Community health workers – a resource for identification and referral of sick newborns in rural Uganda

Christine Kayemba Nalwadda[1,2], David Guwatudde[1], Peter Waiswa[1,3,2], Juliet Kiguli[1], Gertrude Namazzi[1,3], Sarah Namutumba[3], Göran Tomson[2,4] and Stefan Peterson[2,5]

1 School of Public Health, Makerere University, Kampala, Uganda
2 Division of Global Health, Karolinska Institutet, Stockholm, Sweden
3 Uganda Newborn Survival Study, Iganga- Mayuge Demographic Surveillance Site, Kampala, Uganda
4 Medical Management Center (MMC) Karolinska Institutet, Stockholm, Sweden
5 International Maternal and Child Health Unit, Uppsala University, Uppsala, Sweden

Abstract

OBJECTIVE   To determine community health workers' (CHWs) competence in identifying and referring sick newborns in Uganda.

METHODS   Case-vignettes, observations of role-plays and interviews were employed to collect data using checklists and semistructured questionnaires, from 57 trained CHWs participating in a community health facility–linked cluster randomised trial. Competence to identify and refer sick newborns was measured by knowledge of newborn danger signs, skills to identify sick newborns and effective communication to mothers. Proportions and median scores were computed for each attribute with a pre-defined pass mark of 100% for knowledge and 90% for skill and communication.

RESULTS   For knowledge, 68% of the CHWs attained the pass mark. The median percentage score was 100 (IQR 94 100). 74% mentioned the required five newborn danger signs unprompted. 'Red umbilicus/cord with pus' was mentioned by all CHWs (100%), but none mentioned chest in-drawing and grunting as newborn danger signs. 63% attained the pass mark for both skill and communication. The median percentage scores were 91 (IQR 82 100) for skills and 94 (IQR 89, 94) for effective communication. 98% correctly identified the four case-vignettes as sick or not sick newborn. 'Preterm birth' was the least identified danger sign from the case-vignettes, by 51% of the CHWs.

CONCLUSION   CHWs trained for a short period but effectively supervised are competent in identifying and referring sick newborns in a poor resource setting.

keywords community health workers, knowledge, communication, skill, newborn, danger signs, referral, Uganda

Introduction

Four in ten of child deaths worldwide are newborns, and in Africa, the newborn mortality rate (NMR) is 35.9 deaths per 1000 live births (Oestergaard et al. 2011). In Uganda, 38 000 newborn deaths occur each year (Mbonye et al. 2012) and the NMR is 27 per 1000 live births (UBOS 2011). Globally, complications from preterm births are the leading cause of newborn deaths (29%), followed by asphyxia (23%) and infections due to sepsis and pneumonia (25%) (Black et al. 2010).

Evidence-based newborn care interventions at home can prevent 30–60% of newborn deaths in high mortality settings under controlled conditions (WHO 2009). Among the interventions is home visit by community health workers (CHWs) to pregnant mothers, and immediately after birth to assess newborns' health and treat,

or refer sick ones. This intervention reduced neonatal mortality by 34–62% in Bangladesh and India (Bang et al. 1999; Baqui et al. 2008). However, experts are uncertain whether the success demonstrated in improvement of newborn outcomes in Asia can be replicated elsewhere due to social–cultural and contextual variations (Lawn et al. 2009).

A previous study in rural eastern Uganda showed that half of newborn deaths were due to delays in recognising problems or making the decision to seek care, and about 30% were due to delays in receiving quality care at healthcare facilities (Waiswa et al. 2010a). After these findings, a community health facility–linked intervention in the Uganda Newborn Survival Study (UNEST) (Waiswa et al. 2012) was implemented with the aim to improve newborn outcomes. The current study was conducted to evaluate whether the trained CHWs have

adequate knowledge and skills to identify newborns with possible danger signs, and whether they can effectively communicate to mothers to immediately seek care for their sick newborns from health facilities.

Materials and methods

Study setting

This study was conducted in November 2011, in the Iganga–Mayuge Health Demographic Surveillance Site (HDSS), located in two eastern Uganda districts of Iganga and Mayuge, approximately 120 kilometres east of Kampala, the capital city of Uganda. The HDSS covers a population of 74 894 people and is mainly rural. 10 863 are children under 5 years and 17 782 are women of reproductive age. The people predominantly practise subsistence farming among other occupations like business, market vendor and professional jobs (HDSS 2011). There are five health facilities that provide maternity services, and 68% of deliveries occur at health facilities, of which 71% are attended by skilled health workers (UBOS 2011). The NMR is estimated at 30 deaths per 1000 live births (HDSS 2011).

Background on UNEST study

Sixty-one literate CHWs were selected and trained for 5 days between June and July 2009 (Waiswa *et al.* 2012). The CHWs were trained in groups of 20 together with their supervisors (health workers), to enable them understand the CHWs' training scope and also get acquainted with CHWs. The methods of training included: role-plays using job aids, questions and answers, group discussions followed by plenary presentations, demonstrations and feedback sessions by facilitators. The CHWs' roles during pregnancy and after delivery were emphasised, including health education, screening for danger signs (Table 1) and counselling for referral. Other topics covered are shown in Panel 1. At the commissioning ceremony, CHWs were presented with a certificate of attendance, job aids, a bag and a T-shirt-labelled UNEST for identification in their respective villages.

The CHWs were supervised during monthly meetings with their supervisors, by directly observed supervision (DOS) and quarterly meetings, all characterised by reinforcing knowledge and skills (Panel 1).

Study population

All 61 CHWs under the UNEST study were eligible for this study. Four were excluded after they were randomly

Table 1 List of newborn danger signs, communication and referral form attributes

New born danger signs*	Rapid breathing in a calm child
	Severe chest in-drawing
	Grunting
	Convulsion/seizures
	Lack of body movement when stimulated
	Baby feels hot or cold
	Red umbilicus or cord with pus
	More than 10 skin pustule
	Not breast feeding or drinking
	Yellow soles or palms
	†Small baby born < 37 weeks of gestation (preterm baby)
Required communication attributes	Greeting the mother
	Introduction to mother
	Clear explanation of purpose of the visit
	Request to examine the newborn
	Examination of the newborn
	Informing the mother that the newborn needs to be referred to the health facility
	Clear explanation for the referral
	Mentioning clearly place to go to for referral care
	Mentioning clearly when to go for referral care
	Clearly explain to the mother that they need to keep the newborn warm and continue breastfeeding while being taken for referral care.
Pre-designed referral attributes on referral form that were completed	Date of referral
	Name of the newborn
	Name of referring CHW
	Reason for referral
	Village
	Parish
	Subcounty
	Age of newborn
	Name of referring community health worker

*Adapted from continuum of care (WHO 2006).
†Community health workers did not weigh the newborns during home visits but checked on the immunisation cards or discharge forms for those who were delivered in health facilities.

selected and used in pre-testing the study tools. Hence, 57 CHWs participated in the evaluation, which was conducted 25 months after the initial training.

Measurements

CHWs' competence to identify and refer sick newborns was determined using tools adapted from training

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Panel 1: Uganda Newborn Survival Study (UNEST) and CHW training package

Description of Uganda Newborn Survival Study IS-RCTN50321130

Objective

To test an integrated maternal–newborn care package that links community and facility care and evaluate its effect on maternal and neonatal outcomes in Iganga and Mayuge districts (Waiswa 2010).

Study design

A cluster randomised trial in 32 control and 31 intervention villages, located in a demographic surveillance site with about 74 894 people in eastern Uganda.
  Intervention package:
- Trained health workers and provided supplies and equipment to strengthen maternal and newborn care services in health facilities
- Trained 61 CHWs to link communities and health facilities by:

  1) CHWs making two home visits to pregnant mothers and three visits during the first week after birth
  2) CHWs referring mothers and newborns found with danger signs and those born outside facilities for immunisation and post-natal care.

CHW supervision

The CHWs were supervised in three ways: i) monthly meetings with their supervisors at the health facility, ii) directly observed supervision (DOS) for the first 6 months of the intervention, where the supervisor used a standard checklist to observe how a CHW conducted antenatal and postnatal home visits uninterrupted. Thereafter, the supervisor corrected mistakes and reinforced the knowledge and skills of the CHW, and iii) quarterly meetings comprising of health workers, CHWs, DHT and UNEST members, and integrated with refresher trainings.
  Content of the training provided to CHWs regarding newborn care included
- Birth preparedness
- Cord care
- Thermal care
- Breastfeeding and initiation
- Kangaroo mother care
- Newborn danger signs
- Newborn referral
- Community mobilisation skills

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materials used in UNEST study. Competence was defined as having sufficient knowledge and ability to recognise sick newborns at a pre-defined pass mark, similar to a study that evaluated health workers' competence in maternal and newborn care in Pakistan (Ariff *et al.* 2010). We evaluated 3 attributes of the CHWs' competence: (a) knowledge about newborn danger signs, (b) ability to recognise newborn danger signs and (c) ability to effectively talk to mothers about newborn danger signs and counsel them to seek care from health facilities.

A structured questionnaire was used to evaluate CHWs' level of knowledge about newborn danger signs by asking CHWs to name 5 newborn danger signs they knew (unprompted), and to indicate whether a named sign was a newborn danger sign or not by answering true or false (prompted). There were a total of 11 danger signs for the prompted questions (Table 1), as outlined in Uganda's National Newborn Standards (MOH 2010) and the newborn continuum of care (WHO 2006; Kerber *et al.* 2007). One score was awarded for each correct danger sign mentioned. CHWs' knowledge was adequate if they mentioned five newborn danger signs (unprompted), and if they correctly recognised all the 11 danger signs read to them (prompted). Thus, the knowledge component was allocated a minimum score of zero and a maximum of 16 points.

The structured questionnaire was also used to collect the CHWs' background characteristics including age, sex, marital status, education status, ethnicity, occupation, number of newborns referred in the last 25 months prior

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Panel 2: Case-vignettes used in the assessment of skills of CHWs to identify newborn danger signs

Case-vignette 1: During your work as CHW, you visit a home with a 3-day-old baby boy. The mother seems worried because the baby has been persistently crying and has <u>failed to suckle</u> in the last 24 h. When you check on the baby you find that the cord is still attached but with a <u>smelly fluid oozing</u> out and parts of the baby's body are covered with <u>pustules.</u>

Case-vignette 2: A father of a newborn in your work area comes and reports to you that his 3-week-old baby is not well. You quickly go to check on the baby and you are told that the baby cries a lot but keeps quiet after suckling. The mother complains that the baby wants to suckle all the time and feeds over 10 times in a day. The mother is very worried and concerned about the condition of the baby (**no danger signs in this scenario, baby is not sick**).

Case-vignette 3: As part of your responsibilities you go out to visit one of the families with a newborn. You are told that the baby is well apart from <u>feeling very hot</u> and also pushing its head backwards. When you ask to be shown the baby you find that the <u>baby's neck and limbs are difficult to move</u> but keeps jerking. The baby also looks <u>very pale</u> and is <u>small, weighing about two kilograms.</u>

Case-vignette 4: You receive the news that one of the mothers in your work area delivered in the previous night. You prepare and go to visit the family of the newborn. You request to see the baby. When you hold it and look at the baby' eyes, they are closed. The baby has <u>no power in all the limbs,</u> has <u>difficulty in breathing</u> and <u>feels cold.</u> However, the mother says that she had no problem during delivery and the baby is well.

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*Note: only the underlined symptoms and signs were considered as danger signs in this study

to the study, period of working as CHW for UNEST study and past experience of working as CHWs prior to participating in UNEST.

To assess CHWs' ability to identify newborn danger signs, four case-vignettes were used. Case-vignettes have been used to evaluate skills of primary health workers in case management of serious illness among young infants (Gouws *et al.* 2005). Our case-vignettes were developed using sick newborn clinical notes from Iganga district hospital by the study investigators together with a consultant paediatrician who is a team member of UNEST. They were reviewed by another paediatrician independently of this study. Consensus was reached that three case-vignettes depicted sick newborns and one depicted a healthy newborn. The four case-vignettes used in this study are described in Panel 2. A total of 11 newborn danger signs were embedded in the four case-vignettes.

The case-vignettes were translated into Lusoga, the local language most commonly used in the study area, by a language specialist based at the HDSS. Trained interviewers (a public health specialist and three nursing officers) read out each case-vignette to a CHW at least three times and complemented it with pictures showing newborn-specific danger signs to ensure that the CHW understood the newborn in description.

For evaluation, a CHW was asked to point out whether the newborn in the given case-vignette had any danger sign or not, specify the danger sign(s), if any, in each of the 4 case-vignettes and actions they would take in each scenario. Each correct answer was awarded one

point and none for an incorrect one. The minimum score for the four case-vignettes was zero, and the maximum was 11 points.

The CHWs' effectiveness in communicating to mothers to seek health care for their sick newborns was evaluated using role-plays. Role-plays have been used in assessing communication skills among nurses working in an intensive care unit in New York (Krimshtein *et al.* 2011). Two aspects of effective communication by CHWs were assessed using tools adapted from UNEST supervision checklists: observing the CHW's communication skills to the mother in the role-play, and the quality of the completed pre-designed referral form. A consenting mother with a healthy newborn was identified from the study community and coached to participate in the role-play as if the newborn had fever and the baby's cord was smelly with pus. Each CHW was instructed to assume that the description of the condition of the newborn by the mother was correct. Using a pre-designed checklist, the interviewers critically observed and took note of every CHW's action as he or she communicated with the mother. Ten communication aspects (Table 1) were assessed. Each of these aspects was scored one point if done and none if not done. Every CHW was expected to perform all the 10 communication attributes. Regarding referral, the CHW was expected to request for a referral form, and complete it with all the eight necessary details as listed in Table 1. The pre-designed referral form was provided by the observer on request by the CHW in case (s) he found it necessary to use it after interacting with

mother. Each item filled correctly was scored one point and none if left blank. Thus, the communication component was allocated a minimum score of zero and a maximum score of 18 points.

Statistical analysis

Data were entered in Epi-Data software and exported to STATA version 10 for analysis. Regarding knowledge and ability to identify newborn danger signs from the case-vignettes, proportions were calculated and reported for the attributes scored as outlined above. The range and median scores attained by the CHWs were also computed.

For effective communication of CHWs, we calculated the proportion of CHWs who were able to display the required communication attributes as listed in Table 1, during the role-plays, and the proportion of CHWs who correctly completed the referral form with all the eight attributes listed in Table 1.

For each component, we computed a total score for every participant and the proportion of CHWs who attained the pass mark. Because there are no national references, for each component an arbitrary pre-defined pass mark was set. For knowledge, it was 100%, because this was considered to be a relatively easy task of mentioning only five newborn danger signs of the eleven. For skill and communication, it was set at 90% because same attributes were regularly assessed during supervision.

Because of the small number of CHWs involved in this study, the summary measures used were medians and interquartile range (IQR), and statistical comparisons between groups were made using non-parametric test like the Wilcoxon rank-sum (Mann–Whitney) test.

Ethical issues

The CHWs and the mothers participating in the role-plays were informed about the study, and written informed consent was obtained before recruitment. The study was approved by the Makerere University School of Public Health's Institutional Review Board and the Uganda National Council of Science and Technology.

Results

Characteristics of community health workers

A total of 57 CHWs were assessed, of which 40 (70%) were females. The mean age was 38 years (SD 7.6). Forty-nine (86%) had completed over 7 years of formal education. Thirty-nine (68%) had worked as community resource persons prior to joining UNEST mainly as members of their respective village committees (24/57, 42%). Over a period of 25 months, CHW referred between 0 and 60 newborns. Other CHWs' characteristics are summarised in Table 2.

Knowledge of newborn danger signs

The minimum knowledge score attained by the CHWs was 14 of the expected maximum of 16 (88%), with a median of 16 (100%). Forty-two of the 57 CHWs (74%) mentioned all five newborn danger signs unprompted. The most commonly mentioned newborn danger signs were red umbilicus/cord with pus (100%), newborn feeling hot or cold (83%), failure to breastfeed (77%) and convulsions (63%). None of the CHWs mentioned chest in-drawing and grunting as newborn danger signs (Table 3). Almost all of the CHWs (56, 98%) correctly identified all the prompted newborn danger signs. 68% attained the pass mark for knowledge and the median score was 100% (IQR 94%–100%). Overall, there was no significant difference in the median score: by sex, district of work, level of education and age of CHWs.

Table 2 Background characteristics of the community health workers

Characteristics	Categories	N = 57 n (%)
District of operation	Iganga	44 (77.2)
	Mayuge	13 (22.8)
Location	Urban	17 (29.8)
	Rural	40 (70.2)
Gender	Male	17 (29.8)
	Female	40 (70.2)
Marital status	Never married	2 (3.5)
	Married	49 (86.0)
	Widowed	3 (5.3)
	Divorced/separated	3 (5.3)
Education	Primary	8 (14.0)
	Post-primary (s1–s6) and above	49 (86.0)
Ethnicity	Musoga	50 (87.7)
	Others	7 (12.3)
Occupation	Peasant farmer	39 (69.6)
	Business person	8 (14.3)
	Civil servant	5 (8.9)
	Others	4 (7.2)
Worked as community resource person prior to UNEST	Yes	39 (68.4)
	No	18 (31.6)

Table 3 Newborn danger signs mentioned by community health workers (unprompted)

Newborn danger sign	Frequency (%)
Red umbilicus/cord with pus	57 (100)
Newborn feeling hot or cold	47 (83)
Failure to breastfeed	44 (77)
Convulsions	36 (63)
Rapid breathing	28 (49)
Lack of body movement when stimulated	23 (40)
Preterm birth	15 (26)
Yellowing of the soles/palm	10 (18)
More than 10 skin pustule	9 (16)
Chest in-drawing	0 (0)
Grunting	0 (0)

Ability to identify newborn danger signs

The minimum score on ability to identify newborn danger signs attained by the CHWs was 7 of the expected maximum of 11 (74%), with a median of 10 (91%) and an IQR of 82%–100%. 98% correctly identified all four newborn case-vignettes as either sick or not sick. 'Preterm birth' was the least identified danger sign from the case-vignettes by only 51% (Tables 4). All CHWs correctly described the appropriate action to be taken for the sick newborn case-vignettes and 89% for the healthy newborn. 63% of the CHWs scored the pass mark of 90%. The median scores by the CHWs differed significantly between district of work (Iganga = 91%, Mayuge = 82%, $P < 0.001$).

Effective communication by CHWs to mothers of the newborns

The minimum score attained on communication by the CHWs was 14 of the expected maximum of 18 (78%), with a median of 17 (94%). Overall, 63% scored the pass mark of 90%. However, only 25% demonstrated all the required 10 communication attributes during the role-plays. The best performed attribute of communication was that of referring the baby after discovering that the baby had a danger sign, demonstrated by all CHWs. The poorest demonstrated attribute was that of clearly explaining to the mothers that they needed to keep the newborn warm and continue breastfeeding while being taken for referral care, which was demonstrated by only 17 CHWs (30%) (Table 5).

96% completed all the referral form variables correctly, and 63% scored the pass mark of 90%. The median score was 94% (IQR 89%–94%). The median scores of the CHW differed significantly by district of work (Iganga = 94%, Mayuge = 83%, $P < 0.001$).

Discussion

In this study, the CHWs demonstrated a high level of competence on knowledge of newborn danger signs, ability to identify sick newborns with danger signs, and effectively communicating to mothers the need to immediately seek care for their sick newborns from health facilities.

We found that trained CHWs are able to retain adequate knowledge on newborn danger signs, because

Table 4 Community health workers who correctly identified case-vignettes and newborn danger signs

Newborn Danger sign	CHW correctly identifying case as sick or not n (%)	CHW correctly identifying specific danger sign in case-vignette n (%)	CHW recommending correct action for the newborn
Case-vignette 1 - sick	57 (100)	–	57 (100%)
Failure to suckle	–	42 (74)	–
Smelly fluid oozing out of cord	–	57 (100)	–
Skin pustules	–	54 (95)	–
Case-vignette 2 - Not sick	53 (92.9)	*	51 (89%)
Case-vignette 3 - Sick	57 (100)	–	57 (100%)
Feeling hot	–	34 (60)	–
Baby's neck and limb stiff	–	36 (63)	–
Very pale	–	35 (61)	–
Preterm birth	–	29 (51)	–
Case-vignette 4- Sick	56 (98.3)	–	57 (100%)
No power in the limbs	–	52 (91)	–
Difficulty in breathing	–	50 (88)	–
Feels cold	–	47 (83)	–

*No danger sign in this case-vignette.

Table 5 Communication attributes fulfilled by community health workers during role-plays

Communication attributes	Yes n (%)
Informing the mother that the newborn needs to be referred to the health facility	57 (100)
Clear explanation of purpose of the visit	56 (98)
Greeting the mother	55 (97)
Clear explanation for the referral	55 (97)
Mentioning clearly place to go to for referral care	53 (93)
Examination of the newborn	51 (90)
Mentioning clearly when to go for referral care	50 (88)
Introduction to mother	49 (86)
Request to examine the newborn	49 (86)
Clearly explain to the mother that they need to keep the newborn warm and continue breastfeeding while being taken for referral care	17 (30)

almost all of them correctly identified the prompted newborn danger signs (98%) and 74% mentioned the required five newborn danger signs unprompted. Kayemba *et al.* (2012) elicited similar findings in western Uganda, where 87% of the village health team members could mention 3 and more of the newborn danger signs with infected umbilical cord (81%) as the most commonly mentioned danger sign under the integrated community case management programme (Kayemba *et al.* 2012). In a similar assessment in Pakistan, lady health workers obtained a median knowledge score of 65% regarding newborn care, with the minimum score set at 50% (Ariff *et al.* 2010). However in our study, grunting and chest in-drawing were not mentioned by any of the CHWs. This is probably because they were not highlighted during the CHWs' training, as they are less obvious in newborns, but emphasis was put on 'difficulty in breathing' among the respiratory danger signs. Further, preterm birth was among the least mentioned newborn danger sign (26%), yet it is the first leading cause of death among newborns (Oestergaard *et al.* 2011) and of high public health importance in Uganda (WHO 2006). With 14 800 babies dying annually due to preterm complications, Uganda is one of the countries with a highest burden of preterm babies, in 12th position globally. It is also 13th among the 15 countries contributing to two-thirds of global preterm births (WHO *et al.* 2012).

Our study demonstrates that trained CHWs are able to attain high levels of relevant skills to identify sick newborns in their communities. 98% of the CHWs correctly classified newborn case-vignettes as either sick or not sick. The high level of skills demonstrated by the CHWs was probably due to the regular and innovative model of supervision that involved direct observation and debriefing of the CHWs during home visits, and monthly

meetings between CHWs and the health workers (supervisors) (Waiswa *et al.* 2012). This model of supervisory approach most likely reinforced the CHWs' ability to retain knowledge and skills in newborn care. Waiswa *et al.* (2010a) also found that CHWs were able to perform roles related to the training they received on breastfeeding, malaria prevention, family planning, safe motherhood, among others (Waiswa *et al.* 2010b). Likewise, Gill *et al.* (2011) demonstrated that trained traditional birth attendants can manage perinatal conditions and significantly reduce neonatal mortality in rural African setting. But generally, not many studies have been carried out to assess the skills of CHWs in identifying sick newborns, although similar work has been carried out among older children (Kallander *et al.* 2006; Khanal *et al.* 2011; Mukanga *et al.* 2011) and for other cadre of health workers (Kolstad *et al.* 1997).

CHWs participating in this study also demonstrated that they can effectively communicate with mothers about the need to seek care for their sick newborns from health facilities, and that they can appropriately refer them to the health facilities as reflected by the overall median score of 94% on the attributes assessed. Effective communication by healthcare workers is a critical component during provision of health care (Agrawal *et al.* 2012), and our study adds to the growing body of evidence that trained CHWs can effectively contribute to healthcare delivery at community level. The continuous regular support supervision offered to the CHWs during the implementation of the UNEST intervention could also have contributed in enhancing communication skills of the CHWs. The differences in the median scores between district of work of the CHWs, in the skill and communication components could have been due to possible differences in the intensity of supervision given that Mayuge has less health facilities, hence a bigger ratio of 1 supervisor to at least 9 CHWs, compared to Iganga, where the ratio was 1 supervisor to at most 5 CHWs. Supervision time could also have been lessened by the long distances the supervisors had to cover.

Methodological issues

Ideally, the CHWs' ability to identify newborn danger signs should have been assessed using actual sick newborns because the case-vignettes used may not have adequately depicted newborn danger signs. However, given that newborns with danger signs were not readily available, and that sick newborns need to be treated immediately to save their lives, use of case-vignettes was found most appropriate. Our findings might have been different with actual sick newborns. Secondly, CHWs from one

area were studied, which limits generalisation of our findings and necessitates larger studies. Despite these limitations, we believe that our findings generally reflect CHWs' ability to effectively identify and refer sick newborns in this setting.

This study in sub-Saharan Africa (SSA) has demonstrated that regularly supervised and trained CHWs in rural settings with a poor health systems are able to maintain a high level of knowledge on newborn danger signs and are competent in identifying and referring sick newborns to health facilities. Previous studies among CHWs in SSA have examined CHWs' ability to manage older children (Gouws *et al.* 2005; Kallander *et al.* 2006). Our study adds to the evidence from Asia (Bang *et al.* 1999; Baqui *et al.* 2008; Kumar *et al.* 2008; Darmstadt *et al.* 2010) that CHWs can contribute to strengthening the supply side of the health system, by conducting home-based programmes to improve newborn health. Our findings also support earlier evidence that simple tasks can be shifted to CHWs (Kinney *et al.* 2010) to increase coverage of essential interventions for child survival (Haines *et al.* 2007; Khanal *et al.* 2011; Mukanga *et al.* 2011). Thus, countries in a similar context, constrained by human health resources and implementing home visits for newborns, can consider using CHWs. However, mothers' adherence to the referral advice and sustainability issues regarding long-term facilitation of CHWs requires further research.

Uganda is rolling out utilisation of CHWs as part of an effort towards improving newborn survival, and there are lessons to learn from our study, such as training CHWs before assigning them tasks, regular supervision and regular debriefing after home visits. This approach enhances knowledge and skills acquisition and improves communication skills. Preterm birth as a danger sign and its role in newborn mortality should be highlighted during the training and supervision. Overall, CHWs are a potential resource that can be utilised in settings constrained with human resource for health, in the identification and referral of sick newborns to improve child survival.

Acknowledgements

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Corresponding Author Christine Kayemba Nalwadda, School of Public Health, Makerere University College of Health Sciences, P.O.Box 7072, Kampala, Uganda. Tel.: +256 772 495 169; E-mail: cnalwadda@musph.ac.ug