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Research Article

A multi-country assessment of providers of community based maternity care in resource limited countries

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Abstract

Background: Resource poor countries continue to have large numbers of non-facility births and the highest numbers of pregnancy and child birth related mortality and morbidity in the world. For effective strategies to reduce maternal mortality, an understanding of current providers of community based maternity care for the poor is needed. This review explored providers of community maternal and newborn care in resource poor countries. The objectives were to identify community based maternity carers, their roles and functions, how they can complement the current global focus on skilled birth attendance, and to identify the enablers and barriers to their involvement in the continuum of care.

Methods: This was a systematic review. The following search terms and their appropriate variations and truncations were used: community based care, home birth, resource poor countries, maternal health, neonatal health, roles, enablers and challenges. An online database *EBSCO Discover*, which searched 37 databases was used.

Results: Fifty seven studies from three resource poor regions were included. There is a variety of Community based carers (CBCs) providing maternal and newborn care in resource poor countries, they differ by title, role, demographics, recruitment, skills, training, remuneration and employment status. These CBCs are mostly women of 18-90 years old, respected members living within their communities. Most CBCs are nominated by their communities, CBCs' main role is to conduct deliveries. The main barriers to CBCs' involvement in the continuum of care are poverty, poor skills, no equipment, challenging geographical terrain, mistrust from professionals and lack of supportive supervision. The main enablers are CBCs' integration into health system, supportive supervision, and availability of supplies, training and access to functional referral systems.

Conclusion: The diverse cadres of CBCs in poor countries can, with enablers suited for each local context bridge the gap in the continuum of care between facilities and communities.

Keywords: Community based maternity, Carers, Community maternity care, Resource poor countries, Birth attendance, Enablers, Barriers

Introduction

Each year between 250,000 and 300,000 women still die from complications of pregnancy and childbirth. Almost all these deaths (99%) occur in developing countries [1]. Of the deaths in developing countries, 65% are estimated to be in eleven countries with six of these countries (Nigeria, Democratic Republic of Congo, Ethiopia, United Republic of Tanzania, Sudan and Kenya) in sub-Saharan Africa (SSA) [2,3]. The maternal mortality ratio shows the greatest disparity of all health indicators when comparing developing and developed countries.

For every woman who dies, it is estimated that between 10 to 20 women survive but will suffer ill health and disability as a result of complications before, during and after childbirth [4]. In addition, an estimated 4 to 5 million neonatal deaths occur each year while around 3 million babies are still born [5]. The health of the neonate is closely related to that of the mother and the majority of deaths in the first month of life could also be prevented if interventions were in place to ensure maternal survival.

There is accelerated progress with regard to reducing under-five mortality and maternal mortality globally. In 2008, the total number of under-five deaths declined from 12.5 million in 1990 to 8.8 million with the greatest progress made in Northern Africa, Eastern Asia, Western Asia, Latin America and the Caribbean. The recent

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estimates for maternal mortality also suggest progress is being made. In the developing regions as a whole, the maternal mortality ratio (MMR) is estimated to have dropped from 440 maternal deaths per 100,000 live births in 1990 to 290 maternal deaths per 100,000 live births in 2008 [3]. Eastern Asia, Northern Africa, South-Eastern Asia (SEA) and Southern Asia have made significant progress with a reported 40% reduction or more [3]. However, the Millennium Development Goals (MDGs) 4 and 5 targets are still far from being achieved in (SSA) and with the current levels of progress it is unlikely that any countries in (SSA) will be able to meet the agreed targets set for MDG 4 and 5 by 2015 [1,6].

Ensuring skilled birth attendance (SBA) for all women and access to good quality Emergency Obstetric Care (EmOC) for women with life-threatening complications during pregnancy, childbirth and the post-partum period are key steps toward reducing maternal and newborn mortality and morbidity. In addition, prevention of complications of unsafe abortion (including safe abortion services where this is legal), provision of family planning services and focused antenatal care need to be available and accessible. This has also been described as the 'continuum of care' [7].

However, this is not yet a reality for many women in SSA. Annually 60 million women give birth outside health facilities and 52 million of these births occur without SBA [8]. In resource poor countries the majority of women still deliver at home without SBA [9]. Between 33% and 69% of women are recorded as having a skilled birth attendant at the time of delivery [7]. Disparities remain within countries in the proportion of births attended by SBAs, impoverished and rural women are far less likely than their urban or wealthier counterparts to receive SBA or facility care [10,11]. In SSA and SEA more than 70% of all deliveries in the lowest two wealth quintiles are conducted at home, showing that the poor are more likely to deliver at home [12].

It is well documented that training midwives and increasing SBA coverage is the best strategy to reduce pregnancy and child birth related mortality and morbidity [13]. Resource poor countries however face a human resource crisis with far below target numbers of SBAs [8,11,14]. The need for comprehensive maternal and newborn services effectively linked from institutional care to home is well recognized as the continuum of care, necessary throughout the lifecycle of woman [15].

In many countries there is a wide range of people helping women during pregnancy and birth. These may include formally recognised and non-recognised carers both in the community and at health facility level. However, who these other providers are exactly, how their current roles are affected by and can complement or add to the strategy of 'SBA for all' has received relatively little attention. These community based carers' vary by country and can include: traditional birth attendants (TBAs), grandmothers and other women in the community who are not associated with the health service system as well as carers associated with the health service system. Those in the health system are currently known to include health surveillance assistants, maternal and child health aides, village health workers, community health aides, community health promoters, community health officers and community health extension workers. As all these health care providers (with the exceptions of TBAs) have linkages with the formal health system (usually at primary level) they have been sometimes referred to collectively as "community health workers". We however propose the term "Community Based Carers" which includes both those associated with the health system more formally but linked to the community and those wholly based in the community. The inability of Community Based Carers (CBCs) to deal with complications while assisting women has been sometimes linked to the high maternal and neonatal mortality and morbidity in resource poor countries [8,16].

In this paper we review the literature describing who CBCs currently are, what roles and functions they perform and what factors can promote or enhance their contributions to improve maternal and newborn health (MNH) in resource poor countries.

Methods

Search terms and their variations were identified from the review topic. Search terms used are listed in Figure 1. The list

Community Based Care, Home Birth.
Resource Poor Countries, Developing countries, Third world countries, Low Income Countries, Poor Countries, Africa, Asia, South America.
Maternal Neonatal Health, Maternity, Home birth, Neonatal, Newborn, Mothers Health, Maternal Mortality, Maternal Morbidity.
Training, Education, Skills training, Midwifery training in the community, Obstetrics, Training in the Community.
Roles, Functions, Tasks, Jobs, Position, Duties.
Enablers, Motivators, Facilitators, Support Challenges, Barriers.

Figure 1: Search terms.

of search terms was reviewed by the authors, in consultation with an academic librarian. The terms, as well as appropriate variations and truncations were entered into an online database *EBSCO Discover* search which included 37 databases. No date or language limits were placed on the search.

The identified studies were assessed for relevance and included studies were appraised, graded for quality and analyzed. We used the World Bank classification of Gross National Income (GNI) to determine resource poor countries.

Inclusion criteria: All studies discussing the following aspects of community based maternity service providers in resource poor countries: Cadres, roles and functions, enablers and barriers and CBCs' involvement in the continuum of care.

Exclusion criteria: Studies not discussing any aspect of study topic as defined in inclusion criteria.

All studies meeting these inclusion criteria were included.

We adapted and used the Child Health Epidemiology Reference Group (CHERG) method of grading evidence to determine validity of the study and grade the quality of evidence. The CHERG method of grading evidence is based on six steps: (1). defining the scope of the review; (2). conducting a search for appropriate evidence; (3). extracting information; (4). assessing and summarizing evidence (grading study design, quality, relevance and consistency); (5). translating evidence into effect estimates; and (6) sharing results.

We however excluded the fifth step, and that made the CHERG framework usable for both quantitative and qualitative studies. Another adaptation was made to the fourth step of the CHERG framework (assessing and summarizing evidence). This fourth step was achieved by using the Grading of Recommendations Assessment Development and Evaluation (GRADE). The GRADE assesses the quality of evidence and the strength of recommendations [17].

Four GRADE categories of criteria for judging quality of study evidence were used in this review. The GRADE categories used were:

1. Study design grade
2. Grading study quality
3. Grading relevance to study objectives
4. Grading for consistency

After assigning an initial grade, each included study was graded up or down on the following aspects: study quality, relevance to study objectives, and consistency within study. Specified rules were used in grading up or down that is for quality the following rules were used: Serious (-1) or very serious (-2) limitation to study quality, Important inconsistency (-1) Imprecise or sparse data (-1), High probability of reporting bias (-1), No limitation to study quality (+1), Consistency (+ 1) Low probability of reporting bias (+ 1), If all plausible confounders were taken into account (+1) If appropriate explanatory analysis especially for qualitative studies (+1).

Study design	Grade of design
Systematic review	5
Randomised controlled trial	4
Survey	3
Literature reviews (non-Systematic)	2
Qualitative Study	1

*Reports were ungraded

Table 1: Hierarchy of Evidence.

The following rules were used to grade relevance to study objectives: only discussed community maternity service providers in resource poor countries (+1), if study included some institutional providers (-1), addresses at least one aspect of review topic directly that is roles, training, challenges or how community maternity service providers contribute to the continuum of care (+1).

Consistence was graded as: if consistent or if inconsistencies are explained (+1), if inconsistencies were observed and not explained (-1).

This grading process resulted in studies falling into the following categories – High to very high quality studies graded as 4 to 5, moderate quality graded as 3 and low to very low quality studies graded as 1 to 2.

Table 2 lists the studies, region where from, grade assigned and the serial number assigned, the number was used to refer to the studies in synthesis and results presentation. Table 2 also serves as the list of all included studies.

Results

The literature search yielded 1004 articles. After removing duplicates, screening for relevance to the review topic, and searching reference lists of relevant articles, the result was 57 articles, presenting data from 43 resource poor countries, Table 2 above, lists the 57 studies and their quality grades. We have used round brackets to indicate references of the reviewed studies.

Of the 57 studies, 23 studies were from the lowest income countries (1,4,7,8,12,14,17,19,20,24-26, 29,30,36, 38-41,43,44,47,55); 21 studies from lower middle income (2,9,11,15,18,21,22,28,31-35,37,42,45,49,50,52,54,56); 7 studies were from upper middle income countries (3,5,10,46,53,55,57); and one study (23) from Tibet (not appearing as a country in the World Bank classification, but a resource poor region under Chinese rule). Six studies (6,13,16,27,48,51) were literature reviews of which one was a seminar report presenting data from SEA countries (48). All the three resource poor regions of the world were represented. Table 3 lists the countries covered and categories in terms of GNI.

a. Who are the providers of community based maternal and newborn health care?

All 57 studies described aspects of who providers of community based MNH care are in resource poor countries. The following categories emerged from the literature in terms of who CBCs are. These include: cadre title, gender, age, recruitment, place of residence, remuneration, education level and training.

Title: CBCs are called by many different titles. These cadres also vary by country and sometimes within country with TBAs appearing in all resource poor regions though more common in SSA. TBA appeared in 26 studies (4,7,8,11,14,16,21,24,25-

High quality studies # 1- 17

#	Study	Worldregion	Author/Year	Grade
1	A large Cross Sectional Community Based Study of Newborn Care practices in Southern Tanzania	SSA	Penfold et al., (2010)	4
2	A study of interface of ASHA with the community and the service providers of Uttar Pradesh 2008-09	SEA	Nandan et al., (2009)	4
3	Bringing two worlds together: Exploring the integration of traditional midwives as doulas in Mexican public hospitals	Latin America	Smid et al., (2010)	4
4	Changes in Expanded Program for Immunization coverage for mother and child in Krakor, Cambodia 1996 ± 1998	SEA	Main et al., (2001)	4
5	Evaluation of a Village Health Worker Program: The Use of Village Health Worker Retained Records	SSA	Kuhn and Zwarenstein (1990)	5
6	Home birth attendants in low income countries: Who are they and what do they do?	SSA, SEA and Latin America	Garces et al., (2012)	4
7	Impact of a training package for Community Birth Attendants in Madagascar	SSA	Lucey et al., (2010)	4
8	Impact of TBA Training in Mozambique	SSA	Gloyd et al., (2001)	4
9	Improvement of perinatal and newborn care in rural Pakistan through community-based strategies: A cluster-randomized effectiveness trial.	SEA	Zulfiqar et al., (2011)	5
10	Philani plus (+): A mentor mother community health worker home visiting program to improve maternal and infants' outcomes	SSA	Rotheram et al., (2011)	5
11	Relevance to primary health care of village health workers and TBAsin rural areas of Oyo State, Nigeria, International	SSA	Apantaku (2005)	5
12	Responding to the maternal health care challenge: The Ethiopian health extension program	SSA	Koblinsky (2010)	4
13	The TBA in maternal neonatal health and family planning	Multi-region	Verderese and Turnbull (1975)	4
14	TBAs: Practices and problems in Konduga local government area of Borno state; north eastern Nigeria.	SSA	Bello et al., (2009)	4
15	Training of TBAs in India: An examination of biomedical frameworks of knowledge on local birthing practices in India	SEA	Saravanan (2008)	4
16	Transition to SBA: Is there a future role for trained TBAs	Multi-region	Sibley and Sipe (2006)	5
17	We're safe and happy already: TBAs and safe motherhood in a Cambodian rural commune.	SEA	Hoban (2002)	4

Moderate Quality Studies

18	A rapid appraisal of Sahiya (ASHA) in Jharkhand	SEA	Haider et al., (2010)	3
19	Care for perinatal illness in rural Nepal: A descriptive study with cross-sectional and qualitative components	SEA	Mesko et al., (2003)	3
20	Evaluation of a TBA straining program in Bangladesh	SEA	Rowen et al., (2009)	3
21	Home Deliveries in Indonesia Who Provides Assistance	SEA	Thind and Bannarjee (2004)	3
22	Lady health workers program in Pakistan: Challenges, achievements and the way forward	SEA	Hafeez et al., (2011)	3
23	Pregnancy and Village Outreach Tibet: A Descriptive Report of a Community- and Home-Based Maternal-Newborn Outreach Program in Rural Tibet	*SEA*	Dickerson (2009)	3
24	The effectiveness of continuing training TBAs and their reproductive knowledge and performance	SSA	Chen et al., (2009)	3
25	The effectiveness of the TBA program in reducing maternal mortality and morbidity in Malawi	SSA	Bisika (2008)	3
26	The persistence of challenges of home births :perspectives of TBAs in urban Kenya	SSA	Izugbara et al. (2008)	3
27	The TBAs : A reality and a Challenge	Multi-region	Kamal (1998)	3
28	The Village Midwives of the Sudan: An Enquiry into the Availability and Quality of Maternity Care	SEA	Bella and Ebrahim (1984)	3
29	TBAs in rural Gambia: Beyond health to social cohesion.	SSA	Nyanzi (2007)	3
30	TBAs in rural Nepal: knowledge, attitudes and practices about MNH	SEA	Thatte et al., (2009)	3
31	Village based Primary health care in the Central Highlands of Vietnam	SEA	Barrett et al., (2001)	3

Low to Very Low Quality Studies

32	An alternative to un attended delivery - a training program for village Midwives in Papua New Guinea.	SEA	Alto et al., (1991)	1
33	Assessing The Role of TBAs in Health Care Delivery in Edo State, Nigeria	SSA	Imogie et al., (2002)	1
34	Care of new of new born by TBAs in Oguobiri community, Bayelsa state, Nigeria	SSA	Afolayan et al. (2010)	1
35	Challenges for TBAs in northern Honduras	Latin America	Low et al., (2005)	1
36	Characteristics of traditional midwives and their beliefs and practices in rural Bangladesh	SEA	Amin and Khan (1979)	2
37	Community perceptions of trained TBAs	SSA	Ngoma and Himwiila (2009)	1
38	Community-Based delivery of maternal care in conflict-affected areas of eastern Burma: Perspectives from lay maternal health workers	SEA	Teela et al., (2009)	2
39	Community-Based Skilled Birth Attendants in Bangladesh: Attending Deliveries at Home	SEA	Tahera and Jakaria (2009)	2
40	From Home to Hospital, Continuum of Care: making Progress towards Millennium Development Goal 4 and 5 in Rural Bangladesh	SEA	Edwards and Saha (2011)	2

41	Home-based Life-saving Skills in Liberia: Acquisition and retention of Skills and Knowledge.	SSA	Lori et. al., (2010)	2
42	Identifying the training needs of TBAs	SSA	Salako et al., (2007)	2
43	Informal Sector Providers in Bangladesh: How equipped are they to provide rational care?	SEA	Ahmed (2009)	2
44	Informal support to first-parents after childbirth: A qualitative study in low-income suburbs of Dar es salaam, Tanzania.	SSA	Mbekenga (2010)	2
45	International Maternal Mortality Reduction: Outcome of TBA Education and Intervention in Angola	SSA	Schaider et al. (1999)	2
46	Maternity Services and the Role of the TBA, *BidanKampung*, in Rural Malaysia	SEA	Ali and Howden- Chapman (2007)	1
47	Process evaluation of a community-based intervention promoting multiple maternal and neonatal care practices in rural Nepal.	SEA	McPherson et al. (2010)	2
48	Role of TBAs in family planning(Conference Proceedings)	SEA	Peng et al., (1974)	Report not graded
49	Role of TBAs in improving reproductive health: Lessons from the family health	SEA	Islam and Malik (2001)	1
50	The Maya Midwife as Sacred Specialist : A Guatemalan Case	Latin America	Paul and Paul (1975)	1
51	The role of TBAs in the reduction of maternal mortality	Multi-region	Bergstrom and Goodburn (2001)	1
52	Threats to safe motherhood in Honduran Miskito communities: local perceptions of factors that contribute to maternal mortality	Latin America	Arps (2009)	2
53	TBAs in Mexico: Advantages and inadequacies of care for normal deliveries	Latin America	Camey et al. (1996)	2
54	TBA training and local birthing practices in India. Evaluation and Program Planning	SEA	Saravanan et al., (2011)	2
55	TBAs in Bangladeshi villages: Cultural and Sociologic factors	SEA	Rozario (1995)	1
56	Training TBAs in Guatemala	Latin America	Replogle (2007)	Report not graded
57	Village Midwives in Malaysia	SEA	Peng et al., (1972)	2

Table 2: Evidence table showing all included studies and quality grade assigned.

29,34-37,42,45,46,48,49,51,52,54,55). Table 4 presents cadres by region and country. It should be noted that in all the resource poor regions some women deliver unattended either due to cultural practices or other circumstances (16,30).

Gender: In 37 studies gender was discussed and in 32 of those studies (1,2,6,8-13,15,17-19,22,24,25,27,29,34,36-40,44-46,49-51,54,56) CBCs were female,in5 studies (11,35,41,42,48) they were both male and female and in the remaining 20 studies gender was not specified. Therefore, where stated, CBC gender is overwhelmingly female.

Age: In 23 studies CBCs are aged between 18 to 90 years (2,6,7,11,13-15,17,22,24,26,27,29,30,34, 36,38,42,45,46,48,50,57). Four studies referred to CBCs age as elderly (8,25,37,54) and 5 studies described CBCs as young (5-7,9,12).

Recruitment: In 13 studies CBCs were mainly nominated by villagers or community leaders (2,10,11,15,18,24,25,27,31,37,38, 40,48). In some cases the role was undertaken by a relative, friend or neighbour out of necessity, cultural expectation or proximity at the time assistance was needed (1,2,19,21,27,34,37,44,45,54). In 9 studies the role was either inherited or taken by choice (13,17,41,43,45,48,53,54,57). In 4 studies, CBCs were recruited by health professionals (5,32,39,52), while in 3 studies CBCs undertook the role as religious duty (20,30,35).

In the least common scenarios CBCs were reported to have been born with the mandate to be CBCs (50) and this had to be

Low-income economies ($1, 005 or less)	Lower-middle-income economies ($1, 006 to $3, 975)	Upper-middle-income economies ($3, 976 to $12, 275)
Afghanistan Bangladesh Burma Cambodia Democratic Republic of Congo Ethiopia Gambia Kenya Liberia Madagascar Malawi Mozambique Nepal Rwanda Sierra Leone Tanzania Zimbabwe	Angola Egypt Fiji Guatemala Honduras India Indonesia Iraq Lesotho Nigeria Pakistan Papua New Guinea Paraguay Philippines Sudan Syrian Vietnam Yemen, Zambia	Brazil Iran Libya Malaysia Mexico South Africa Thailand

Table 3: Resource poor countries.

Region	Countries	Cadre Title
Latin America	Brazil	Camadrona, Curiosa
	Guatemala	Camadrona, Community Parteras (Female), Mayan traditional midwives, Iyom, Pedrano midwives,
	Honduras	Doulas, TBAs, Midwives (SBAs), Family member Local midwives, Private nurses, Community Parteras (Female), Parteros (male), Parteratitulada (trained TBA)
	Mexico	Family member, Traditional Midwives or parteras Tradicionales (Spanish), Doulas
	Paraguay	Chae
Sub-Saharan Africa	Democratic Republic of Congo	Home birth attendants
	Ethiopia	Health extension workers (HEW),Voluntary Community Workers (VCW)
	Gambia	Community Health Nurses (CHNs), Village Health Workers (VHWs),TBAs
	Kenya	TBAs, Home birth attendants
	Lesotho	BabeleXisi
	Liberia	Traditional Midwives (TMs),Trained Traditional Midwives (TTMs), Community members (male and female), Trained in home based lifesaving skills at home level (Male and female), Empirical Midwife.
	Madagascar	TBAs
	Malawi	TBAs (trained and untrained), Health Surveillance Assistants (HSAs)
	Mauritius	Dai
	Mozambique	TBAs or Mbuya
	Nigeria	TBAs, Relatives, Midwives, Village health workers (VHWs), Certified TBAs, Community health extension workers (CHEWs).
	Rwanda	accoucheuseTraditionelle
	South Africa	Village Health workers (VHWs), Mentor mothers
	Sierra Leone	BundoMamy, Maternal and Child Health Aides (MCH Aides)
	Sudan	TBAs, Village Midwives
	Tanzania	TBAs, Female relative or friend, Neighbours
	Zambia	TBAs (trained and untrained), Relatives, Home birthattendants
	Zimbabwe	Ambuya (grandmother)
South East Asia	Bangladesh	Dai, Village Doctor (VD),Community Health workers (CHW),Traditional healers, Allopathic care providers, Health Assistants, Family Welfare Assistants (FWA),Community Based SBA, Family planning Inspectors (FPI), Village Health Volunteers (VHV),TBAs (trained and un trained), Community based health and family planning field workers, Family Welfare Visitors (FWV)
	Burma	MHW (Maternal Health workers)
	Cambodia	Village health Volunteers, TBAs, YieyMaap (Grandmother Midwives)
	Indonesia	TBAs, DukunBayi, Bidan Kampong DukunBaji, Massage Specialists - Dukunbidat, Doctor, Nurse, Midwife, Female family member, Female friends
	India	ASHA (accredited social health activists) Auxiliary nurse midwives (ANMs), Sahiya (village volunteer), Angwandi worker (AWW), TBAs, mothers in law, female relatives, TBAs, Dai, Home birth attendants
	Malaysia	TBAs, BidanKampungs, Kampong Bidan (Traditional Village Midwives)
	Nepal	TBAs (trained and untrained),mother in law, Chamain
	Pakistan	TBAs, LHWs, Village based family planning workers, Dai, Lady health workers (LHW),Home birth attendants
	Papua NewGuinea	Bidan
	Tibet	Outreach care provider (lay person), Health Care Worker (HCW), Family Community Health volunteers (FCHV), family members, mothers in law, Auxiliary Health workers, Traditional healers, TBAs (Trained and untrained), Chamain (delivery assistant).
	Vietnam	Traditional Midwives (TMs), Village health workers (VHWs)
Other countries	Fiji	AllewaVuku
	French speaking countries	Matrone
	Libya	Djidda
	Egypt	
	Yemen	
	Iraq	
	Syria	

Table 4: Titles of CBCs.

confirmed by Shaman (a person who interacts with the physical and spiritual world) or in some cases the family's socio economic status or caste determined the CBC status and role undertaken (50), meaning that tasks regarded as dirty culturally such as conducting delivery, cleaning or cutting the cord are performed by the poor.

Place of Residence: the place of residence of CBCs was reported in 35 studies as being within the community they serve (2,5,7,9-15,18,19,22-25,27,30,31,33-39,41,42,45,47,52-54,56,57). In studies where place of residence was not reported, it was still implied that CBCs live within their communities.

Remuneration: 28 studies reported CBCs receiving some remuneration (2,3,5,7,11-13,15,17,18,22,23,25-27,29,36,37,40,43,48,50-55,57), 30 studies however reported CBCs either not receiving remuneration or did not discuss remuneration (1,4,6,8,9,10,13-16,19-21,24,27,28,30-34, 38,39,41,42,44-47,49,56). Studies 13, 15, 27 had both remunerated and unremunerated CBCs and in 2 studies CBCs believed God would reward them (32,35).

Of the 28 studies where CBCs were remunerated, 19 studies reported the remuneration to be in kind or as a charge paid by client (7,13,15,17,26,27,29,33,36,37,43,48,50-55,57), while in 7 studies CBCs received a stipend, salary or some incentive from either government or Non-Governmental Organisations (NGOs) (5,11,12,18,22,23,48). Overall more CBCs received some form of remuneration than not.

Education level: in 36 studies the educational level of CBCs were discussed (1,2,3,5-9,12,13,15,17,22,24,25-30,32-34,36,37,40,43-45,46,48-51,53,54,57) while 21 studies did not (4,10,11,14,16,18-21,23,31,35,38,39,41,42,44,47,52,55,56). Thirteen studies reported that CBCs had some formal primary and secondary education (2,3,5,6,9,12,22,24,26,36,37,40,43), while in 20 studies CBCs were illiterate (1,7,8,13,15,17,25,28,30,32,33,45,46,48-51,53,54,57). Fourteen studies reported both literate and illiterate CBCs (3,13,15,17,27,30,32,34,36,46,48,49,51,57), and one study (29) reported CBCs had attended mainly Quranic Schools. Overall there were more illiterate CBCs than literate.

Training: Training of CBCs was discussed in 45 studies (2,5-15,17,19-21,23,24,26-32,35-41,43,45-51,53-57) and 9 studies did not (3,4,18,22,33,34,42,44,52), 8 studies reported both trained and untrained CBCs (14-16,20,21,26,30,55) and in 2 studies CBCs had no biomedical training (1,25).

The length of CBC training ranged from a few days to 18 months in these studies. Nine studies reported CBC training by apprenticeship, learning from other TBA or female relative (13,17,19,43,45,48,53,54,57). In 4 studies, training of CBCs was mainly provided by government (11,13,29,35) and in 7 studies training of CBCs was by Non-Governmental Organisations (NGOs) as part of a programme or project (8,14,23,24,36,41,56). In 2 studies, CBCs learnt skills by divine revelation (46,50), instruction in dreams (50) and by being spiritually trained (46). In 2 studies CBCs had both apprenticeship and formal biomedical training (13,27).

b. Roles and functions of CBCs

Roles and functions identified in the literature can be categorized into the following: MNH roles; community health roles; and religious and socio-cultural roles.

MNH roles: These are presented starting with the commonest role across studies down to least common. The findings from the literature revealed that CBCs mainly attended births (1,3,6,7-9,12-17,19-21,24-29, 31-41,43,45,48,50-53,55-57), giving advice (2,5,7-11,16-18,23,25,26,28,30,32-34,36,42,44,45,48,51, 55,57); provide antenatal care (ANC) and home visits (2,9,13,15,16,18,20,21,26,28-30,33,35,40,41,45,48-50,53-55); provide newborn care (1,2,12,13,16-19,25,28,30,34,38,39,44,45,47, 48,54); postnatal care (PNC) (10,16,18,26,29,33,39,47,48,50,53,54,56); massage in labour and post-delivery (13,15,17,29,30,35,46,48,50,53,54,56); distribution of supplements, family planning (FP) supplies and delivery kits (10,13,21,22,23,37,39,45,47,53,54); data collection, record keeping, compiling reports and transmitting data (2,5,10,11,16,22,31,32,37,40,45); counseling, labour companions and referral escorts (3,13,16,18,38,39,44,46,53,56).

Managing common obstetric emergencies (12,16,38,41,55) and abortion care (21,27,57) are the least common role in this category.

a. Community health roles

Results on this starting with most common and ending with least common were: community mobilization - raising awareness on MNH issues and generating demand for health services in 11 studies (2,8,9,11,18,39,40,42,47-49). Health education on hygiene and sanitation, recognition of complications, community based lifesaving skills (4,9,22,31,39), health promotion (5,9,16,22,25), treatment of minor illnesses (19,43,53) and role model (10,44).

b. Religious and socio-cultural roles

Religious and or socio cultural roles include: mediating in spiritual and natural realms in relation to fertility and childbirth, interpreting birth signs, praying for safe delivery, advising future brides and confirming virginity (13,15,17,29,46,48,50,51); herbalists (15,25,29,46,48,53,57).

Socio cultural roles include health activism on: behavior change on issues such as girl-child education and early marriage (2,28,37,40,47).

c. CBC supervision

Of the 57 studies reviewed, 17 studies reported that CBCs were unsupervised (1,7,13,15,17,25-27,30, 34,35,43,44,50,52,53,56). In 3 studies there were both supervised and unsupervised CBCs (6,48,51) and in 22 studies CBCs were supervised (2-5,8,10-12,18,22,23,29,31,32,38-41,45,47,55,57), in 10 of these studies supervision was from health professionals (5,10,11,18,22,23,29,32,41,55). Fifteen studies (9,14,16,19-21,24,28,33,36,37,42,46,49,54) did not discuss supervision of CBCs.

Supervised CBCs tended to be literate (2,3,5,6,9,12,22,24,26,36,37,40,43), trained by Ministry of Health (MoH) or NGOs (8,11,13,14,23,24,29,35,36,41,56), receiving some form of remuneration and part of a health system (5,7,11-13,15,17,18,22,23,26,27,29,33,36-39,43,48,50-55,57).

The CBCs who were illiterate (1,7,8,13,15,17,25,28,30,32,33,45,46,48,49,50,51,53,54,57) untrained (1,25), acquired role by apprenticeship (13,17,19,43,45,48,53,54,57) or having a spiritual

role (46, 50) tended to practice unsupervised.

d. CBCs complementing the SBA strategy

Forty two studies discussed aspects of CBCs' contribution to continuum of care as bridging the gap between community and facilities, assisting births in the community and referring complicated cases (1-11,15-18,20-22,24-29,31-33,36-42,45,47-51,54,56,57).

In 4 studies CBCs facilitated entry into the health system (9,15,22,51) and 3 studies demonstrated that CBCs can be trained in recognition of early signs of life threatening complications in MNH (16,40,41), 2 studies reported engaging CBCs for EmOC as useful in reducing child birth related mortality (38,41).

In 4 studies CBCs were ritual specialists (17,46,51,56) and in 3 studies CBCs were integrated into the formal health system introducing a cultural component which complements the current focus on SBA (3,10,11). Advantages of engaging trained CBCs are that it increases referral (38,43) and improves perinatal outcomes (16). Disadvantages of engaging CBCs focused on their harmful practices in 3 studies (34,51,53).

e. Barriers and Enablers to CBCs' involvement in continuum of care

Forty seven studies discussed challenges or barriers and/or enablers for CBCs (1-11,13,15,17-23,25-32,35-42,44-53,55,57).

Barriers: The following barriers were identified starting with the most recurring and ending with the least common: poverty (8,15,17,25,26,29-31,34,36,37,44,52,53), poor skills (1,6,17,19,30,36,40,42,44,45,47-49,53), lack of education (3,6-8,13,15,17,25,27-30,32,34,36,45,46,48-51,53,54,57), lack of formal training (1,6,13-17,19-21,24-27,30,43,45,48,50,53-55,57), inadequate equipment and supplies (7,25,27,34,42,48,53), challenging geographical terrain or security (3,13,17,35,46,51,52), no supervision with poor referral systems (2,15,31,34,35), restrictive religious practices (21,46,48), lack of clarity on role and competing tasks (9,18), gender issues affecting CBCs' practice (50,52) and lack of incentives (2).

Enablers: The following enablers were identified starting with the most recurring and ending with the least common: being part of the health system or being accepted by health care professionals (2,3,5,10,18,22,29,41), support and supervision by health professionals (10,22,25), availability of supplies such as birth kits (31,38,45), locally made birth kits or birth kits that are modified to suit the local cultural context (32,57), working in both or rotating between facility work and community work (11,41), CBC appreciation by the community and the use of pictorial aids in illiterate communities (40,49), training and skills (39,45), and access to a functional referral system (20,29).

Discussion

This review reiterates the variety of CBCs by country, cadre, demographics, roles education, training and contribution to the continuum of care. The CBCs are an important social cultural support for women, and are well positioned with unlimited access to households, free interaction with local women and possessing social capital useful in mobilising communities. CBCs can generate demand for health care and link communities to formal health care. However in order to contribute meaningfully to the continuum, CBCs must be recognized and respected as equal partners in strategies and not peripheral subservient extras [18].

Who are the existing CBCs providing MNH?

This literature review reveals that until recently the CBCs most highlighted in peer reviewed literature and discussion is the 'Traditional Birth Attendant' (TBA) [19]. According to the World Health Organisation (WHO), TBAs are community based providers of care who assist the mother during childbirth and who are usually women from the community who have acquired skills by delivering babies themselves, herself or by working alongside other older TBAs [20]. TBAs are found in most communities of the world although their nature, role and function do in practice vary. They are often older women and are generally illiterate [21,22].

From the 1970s and up until the safe motherhood conference in Nairobi in 1987, training of TBAs was the main programmatic intervention attempted as a way to reduce maternal deaths. Attempts to evaluate the effectiveness of TBA training have yielded inconclusive results. A meta-analysis of TBA training, found that TBA training resulted in significant increases in TBAs' knowledge, behaviour, ability to advise women, referral of women and uptake of antenatal care [23,24]. There was however no significant impact on maternal mortality reduction [24]. This failure was linked to failure to develop skills and competence, lack of regular supervision, poor referral systems and problems with integration such as unwillingness of health professionals to accept TBAs as partners within the existing health care system [25,26].

Although it has taken sometime to accept that TBA training is not a strategy that will significantly reduce maternal mortality, the debate surrounding the role of TBA has however rumbled on. Since 1999, the core international Safe Motherhood strategy has been to work towards ensuring that at least 90% of all births are attended by a skilled health care worker by 2015. TBA training continues to be debated but is practiced only in very few settings. The debate around TBA training has emerged again, recently following the publication of six Randomised Controlled Trials (RCTs) after the first meta-analysis on the effectiveness of TBA training [26-31] these trials found a reduction in perinatal mortality of up to 30%. Proponents of care by a TBA argue that strategies incorporating TBAs are therefore effective, and may constitute a practical and complementary solution for many women in developing countries, particularly in rural areas where professionally trained skilled birth attendants are still scarce [32-34]. It is however recognized that even though many women may prefer TBAs and TBAs can provide emotional and social support to the mother they are not an acceptable substitute for skilled attendance at birth [33].

What roles and functions can CBCs' perform to complement the SBA strategy?

Findings of the literature revealed that CBCs are a heterogeneous group and have current and emerging roles as well as practical experiences which are likely to vary in different socio cultural environments. All CBCs who carry out one or more functions related to health care delivery will need to be educated and supported specifically for the interventions they are expected to perform. This study revealed that CBCs' who are classed as

community health workers typically have roles and functions that include: carrying out home visits, environmental sanitation, treating minor ailments, health education, nutrition and surveillance, maternal, child health and family planning activities referral, community development activities, record keeping and collection of data on vital events [34-38].

There is emerging evidence to suggest that community based carers with a re-defined role may be able to contribute to the survival and wellbeing of mothers and their newborn infants. Thus there are positive examples of countries in Asia and Africa where CBCs can help improve access to health care resulting in an increased uptake of antenatal and skilled delivery care [27,32,39].

Similarly the active involvement of TBAs in Burundi and Malaysia to promote SBA led to increased facility deliveries and improved outcomes [40]. Another example of working with community based carers to improve uptake of skilled care is the example of provision of financial incentives to TBAs in Malawi to bring women to health facilities for delivery. This intervention resulted in increased utilisation of SBA by women. However, as this was done under a donor funded project the sustainability could not be maintained [41]. The effectiveness of trained community health workers for reducing neonatal mortality has been documented in India, Tanzania and Nepal [42-45]. To promote facility based SBA, the government of India as part of its National Rural Health Mission programme introduced the Female Health Volunteer scheme in each village. These volunteers are referred to as Accredited Social Health Activists (ASHA) and work within a defined catchment area counseling women on birth preparedness, immunization and contraceptives. They also create awareness on existing health services and their utilization, mobilising and assisting women to access the services during antenatal, birth and postnatal periods. The ASHA programme together with the JananiSurakshaYojana (a maternity benefit scheme) helped to increase the proportion of births attended by SBAs from 39% in the 1990s to 50% in 2009 [46].

Using a pre-post comparison study, 50 safe motherhood promoters (SMP) were identified and trained in 4 villages in Mtwara district of Tanzania. The safe motherhood promoters were to promote early and complete antenatal care visits and delivery with a skilled attendant at a facility to women and men in the study setting. Findings of the study showed that early ANC booking (4 to 16 weeks) rose significantly from 18.7% at baseline to 37.7% in 2005 and 56.9% ($\rho<0.001$) at final assessment. There was also a significant increase in deliveries assisted by SBA from 34.1% to 51.4% ($\rho<0.05$). It was reported that two years after the study, 44 (88%) of the SMPs were still active [47].

There is clear evidence of improved birth outcomes when there is a (female) companion present during childbirth, who provides moral support and comfort [48,49]. It is possible that this is also one of the key roles of a CBC with regard to supporting birth. In a study conducted in Brazil, 212 primiparous women were enrolled in a randomized trial from 2004 to 2005. One hundred and five women (105) were allocated to the intervention group (support during labour) and 107 to the control group. Overall, the women in the intervention group were more satisfied with their labour experience (median 88.0 versus 76.0, $p<0.0001$) and delivery (median 91.4 versus 77.1, $p<0.0001$). The integration of TBAs as labour companion was explored in Mexico. Using qualitative approaches, TBAs and health workers from the Mexican health system were interviewed about the acceptability and challenges of involving TBAs as labour companions. Both TBAs and health personnel perceived this new role of TBAs as having benefits for the women and the health system. It was however suggested that to enhance the relationship between the TBAs and health personnel, interactive training for the two groups should be conducted [50].

Integration of CBCs into the health system for roles such as labour companions brings a culturally sensitive component to the formal health system and encourages women to use available services [51]. This approach needs further exploration as it can potentially increase facility deliveries in cases where the formal health care system is functional and thus reduce pregnancy and child birth related mortality and morbidity.

Following the recent consensus towards providing MNCH as a continuum of care there has been a call towards reviewing and redefining the roles of the TBAs and other CBCs with the aim of increasing their integration within the formal health system in order to complement the SBA strategy and to contribute to the community level of the continuum of care model for MNCH [38]. We recommend this requires urgent attention to inform the emerging strategies countries are in process of adapting with regard to the role of all existing CBCs in each setting.

The specific factors relating to access and provision of MNH also form part of a wider debate that is re-emerging and was given particular impetus in 2008 in recognition of the 30th anniversary of the Alma Ata declaration for universal primary health care (PHC). Pertinent to this are debates surrounding community participation and ownership [52], the role of formal and informal community level health care workers which is re-merging in a number of other areas of health care in developing country settings [53-55], and the ways in which poverty, gender roles and relations intertwine to shape women (and men's) ability to access formal care [56-59].

Appropriate enabling environment to support CBCs and implications for policy and practice

The importance of ensuring CBCs are carefully chosen, trained and supported has been highlighted by a number of authors.

Selection of CBCs: CBCs should be me*m*bers of the community they serve. This means that they live and work in the same community. The selection of CBCs should be by community members. Where Ministries of Health and other Organisations within the health system have selected CBCs this has not worked well. For example, CBCs were selected by health personnel rather than the community in Botswana, Colombia and Sri Lanka [60]. This approach was said to have a negative effect on the retention of CBCs and utilisation of services by the community [60]. It is important that community members select CBCs using participatory approach [52]. This enhances accountability and commitment on the part of the CBCs and enhances community participation and utilisation of health services [52].

Training: One of the factors linked to ineffectiveness of TBAs in reducing maternal mortality has been the training TBAs have received. There was no standardised training for TBAs, neither was there an agreed curriculum. The content and duration of TBA training varied by country and within countries [23,24]. In Niger,

for example, village health workers were trained for 10 days and offered an annual 10-day refresher course. Village health workers in Tanzania, were trained for three to six months and training of village health workers in Nigeria, was for three months, with refresher courses conducted twice a year subsequently. Trainings were mostly driven by NGOs and were conducted by health staff from the Ministry of Health, health facilities and the NGOs [61].

Whatever the tasks that will be allocated to CBCs and irrespective of the type of carer, it is important that CBCs are equipped with the basic skills and knowledge needed to perform their role and to function effectively within the community. A well-developed competency-based curriculum matching the expected roles and responsibilities will be paramount. This should also reflect the specific local setting, the functions expected of the CBCs and their level of education. Without appropriate knowledge, skills and practice in the environment in which the CBC will work, it will not be possible for CBCs to provide good quality maternal and newborn care in the community [61].

Supportive supervision: Supportive supervision has been identified as one of the critical factors needed for the success of any community based programme [23,24,27,36,61,62]. It is however acknowledged that supportive supervision is often weakest for health care workers who are community based [61].

CBCs work in remote, rural areas and serve marginalised communities. CBCs have all the critical factors which should make supportive supervision crucial to their effectiveness. These factors are: 1) most of the time CBCs work alone in a community; 2) they have no or poor linkages to formal health services; and 3) they have been trained for a very short period only [59,60]. There are instances in the literature describing CBCs who do not know their supervisors or are supervised by other health care providers such as doctors, nurses and midwives who have the technical skills but lack any training in supportive supervision and/or understanding of the community setting and needs.

To enhance the role of CBCs, supportive supervision should be regular as well as "truly supportive". There should be agreement among all stakeholders on who the supportive supervisors should be and what their tasks and expectations are. This should be supported with adequate training of supportive supervisors and adequate provision of resources needed to undertake supervisory functions. Effective supervision for CBCs will help to; reduce the sense of isolation that CBCs may experience in the field, sustain their interest and motivation, and could significantly enhance the quality of maternal and newborn care provided to the community [61-63].

Provision of needed supplies and equipment: Alongside the provision of effective supportive supervision is the provision of supplies and other logistics needed by CBCs to provide quality MNH care. This should include the provision of transport for effective referral, drug supplies and basic equipment [61-63].

From the studies we reviewed, CBCs face more challenges than enablers to effectively contribute to the continuum of care. These challenges can be addressed, thus turning them into enablers which in turn will save lives. The following are some of the ways these challenges can be addressed.

- Remuneration to alleviate CBCs poverty and if this is formalised it connects CBCs and their clients to the formal system [64,65].
- Training equips CBCs for safe practice [65]. Illiteracy as a barrier to training can be overcome by the use of pictorial aids [15,66]. Training also brings CBCs in contact with health professionals familiarizing and building rapport and trust between the two parties [67].
- Clear government policy and regulation of cadre training and practice ensures adequately trained, safe and accountable CBCs, this also ensures clients safety while protecting CBC from unjustified litigation [64].
- Recognition and respect of CBCs' socio-cultural role/ expertise in pregnancy and child birth [18,26,68,69].
- Supervision and support from formal health care system ensures safe care and timely referrals [66,67,69]. When left unsupervised, CBCs tend to slide back into their old and sometimes harmful practices [70].
- Access to a functional referral system and EmOC is crucial in connecting the community to health care and avoiding delayed access to life saving interventions [10,22].
- Integrating CBCs into the health care system can improve quality of care in the public health system and access to SBAs [51].

Study limitation: The search was conducted in English, though no language limits were placed, language may still have excluded studies from non-English speakers.

Conclusion

This literature review has described the roles and functions of people currently considered to be CBCs. We note that there is a wide variety of such carers with often a lack of clarity regarding their roles and responsibilities especially with regard to MNH. This needs further exploration as it will be important to know how such CBCs can be supported and harnessed to improve MNH outcomes including an increased uptake of SBA in resource poor countries.

This will need to be done with a clear understanding of the importance of promoting and supporting the global strategy of SBA. The potential role of CBCs and the possible linkages of these with the formal health care system, how this might work in the different contexts in developing countries needs to be carefully examined. Sociological and public health perspectives must be taken into account to explore socio-cultural acceptability, community participation and empowerment of women in the community as well as defining and strengthening the role of the CBCs themselves.

It is important to state that for many women care by a CBC may still be the only care available during pregnancy and childbirth. The appropriateness of CBCs to specific socio-cultural contexts, the likelihood of trust and acceptance by women and their families, and their ability to be right at the heart of a community even in isolated rural areas means these carers continue to play a significant role especially for poor, rural and marginalised women in resource poor countries. This role needs urgent further conceptual and empirical exploration as CBCs should not be seen as the panacea for the poor maternal health

indicators for developing countries nor a cheap option to provide access to health care for underserved populations.

Research that critically examines the current and emerging roles of CBCs and explores ways in which CBCs can complement the current focus on SBA for MNH is needed now more than ever.

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