Have ethical issues been taken into consideration?
8. Was the data analysis sufficiently rigorous?
9. Is there a clear statement of findings?
10. How valuable is the research?

Possible Responses: Yes, No, and Cannot assess due to missing information

For each checklist item, studies were scored with a 1 if a CASP criterion were met and 0 if not. These scores are available in Table 2 below.

Table 2. CASP Criteria Analysis

Following data extraction, relevant text from the results, discussion and conclusion sections, which provided information directly pertinent to home care of newborns from the perspectives of family caregivers, were imported into NVivo 11 qualitative software (NVivo qualitative data analysis software; QSR International Pty Ltd. Version 11, 2015).

Following the appraisal, deductive content analysis based on the WHO guidelines[15] was employed to identify domains for investigation and presentation within a framework analysis approach[16]. The focus of analysis was on manifest content rather than latent content [17]. For each domain of newborn care, study findings were extracted, and information on barriers and facilitators synthesized. Then, a narrative summary of the identified domains and themes, developed according to content, was reviewed by the research team (SE, ANB, EFK) to produce a consensus-based listing including barriers and facilitators to recommended newborn care practices.

RESULTS

Geographic overview of studies reviewed

The vast majority of studies identified emerged from research carried out in the Sub-Saharan region, while the South Asian region was also well represented in the qualitative literature relating to newborn care practices at home.

Sub-Saharan Africa

Studies from the African region comprised 24 of 37 included for review, and information presented in the studies described the full range of home based newborn care practices.

South Asia

From the South Asian region, 8 of 37 studies presented information on newborn care practices, covering more general rather than specific domains of newborn care, though one focused on breastfeeding.

Southeast Asia

Three studies, two related to breastfeeding in Cambodia and Lao PDR, along with another from Cambodia related to skin care, were identified from the Southeast Asian region.

Latin America / Caribbean

Two qualitative studies were identified from the Latin America/Caribbean region, from Guatemala and Haiti, related to breastfeeding and cord care respectively.

Barriers and facilitators

A comprehensive list of barriers and facilitators stratified by the recommended care practice that were generated through the data synthesis exercise appears in **Table 3**. Among the 37 studies in this review, many of the reported barriers and facilitators were cross-cutting for recommended newborn care practices (i.e. cord care, drying and wrapping after delivery, prompt initiation of breast feeding, bathing, thermal control, breast feeding and care seeking for newborn illness). Across all practices, delivering at a health facility, including grandmothers in decision-making processes during and after pregnancy, low health care costs, and exposure to newborn care messaging in the community were reported as important facilitators for adoption of recommended newborn care practices. Common barriers across the recommended practices included traditional and historical beliefs and practices, cultural and gender norms, geographic location, conflicting health messaging, and societal pressures.

Barriers that influenced adoption of recommended **cord care practices** included lack of resources (e.g. clean water and razor blades), misinformation on timeliness of cord cutting, religious and cultural beliefs, and untrained birth attendants. Facilitators included institutional delivery, exposure to educational campaigns on safe and hygienic cord cutting practices, community outreach activities promoting handwashing and provision of clean razor blades, decision-making by grandmothers and women leaders, and cord-care counseling by Traditional Birth Attendants (TBA).

Barriers to timely **drying and wrapping** included perceptions of newborn vulnerability and dirtiness, conflicting advice household stakeholders, and waiting for delivery of the

placenta. Facilitators included institutional delivery, exposure to educational campaigns on newborn thermal regulation, traditional wrapping practices, and the presence of two TBAs during delivery.

Factors impeding **delayed bathing** included societal pressure for cleanliness, preference for immediate bathing due to concerns about ritual pollution and hypothermia, negative perceptions of the vernix, and immediate bathing at health facilities. Factors that facilitated delayed bathing after delivery included hospital-based birth, exposure to newborn care messaging on the radio during pregnancy, communication between health care workers in the community and at the facility during pregnancy, and social support from other women in the household.

Factors inhibiting **skin-to-skin care** and **thermal control** practices included use of blankets instead of skin-to-skin contact, not immediately releasing baby to mother following delivery, early bathing, concerns of disease transmission, and maternal household duties. Facilitators included exposure to kangaroo care messaging during pregnancy, observing positive newborn health outcomes of other mothers who used kangaroo care practices, medical advice from health care providers, and prior participation in behavior change interventions.

Barriers to **care-seeking for illness** included lack of transport, minimal financial resources, distances to health facility, gender norms, prior negative experiences at health facilities, and cultural norms such as protective isolation during the postpartum period. Facilitators included family knowledge and recognition of danger signs and illness symptoms, lower health care costs, community education and support from religious leaders, and exposure to newborn health campaigns.

Barriers to **initiating breastfeed**ing included spatial/physical isolation, conflicting health messages, mother exhaustion, baby not crying for milk, historical and traditional beliefs to discard colostrum, and education. Facilitating factors included community and family member knowledge, information provided during health facility-based birth, attendance by trained TBAs, being a first time mother, and exposure to breast feeding education and policy campaigns.

DISCUSSION

Effective interventions to improve newborn survival require information on a number of complex factors related to essential newborn care [18]. In addition to collecting improved quantitative data for neonatal survival, qualitative data are essential for behavioral interventions targeted to specific populations.[19] Few qualitative systematic reviews exist to synthesize information from perspectives of parents on newborn care. One review from 2014 focused on skin-to-skin contact and included 29 studies containing data from 9 countries[20]. Findings from that review centred on the experience of becoming a parent under unfamiliar circumstances, and thoughtfully considered the experiences of parents in the unique practice of skin-to-skin care. The authors did not restrict the review to low income settings, though studies from Uganda, Brazil, and South Africa were included. Our findings add further information to the peer reviewed literature from low income countries, where the majority of newborn deaths occur.

Another review was recently conducted in relation to thermal care for newborns in Sub-

Saharan Africa[21]. The review focused on sociocultural factors and identified a number of potentially harmful cultural norms and traditions which influence care across African settings. Similar to what has been found in the present review, that review identified caregiver factors and contextual barriers as well as facilitating factors, but in contrast to this review these were specific to thermal control, which may not represent the full range perspectives for other newborn care practices. In contrast to this review, that review's restriction to Sub-Saharan Africa settings limits the potential for transferability of the findings to other geographic settings, and data from parents or family caregivers was not the focus.

A systematic review covering neonatal care practices in Sub-Saharan Africa was recently undertaken[22]. The authors of that review included both quantitative data and qualitative data published from 2001-2014, whereas our review focused on qualitative data only, and covered the period 2006-2017, though similar findings were identified in both reviews in relation to care practices, confirming the findings. Bee et al. also included studies of facility-based and home-based care (unlike our study which focused on data from parents regarding home care) and noted the limitation of data having come mainly from 5 countries, highlighting a need for research from a wider geographic area, such as has been provided in the present review. Given that birth at home presents unique risks to the newborn[23], information from these settings is key. Whereas the present review focused on barriers and facilitators identified through qualitative research, the review by Bee et al. centered on the prevalence of key immediate newborn care practices, however, the findings of both reviews are concordant.[22]

Policy recommendations and current approaches to reducing newborn mortality have not yet been appropriately scaled to reduce newborn mortality to levels targeted by the

Sustainable Development Goals[24]. In the context of international calls for reduction of newborn mortality and stillbirths[25], it will be essential for interventions to meet the needs of families and parents caring for newborns. This systematic review of qualitative research, drawn from the literature across low income countries, is an important step to providing data on the range of newborn care practices at home, which is specifically relevant to behavior change in settings where high newborn mortality continues.

Conclusions

This systematic review identified qualitative studies reporting on the experiences and first-hand accounts of family members and caregivers in low income countries who are responsible for providing essential newborn care for their infants up to the first 28 days of life. The review identified barriers and facilitators commonly reported in studies of newborn care practices. The findings presented here are directly applicable to social and behavioral change initiatives aimed at improving care practices for better newborn health outcomes in low resource settings.

Table 1. Characteristics of included studies*

No.	Author(s)	Year	Qualitative Methods	Participants**	Country (s)	Newborn Care Practices
1	Aborigo, Moyer, Rominski, et al.	2012	In depth interviews (IDI), Focus Group Discussions (FGD)	Mothers, health care providers, TBA, community leaders, grandmothers, compound heads, heads of households	Ghana	Breastfeeding practices
2	Adejuyigbe, Bee, Amare et al.	2015	IDI, Narrative Interviews, and Observations (O)	Mothers, fathers, health workers, grandmothers, TBA	Nigeria, Tanzania, Ethiopia	Thermal care and bathing
3	Alam, Ali, Sultana et al.	2008	IDI, O	Mothers, fathers, grandmother, family members, TBA	Bangladesh	Cord care practices
4	Amare	2014	IDI	Mothers, grandmothers, TBA	Ethiopia	Cord care practices
5	Amare, Shamba, Manzi, et al.	2015	IDI, FGD, (O)	Mothers, fathers, health workers, TBA, grandmothers, merchants	Four African sites	Emollient use for skin care
6	Atyeo, Frank, Vail et al.	2017	Semi structured interviews (SSI)	Mothers	Guatemala	Breastfeeding practices
7	Bazzano, Kirkwood, Tawiah-Agyeman, et al.	2008	IDI, FGD, Participant Observation, Case Study (CS), SSI	Mothers, grandmothers, health providers, community members	Ghana	Care seeking behaviors
8	Bazzano, Oberhelman, Potts et al.	2015	IDI, O, FGD, visual media	Mothers, grandmothers, fathers	Cambodia	Breastfeeding practices
9	Bazzano, Var, Grossman, et al.	2017	O, SSI	Mothers	Cambodia	Newborn care practices with emphasis on use of emollients
10	Byaruhanga, Nsungwa-Sabiiti, Kiguli, et al.	2011	IDI, FGD	Mothers, TBA, elderly care takers	Uganda	Care seeking behaviors
11	Degefie, Amare, and Mulligan	2014	IDI, Key informant interviews (KII)	Mothers, grandmothers, TBA, fathers	Ethiopia	General care practices
12	Dhinga, Gittelsohn, Suleiman, et al.	2014	IDI, FGD	Mothers, fathers, TBA, grandmothers, health care providers	Tanzania	Cord care practices
13	Engmann et al.	2013	IDI, FGD	Mothers, grandmothers, health care providers	Ghana	Newborn illness, danger signs, and care seeking behavior
14	Gondwe, Munthali, Ashorn, et al.	2014	IDI, FGD	Mothers, fathers, TBA, grandmothers, traditional healers,	Malawi	Pre-term birth and care seeking practices
15	Herlihy, Shaikh, Mazimba, et al.	2013	IDI, FGD	Mothers, grandmothers, TBA, community members	Zambia	Cord care practices
16	Hill, Tawaiah-Agyemang, Manu et al.	2010	IDI, FGD, and Narratives (N)	Mothers, grandmothers, TBA, fathers, pregnant women	Ghana	Thermal care practices
17	Hunter, Callaghan-Koru, Mahmud, et al.	2014	IDI, FGD	Pregnant women, mothers, husbands, grandmothers, traditional healers, community leaders, religious leaders, health care providers	Bangladesh	Skin to Skin practices
18	Kesterton and Cleland	2009	IDI, FGD	Mothers, grandmothers, TBA	India	General care practices
19	Khadduri, Marsh, Rasmussen et al.	2008	SSI, FGD	Women of reproductive age, health service providers, mothers, fathers	Pakistan	General care practices
20	Lee, Durham, Booth, et al.		IDI, FGD	Mothers, health care staff, key informants	Lao PDR	Breastfeeding practices

21	Lunze, Yeboah-Antwi, and Marsh	2014	IDI, FGD	Mothers, community leaders, health officers, grandmothers	Zambia	Neonatal hypothermia and thermal care practices
22	Melesse-Salasibew, Filteau, and Marchant	2014	IDI, SSI, FGD	Mothers, local experts on newborn care practices	Ethiopia	General care practices following home births
23	Moran, Choudhury, Khan, et al.	2009	IDI	Pregnant women, mothers	Bangladesh	General care practices
24	Moyer, Aborgio, Logonia et al.	2012	IDI, FGD	Women with newborns, grandmothers, compound heads, community leaders, TBA, health care providers	Ghana	Cord care practices
25	Mrisho, Schellenberg, Mushi et al.	2008	IDI, FGD, CS	Female community informants	Tanzania	Home-based care practices
26	Nabiwemba, Atuyambe, Criel, et al.	2014	IDI	Mothers	Uganda	Care practices for LBW babies
27	Nalwadda, Waiswa, Guwatudde, et al.	2015	IDI, FGD	Mothers, fathers, TBA	Uganda	General care practices with emphasis on cord care
28	Newbrander, Natiq, Shahim, et al.	2014	IDI, FGD, O	Household members of perinatal woman, community members	Afghanistan	General care practices
29	Okeyere, Tawiah-Agyemang, Manu, et al.	2010	IDI, FGD, Birth Narratives (BN)	Mothers, TBAs, grandmothers, husbands, *asram* healers	Ghana	Traditional illness
30	Pati, Chauhan, Panda, et al.	2014	IDI	Mothers, TBA	India	General care practices with an emphasis on breastfeeding
31	Premji, Khowaja, Meherali, et al.	2014	IDI, FGD	Mothers, fathers, grandmothers	Pakistan	General care practices
32	Sacks, Moss, Winch et al.	2015	IDI, FGD, O	Mothers, TBA, hospital staff	Zambia	Skin, thermal, and cord care
33	Shamba, Schellenberg, Hildon et al.	2014	IDI, FGD, BN	Mothers, TBA	Tanzania	Bathing, thermal, and skin to skin care practices
34	Tawiah-Agyemang, Kirkwood, Edmond, et al.	2008	SSI, FGD	Mother, women of child bearing age, health workers, policy makers	Ghana	Initiation of breastfeeding
35	Thairu and Pelto	2008	IDI	Mothers	Tanzania	General care practices
36	Waiswa, Kemigisa, Kiguli, et al.	2008	IDI, FGD	Mothers, fathers, grandparents	Uganda	General care practices
37	Walsh, Norr, Sankar, et al.	2014	FGD	TBA, pregnant women, stakeholders, traditional healers	Haiti	Cord care practices

*Color coding indicates geographic regions

**Data for the review were only extracted from participants who were family members (including mothers of newborns or mothers-to-be) and non-professionals who provided care at home to the newborn.

Table 2. Critical Appraisal Skills Program (CASP) Assessment

No.	Author(s)	Year	CASP 1	CASP 2	CASP 3	CASP 4	CASP 5	CASP 6	CASP 7	CASP 8	CASP 9	CASP 10	Overall Score
1	Aborigo, Moyer, Rominski et al.	2012	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
2	Adejuyigbe, Bee, Amare et al.	2015	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
3	Alam, Ali, Sultana et al.	2008	Y	Y	Y	Y	Y	N	Y	Y	C	Y	8/9
4	Amare	2014	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10
5	Amare, Shamba, Manzi, et al.	2015	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10
6	Atyeo, Frank, Vail et al.	2017	Y	Y	N	C	N	Y	Y	Y	Y	Y	7/9
7	Bazzano, Kirkwood, Tawiah-Agyemang, et al.	2008	Y	Y	Y	Y	Y	N	N	Y	Y	Y	8/10
8	Bazzano, Oberhelman, Potts, et al.	2015	Y	Y	Y	Y	Y	C	Y	Y	Y	Y	9/9
9	Bazzano, Var, Grossman, et al.	2017	Y	Y	Y	Y	Y	C	Y	Y	Y	Y	9/9
10	Byaruhanga, Nsungwa-Sabiti, Kiguli, et al.	2011	Y	Y	N	Y	Y	N	Y	Y	Y	C	7/9
11	Degefie, Amare, and Mulligan	2014	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
12	Dhingra, Gittelsohn, Suleiman, et al.	2014	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10
13	Engmann, Adongo, Akawire, et al.	2013	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
14	Gondwe, Munthali, Ashorn, et al.	2014	Y	Y	Y	Y	C	N	Y	Y	Y	Y	8/9
15	Herlihy, Shaikh, Mazimba, et al.	2013	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
16	Hill, Tawiah-Agyemang, Manu, et al.	2010	Y	Y	Y	Y	Y	N	N	C	Y	Y	7/9
17	Hunter, Callaghan-Koru, Mahmud, et al.	2014	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
18	Kesterton and Cleland	2009	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
19	Khadduri, Marsh, Rasmussen, et al.	2008	Y	Y	Y	Y	C	N	N	C	Y	Y	7/9
20	Lee, Durham, Booth, et al.	2013	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
21	Lunze, Yeboah-Antwi, Marsh, et al.	2014	Y	Y	Y	Y	Y	N	Y	C	Y	Y	8/9
22	Melesse-Salasibew, Filteau, and Marchant	2014	Y	Y	Y	N	Y	N	Y	N	Y	C	7/9
23	Moran, Choudhury, Khan, et al.	2009	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
24	Moyer, Aborigo, Logonia, et al.	2012	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
25	Mrisho, Schellenberg,	2008	Y	Y	Y	Y	C	N	Y	N	Y	Y	7/9

	Mushi, et al.												
26	Nabiwemba, Atuyambe, Criel, et al.	2014	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
27	Nalwadda, Waiswa, Guwatudde, et al.	2012	Y	Y	Y	Y	C	N	Y	C	Y	Y	7/8
28	Newbrander, Natiq, Shahim, et al.	2010	Y	Y	Y	Y	C	N	Y	N	Y	Y	7/9
29	Okyere, Tawaiah-Agyeman, Manu, et al.	2006	Y	Y	Y	Y	C	N	Y	N	Y	Y	7/9
30	Pati, Chauhan, Panda, et al.	2014	Y	Y	Y	Y	N	N	Y	N	N	C	5/10
31	Premji, Khowaja, Meherali, et al.	2014	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	10/10
32	Sacks, Moss, Winch, et al.	2015	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10
33	Shamba, Schellenberg, Hildon, et al.	2014	Y	Y	Y	Y	Y	C	Y	Y	Y	Y	8/9
34	Tawiah-Agyemang, Kirkwood, Edmond, et al.	2008	Y	Y	Y	Y	Y	N	N	Y	C	Y	7/9
35	Thairu and Pelto	2008	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10
36	Waiswa, Kemigisa, Kiguli, et al.	2008	Y	Y	Y	N	Y	N	Y	Y	Y	Y	8/10
37	Walsh, Norr, Sankar, et al.	2015	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9/10

Table 3. Barriers and facilitators described in articles reviewed

Domain of newborn care	Barriers	Facilitators	Article Number per Table 2, Year	Total Number of Article Mentions
Cord care	Lack of supplies, including water or infection prevention supplies Using surgical spirits and powder Unhygienic cutting practices, including used, unsterilized razor blades or scissors Unskilled attendants Delayed cord cutting, resulting in infection Mixed perception about the length at which cord should detach and heal Use of topical applications to the cord, including herbs, butter, and indigenously-made substances, for medicinal/protective purposes Application of traditional remedies and substances on the cord to moisturize or dry it and facilitate its separation and promote healing Belief that cord infections caused by mother's diet Lack of understanding about cord cleaning Lack of understanding of risks and infections affecting the cord and certain signs of infection, such as redness Cultural belief and newborn care practices not conforming to recommended practices Cost of supplies, including CHX solution Religious and cultural beliefs about cord cutting and cleaning Umbilical cord thought to make baby vulnerable to witchcraft Mothers cutting the cord themselves Umbilical cord not tied prior to cutting, can lead to tetanus Practice of only tying to cord on the side of the baby	Knowledge about cord care Community stakeholder recognition that infants are susceptible to cord infection Delivery in hospital Informed at health facility Tailored behavior change communication Appropriate compromises between existing and recommended practices Community education Outreach education Inclusion of grandmothers and other female household members, who are key decision makers and caregivers Participatory health promotion techniques, such as women's groups Programs targeting Traditional Birth Attendants (TBAs) and community mothers Importance of cord care and tying recognized in community and understood culturally Recognition of cord problems, such as delayed healing, bleeding, or swelling TBAs counselling mothers to protect the cord from infections Consensus regarding liquid cord cleaning Raising awareness about usefulness of CHX in cord cleaning Willingness to adopt practices that would protect the newborn and alter traditional cord care practices Behavior change communication messages beginning at pregnancy Prescribed practices making their way into traditional care	3, 2018 4, 2014 9, 2017 10, 2011 11, 2014 12, 2014 15, 2013 18, 2009 19, 2008 22, 2014 23, 2009 24, 2012 25, 2008 26, 2014 27, 2015 30, 2014 32, 2015 36, 2008 37, 2014	19/37

	Recontamination of washed hands before attending to newborn Seclusion of mother and baby in postpartum period may lead to late identification of illness and delay to seeking care Utilizing materials, such as rope and twigs, in cord tying Disconnect between healthcare providers and community Local conceptions regarding role of cord tying in stemming blood flow Concerns regarding the length of time until cord detachment Presence of blood clots associated with curses	Efforts to promote hand-washing and to avoid recontamination Promotion of efforts to avoid unclean home applications to the cord Programs, promoting cord cleansing with antiseptics, should provide educational messages about the balance between the benefits and the likelihood that separation of umbilical cord may be slightly delayed Using materials, such as clean cotton, other than fingers to apply medicine/antiseptic Programs in urban slum areas Interventions to improve social support to women, especially first-time mothers Educating healthcare providers about harmful, traditional practices so they are specifically addressed Explaining rationale for tying the cord on both sides of the cut Cultural health systems model that depicts all stakeholders Presence of blood clots leading to seeking medical treatment at health centers Promotion of chlorhexidine in place of commonly-reported application of harmful substances Scale-up of evidenced based practices Health promotion programs taking into account health system barriers and financial burden		
Drying and wrapping	Behaviors vary among home deliveries Perception of dirtiness of baby Perception of birthing process as polluting Vulnerability of baby Opinions of other household stakeholders, such as the mother-in-law Home and hospital delivery Not attending to baby until placenta delivered	Knowledge about drying and wrapping Understanding that baby should be kept warm Delivery in hospital Informed at health facility Tailored behavior change communication Appropriate compromises between existing and recommended practices Community education	2, 2015 8, 2011 10, 2014 14, 2010 16, 2009 19, 2014 20, 2014 21, 2009 28, 2014	11/37

	Prioritization of the mothers	Outreach education Inclusion of grandmothers who are key decision makers Participatory health promotion techniques, such as women's groups Traditional practice of wrapping in new clean cloth Use of warm water and traditional herbs to protect baby Behavior change communication messages beginning at pregnancy Babies dried and wrapped due to awareness of reduction of cold Having more than one attendant to help both the mother and baby Programs in urban slum areas Interventions to improve social support to women, especially first-time mothers	30, 2015 31, 2014	

Bathing	Traditional or historical practice Lack of knowledge of when to bathe baby, especially in home deliveries Early bathing due to societal pressure Cultural norm of frequent bathing Cultural belief and newborn care practices not conforming to recommended practices Negative perception of vernix, including association with sperm Vernix considered dangerous for HIV-exposed infants Bathing in close proximity to smoking fires Early bathing due to association with dirtiness as well as body odor later in life Differences in practice by untrained TBAs Spiritual beliefs attached to use of local herbs for bathing Bathing practices, such as using pond water Substances added to water, including Dettol or Savlon Bathing immediately after birth due to concerns about 'ritual pollution' can cause hypothermia Early bathing linked to shaping the baby's head Early bathing to help the baby sleep and feel clean Early bathing in facilities	Delayed bathing when delivery in hospital Informed at health facility Quality of care in health facility Health worker advice Tailored behavior change communication, addressing community norms and based on formative research Appreciation of newborn vulnerability to encourage behavior change Appropriate compromises between existing and recommended practices Community education Outreach education Inclusion of grandmothers who are key decision makers Participatory health promotion techniques, such as women's groups Behavior change communication messages beginning at pregnancy Having more than one attendant to help both the mother and baby Delayed bathing due to concerns about pneumonia Identifying and addressing cultural rationales that underlie negative practices Reinforcing ad protecting beliefs that support positive practices Improving health worker communication skills and social	2, 2015 3, 2008 8, 2011 9, 2014 10, 2014 14, 2010 16, 2009 19, 2014 20, 2014 21, 2009 24, 2014 26, 2014 28, 2014 30, 2015 31, 2014 33, 2008 34, 2008	17/37
Thermal control	Lack of practice when delivery at home or with TBA Lack of knowledge of keeping baby indoors Suboptimal practices Early bathing Length of time baby undressed during bathing Bathing with warm water Use of blankets, rather than skin-to-skin care	Informed at health facility Beliefs about importance of thermal care Quality of care in health facility Tailored behavior change communication based on formative research Appropriate compromises between existing and recommended practices Community education Outreach education	2, 2015 3, 2008 8, 2011 9, 2014 10, 2014 14, 2010 17, 2008 19, 2014 24, 2014	12/37

	Newborn massage, including use of mustard oil, can compromise the skin barrier function Cultural belief and newborn care practices not conforming to recommended practices Lack of maintaining thermoprotective practices in the first few hours postpartum, when newborns are at greatest risk	Inclusion of grandmothers who are key decision makers Participatory health promotion techniques, such as women's groups Behavior change communication messages beginning at pregnancy Knowledge and practice that baby should be kept warm Having more than one attendant to help both the mother and baby Use of low-cost newborn warmers Community-based practices on hypothermia prevention and management	28, 2014 30, 2015 31, 2014	
Skin to skin contact	Few mothers given baby immediately after birth Concerns of disease transmission, harm to umbilicus Perception of dirtiness after birth Maternal rest Concerns of baby becoming cold Delayed due to early bathing Perception that it might be harmful to fragile newborns Lack of understanding that kangaroo mother care is a protective method of caring for healthy newborns Use of blankets, rather than skin-to-skin care Lack of continued skin to skin contact Cultural belief and newborn care practices not conforming to recommended practices Women feeling responsible for household duties	Behavior change interventions based on formative research Quality of care in health facility Tailored behavior change communication Appropriate compromises between existing and recommended practices Community education Outreach education Inclusion of grandmothers who are key decision makers Participatory health promotion techniques, such as women's groups Behavior change communication messages beginning at pregnancy Association with reduced risk of cord infection Concept easily understood and women willing to try if good for the baby Appreciation of kangaroo mother care as an appropriate treatment for ill babies Biomedical advice from healthcare providers reaching community through word-of-mouth and television campaigns Receiving help from family members	2, 2015 3, 2008 8, 2011 9, 2014 14, 2010 15, 2014 16, 2009 19, 2014 31, 2014	9/37

		Witnessing other women perform kangaroo mother care with positive outcomes Focusing intervention messages on building supportive a environment for kangaroo mother care practice		
Hygiene	Lack of knowledge on hand-washing with soap Recontamination of washed hands before attending to the newborn Cultural belief and newborn care practices not conforming to recommended practices	Health education Tailored behavior change communication Appropriate compromises between existing and recommended practices Community education Outreach education Inclusion of grandmothers who are key decision makers Participatory health promotion techniques, such as women's groups Efforts to promote hand-washing and to avoid recontamination Understanding of keeping babies and their surroundings clean Educating healthcare providers about harmful, traditional practices so they are specifically addressed	3, 2008 9, 2014 16, 2009 17, 2008 22, 2012 24, 2014	6/37
Breast feeding (initiation of and provision of colostrum)	Traditional or historical practice Belief that it is unhealthy Mother's exhaustion Limited knowledge Maternal education status Geographic isolation Inconsistency in health education Learning from relatives Pre-lacteal feeds given on fingertip, increasing risk of infection Low urgency in initiating breastfeeding as mother and child believed to be polluted after birth Negative beliefs regarding colostrum	Community members knowledgeable about importance of breast-feeding Delivery in a health facility, where staff encouraged early breast-feeding Culturally-tailored health education Targeting isolated villages Cross-generational education interventions Interventions through community health clinic workers Appropriate compromises between existing and recommended practices Community education Outreach education	1, 2012 6, 2017 9, 2017 10, 2011 11, 2014 12, 2014 18, 2009 19, 2008 20, 2013 22, 2014 23, 2009 25, 2008	18/37

	Traditional practices to test colostrum for bitterness Perception of a lack of breast milk Onset of post-birth activities, such as bathing Perception that baby needs rest Baby not crying for milk Perception of inadequate maternal nutrition and breast milk Premature breast milk supplementation (water and other fluids), which may expose newborns to pathogens Work served as a barrier Difference in advice received from different people by first-time mothers Cultural belief and newborn care practices not conforming to recommended practices Perception that hunger is not met or satisfied by breast-milk alone	Inclusion of grandmothers/mother-in-laws and religious leaders who are key decision makers Participatory health promotion techniques, such as women's groups Awareness of nutritive value of breast milk Positive perception regarding infant feeding TBAs trained by Ministry of Health Raising awareness of early initiation of breast-feeding in the policy arena Cultural belief and practices Identifying and addressing cultural rationales that underlie negative practices Reinforcing ad protecting beliefs that support positive practices Improving health worker communication skills and social management of patients Lowering healthcare costs Programs in urban slum areas Interventions to improve social support to women, especially first-time mothers First-time mothers' mothers Working with employers and developing supportive employment policies Providing postnatal support and working with lay people and health professionals Research to identify optimal combination of interventions Using religious leaders, trained health workers, family health action groups, and radio to disseminate messages	26, 2014 28, 2014 30, 2014 31, 2014 33, 2008 35, 2008	
Care seeking for illness	Lack of transportation Geographic isolation/remoteness from health facilities Financial ability/constraints Seclusion of mother and baby in postpartum period may lead to late	Addressing locally existing cultural beliefs Strengthening facility care Urging families to seek medical care for any symptom of illness in a newborn	7, 2008 8, 2011 11, 2013 17, 2008 25, 2015	7/37

	identification of illness and delay to seeking care Community understanding of the newborn period and cultural expectations Caretaker knowledge about newborn sickness Individual experiences in household and caretaker autonomy Women's inability to seek care without being accompanied by a male relative Healthcare decisions influenced by community members Perceived health system gaps Confidence in healthcare providers is issue-specific Sequential care-seeking practices, with traditional medicine as first-line of treatment for 7 days Untimely action after recognition of danger signs Previous negative experiences with health services facilities Local understanding of illness affects treatment practices Mothers blamed for infant illness Use of traditional home remedies and self-medication instead of care in health facilities Shame about utilization of maternal and neonatal services Care-seeking for local community members for serious health concerns Post-partum depression 'Asram' perceived as common illness which cannot be treated at health facilities 'Asram' treatments including frequent cold herbal baths, air-dying, and oral treatments Modification of 'asram' treatment required the sanction of a healer	Addressing financial barriers Recognition of danger signs Targeted behavior-change communication programs Using religious leaders, trained health workers, family health action groups, and radio to disseminate messages Understanding traditional illnesses in designing care-seeking interventions	26, 2014 27, 2010	

Other newborn care	Cultural perception of emollients as improving the skin, keeping the baby warm, and shaping the baby Social pressure to use emollients Emollient choice influenced by cost, availability, and traditional norms Massage, associated with application of emollients, is potentially damaging to skin Potential impact of emollients, such as engine oil, on harm and even mortality TBAs applying mild pressure inside baby's mouth on the soft palate with water and local herb Application of powders directly into dermal incisions of ill children to ward off malevolent spirits	Association of emollient therapy in reduction of mortality among preterm infants Newborn emollient trials, specifically designed to reflect contextual differences If emollients are proven effective, policy makers deciding whether to provide emollients free of charge or through social marketing Improving practice of massage associated with emollient application Understanding traditional illnesses in designing care-seeking interventions	4, 2014 20, 2014 26, 2010 30, 2015	4/37
Low birth weight recognition	Babies not weighed Belief in supernatural powers Less knowledge of home care practices when baby delivered at home or in lower level health facility Lack of knowledge of how to provide care or when to take baby to health facility Perceptions of preterm birth, including young and old maternal age, heredity, sexual impurity, and maternal illness during pregnancy Poverty Women placed with main responsibility for preterm newborns High time burden of care for preterm babies leading to neglect of household, farming, and business duties	Better knowledge of home care practices when delivery at health facility Health education at community level to reach mothers that deliver at home Mechanisms to support mothers Provision of warmth to preterm newborns Addressing cultural practices for preterm babies among community members Vernix considered important for preterm newborns	9, 2014 12, 2014 24, 2014	3/37

Contributorship statement:

Authors have contributed as follows to this work. Conception and design of the work: ANB, RH**;** Data collection: ANB, AK, EFK, RH**;** Data analysis and interpretation: ANB, AK, EFK**;** Drafting the article: ANB, AK, EFK, SE, RH**;** Critical revision of the article: ANB, AK, EFK, SE, RH**;** Final approval of the version to be published: ANB, AK, EFK, SE, RH.

Competing interests: All authors declare they have no conflicts of interest.

Funding: The study received no financial support.

Data sharing statement: All data came from published articles available from electronic databases which are openly accessible.

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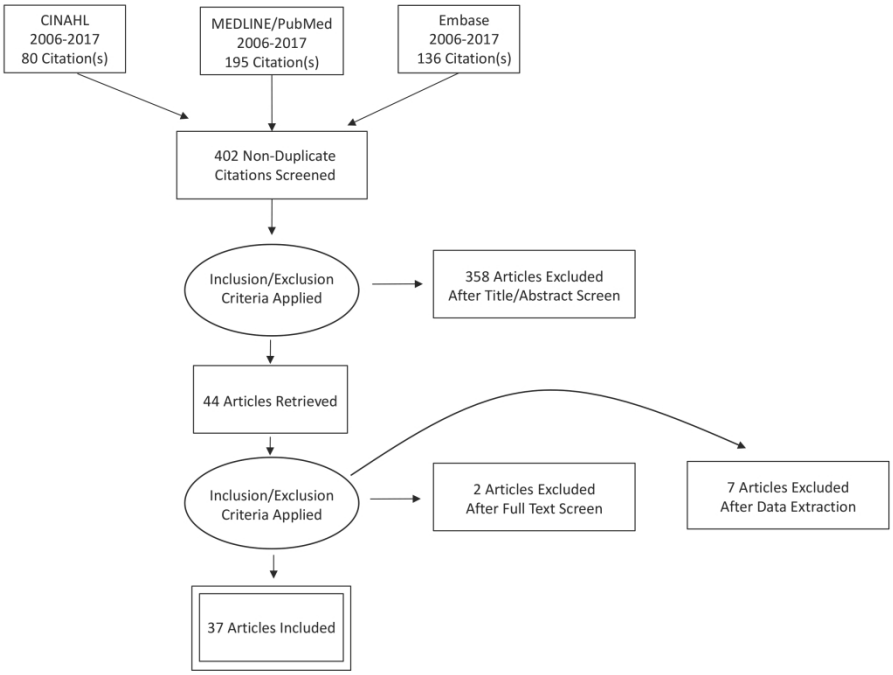

Figure 1

264x190mm (300 x 300 DPI)

Appendix 1. Search Strategy

Search String	Notes
"infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab])) AND ("breast feeding"[MeSH Terms] OR "immediate breastfeeding"[Title/Abstract] OR "exclusive breastfeeding"[tiab] OR "exclusive breast feeding"[tiab] OR "initiation of breastfeeding"[tiab] OR "thermal care"[tiab] OR "cord care"[tiab]) OR "Thermal care"[tiab] OR "Thermal care"[ot] OR "bathing"[tiab] OR bathing[ot] OR "cord care"[tiab] OR "cord care"[OT] OR "umbilical cord care"[tiab] OR "umbilical cord care"[ot] OR "health knowledge, attitudes, practice"[MeSH Terms]	Includes "health knowledge, attitudes, practices"
"mothers"[MeSH Terms] OR mothers[Title/Abstract] OR mother[Title/Abstract] OR "fathers"[MeSH Terms] OR fathers[Title/Abstract] OR "parents"[MeSH Terms] OR parents[Tiab] OR parent[Tiab] OR "Grandparents"[MeSH] OR grandmother[Tiab] OR grandmother's[Tiab] OR grandmothers[Tiab] OR grandmothers'[Tiab)	Parent Perspective Concept
(("Qualitative Research"[Mesh] OR "qualitative research"[TIAB] OR "qualitative research"[OT] OR "qualitative studies"[tiab] OR "qualitative study"[tiab] OR "qualitative studies"[OT] OR "qualitative studies"[OT] OR "qualitative study"[OT] OR "Interviews as Topic"[Mesh] OR "semi structured interview"[TIAB] OR "semi structured interviewer"[TIAB] OR "semi structured interviewing"[TIAB] OR "semi structured interviews"[TIAB] OR "semi structured interview"[OT] OR "semi structured interviews"[OT] OR "semistructured interview"[TIAB] OR "semistructured	Qualitative concept (w/o exclusions)

interview"[OT] OR "unstructured interview"[TIAB] OR "unstructured interviewing"[TIAB] OR "unstructured interviews"[TIAB] OR "unstructured interview"[OT] OR "in depth interview"[TIAB] OR "in depth interviewees"[TIAB] OR" in depth interviewing"[TIAB] OR "in depth interviews"[TIAB] OR "in depth interview"[OT] OR "in depth interviewing"[OT] OR "in depth interviews"[OT] OR "Focus Groups"[Mesh] OR "focus group"[TIAB] OR "focus groups"[TIAB] OR "focus group"[OT] OR "focus groups"[OT] OR "group interview"[OT] OR "group interview"[TIAB] OR "Direct observation"[tiab] OR "Participant observation"[tiab] OR "Non-participant observation"[tiab] OR "Direct observation"[OT] OR "Participant observation"[ot] OR "Non-participant observation"[OT] OR "Ethnology"[Mesh] OR "ethnographic research"[OT] OR "ethnographic research"[TIAB] OR ethnology[OT] OR ethnology[TIAB] OR "ethnographic study"[tiab] OR "ethnographic study"[ot] OR "Community-Based Participatory Research"[Mesh] OR "community-based participatory research"[OT] OR "community-based participatory research"[TIAB] OR "action research"[TIAB] OR "action research"[OT] OR "Formative research"[tiab] OR "Formative research"[ot] OR "Key informant"[tiab] OR "Key informant"[OT] OR "Interpretative perspective"[TIAB] OR "Phenomenological Research"[TIAB] OR Phenomenology[tiab] OR Phenomenology[ot] OR "Phenomenological Research"[OT]))	
ALL countries names (not pig OR hen) OR Developing country/LMIC terms (see above)	ALL LMIC terms and Country names

"infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab]	This is our main concept and prioirity. Reintroduced within context of other concepts
(("infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab])) AND ((#110 AND #93 AND #94 AND #101))	
(("infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab])) AND ((#110 AND #93 AND #94 AND #101)) Filters: Publication date from 2016/01/01 to 2017/12/31	Published Jan 1, 2016 - Dec 31, 2017
(("infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab])) AND ((#110 AND #93 AND #94 AND #101)) Filters: Publication date from 2016/01/01 to 2017/12/31; English	Published English Jan 1, 2016 -Dec 31, 2017
(("infant, newborn"[mesh] OR newborn[Title/Abstract] OR "newborn care"[tiab])) AND ((#110 AND #93 AND #94 AND #101)) Sort by: Relevance Filters: published in the last 10 years; Humans; English	

Reporting checklist for systematic review and meta-analysis.

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		Reporting Item	Page Number
	#1	Identify the report as a systematic review, meta-analysis, or both.	0-1
Structured summary	#2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number	0-1
Rationale	#3	Describe the rationale for the review in the context of what is already known.	1
Objectives	#4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	2
Protocol and registration	#5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address) and, if available, provide registration information including the registration number.	0-1

Eligibility criteria	#6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rational	3
Information sources	#7	Describe all information sources in the search (e.g., databases with dates of coverage, contact with study authors to identify additional studies) and date last searched.	3
Search	#8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	See note 1
Study selection	#9	State the process for selecting studies (i.e., for screening, for determining eligibility, for inclusion in the systematic review, and, if applicable, for inclusion in the meta-analysis).	4-5
Data collection process	#10	Describe the method of data extraction from reports (e.g., piloted forms, independently by two reviewers) and any processes for obtaining and confirming data from investigators.	5
Data items	#11	List and define all variables for which data were sought (e.g., PICOS, funding sources), and any assumptions and simplifications made.	5-6
Risk of bias in individual studies	#12	Describe methods used for assessing risk of bias in individual studies (including specification of whether this was done at the study or outcome level, or both), and how this information is to be used in any data synthesis.	6-7
Summary measures	#13	State the principal summary measures (e.g., risk ratio, difference in means).	6-7
Planned methods of analyis	#14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I2) for each meta-analysis.	6-7
Risk of bias across studies	#15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	6-7
Additional analyses	#16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	6-7
Study selection	#17	Give numbers of studies screened, assessed for eligibility, and	7-8

		included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	
Study characteristics	#18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citation.	7-8
Risk of bias within studies	#19	Present data on risk of bias of each study and, if available, any outcome-level assessment (see Item 12).	7
Results of individual studies	#20	For all outcomes considered (benefits and harms), present, for each study: (a) simple summary data for each intervention group and (b) effect estimates and confidence intervals, ideally with a forest plot.	7
Synthesis of results	#21	Present the main results of the review. If meta-analyses are done, include for each, confidence intervals and measures of consistency.	8-10
Risk of bias across studies	#22	Present results of any assessment of risk of bias across studies (see Item 15).	7
Additional analysis	#23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	8-10
Summary of Evidence	#24	Summarize the main findings, including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., health care providers, users, and policy makers	11
Limitations	#25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review level (e.g., incomplete retrieval of identified research, reporting bias).	11
Conclusions	#26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	12
Funding	#27	Describe sources of funding or other support (e.g., supply of data) for the systematic review; role of funders for the systematic review.	12

Author notes

1. 4, Appendix