

Essential newborn care in rural settings: The case of Warrap State in South Sudan

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Essential newborn care is taking a predominant role in addressing under-five health care delivery interventions. There are no current well-established guidelines or common methodologies on how to assess the situation of newborn care in countries with weak health information systems, especially when addressing situational needs in rural settings. The main objective of this study was to test the feasibility of collecting information using a community-based approach to assess the level of coverage of essential newborn care, especially for rural settings. Six indicators related to promotion and provision of thermal care, early initiation of exclusive breastfeeding, and hygienic cord care, were measured. A two-stage stratified and weighted random sampling was carried out. Standard sample calculations were used to determine a sample of 511 respondents. Descriptive results from the population survey showed that the prevalence of newborns receiving all recommended elements of essential newborn care in the surveyed area was 1%. The most common element completed, with nine out of ten respondents, was wrapping the newborn immediately after birth, but only 1% were not bathed within the first six hours after birth. Survey results confirmed low coverage of systematic application of essential newborn care measures in rural areas of Warrap State in South Sudan. This observational study indicates that the collection of information on health care behaviours around essential newborn care indicators (thermal, cord and eye care, and breastfeeding) can be reliably achieved, especially in hard-to-reach areas, at the community level.

Les soins néonataux essentiels jouent un rôle prépondérant dans les interventions de fourniture de soins de santé pour les moins de cinq ans. Il n'y a pas de lignes directrices actuelles bien établies ou de méthodologies communes sur la façon d'évaluer la situation des soins néonataux dans des pays où les systèmes d'information de santé sont faibles, surtout lorsqu'on répond à des besoins conjoncturels en milieu rural. L'objectif principal de cette étude était de tester la faisabilité de la collecte des informations en utilisant une approche basée sur la communauté pour évaluer le niveau de couverture des soins néonataux essentiels, en particulier dans des contextes ruraux. Six indicateurs liés à la promotion et la prestation de protection thermique, l'initiation précoce à l'allaitement maternel exclusif, et les soins hygiéniques du cordon, ont été mesurés. Un échantillonnage aléatoire stratifié et pondéré en deux étapes a été effectué. Des calculs d'échantillonnage standard ont été utilisés pour sélectionner un échantillon de 511 personnes interrogées. Les résultats descriptifs de l'enquête de population ont montré que la prévalence des nouveau-nés recevant tous les éléments recommandés de soins néonataux essentiels dans la zone étudiée était de 1%. L'élément le plus communément accompli, par neuf personnes interrogées sur dix, était d'envelopper le nouveau-né juste après la naissance, mais seul 1% n'avaient pas été baignés dans les six premières heures suivant la naissance. Les résultats de l'enquête ont confirmé la faible couverture de l'application systématique de mesures de soins néonataux essentiels dans les zones rurales de l'État de Warrap au Soudan du Sud. Cette étude observationnelle indique que la collecte d'informations sur les comportements de soins de santé sur la base d'indicateurs de soins essentiels du nouveau-né (protection thermique, soins du cordon et des yeux, ainsi qu'allaitement) peut être atteint de façon fiable, en particulier dans les zones difficiles à atteindre, au niveau de la communauté.

Introduction

Problem statement

Key focus

As almost half of under-five mortality occurs in the newborn period (You *et al.* 2012), it is fundamental to address health care needs during this age-period to decrease child mortality. Given

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the weak status of health information systems in developing countries, especially amongst fragile states, assessing newborn health status through community-based information is a prerequisite to addressing their most pressing health needs. This study confirms the weak coverage of essential newborn care practices in Warrap State, South Sudan, and the immense need for the rapid deployment of community-based health services with respective linkages to primary health care units.

Background

South Sudan remains a poor and fragile state, with progress toward reaching the Millennium Development Goals (MDGs) continuing to be a challenge. The country's large urban, rural and regional disparities, geographic isolation, public spending inequities, displacement, second-highest illiteracy rate in the world, and limited economic opportunities are all legacies of war that contribute to the challenge (Moszynski 2011). With a population of nearly nine million people, South Sudan has a little more than 120 medical doctors and just over 100 registered nurses. Currently, humanitarian agencies provide more than 85% of all health care in the country (Wakabi 2011). Preventive and curative services are often unavailable or inaccessible, hampered by lack of radio communication and transportation difficulties between communities and health facilities. Warrap State floods easily during the long rainy season of May to October. Whilst malaria is already endemic in the region, outbreaks of acute watery diarrhoea and measles are also common. These factors, plus low awareness and demand, and few skilled staff and medical supplies, cause many to remain in poor health – especially the most vulnerable, including newborns (Wakabi 2011).

As part of government efforts to address these gaps in coverage of health services and the respective consequences on health outcomes, the government of Southern Sudan developed the Basic Package of Health and Nutrition Services for Southern Sudan that stresses the importance of a newly approved cadre of community health providers (Ministry of Health 2009). These providers, known as home health promoters (HHPs) in the health system, are part of a national strategy to respond to the human resource issues.

Trends

The third paper of the Lancet Neonatal Survival Series (Knippenberg *et al.* 2005) proposed an approach based on an adaptation of the four-step management cycle (Lawn McCarthy & Ross 2001) as a guide for scaling up care for newborns in different settings:

Step 1: Assess the situation and create a policy environment conducive to neonatal health.

Step 2: Achieve optimum neonatal care within the constraints of the situation.

Step 3: Systematically scale-up neonatal care.

Step 4: Monitor coverage and measure effect and cost.

The Newborn Health Indicators Technical Working Group recommended in 2008 a set of indicators to measure coverage of key newborn interventions (Moran *et al.* 2013).

Objectives

There are no current well-established guidelines or common methodologies on how to assess the situation of newborn care in developing countries, especially when addressing situational needs in rural settings. There are some studies or reports, mostly by multilateral agencies such as the United Nations Children's Fund (UNICEF) and World Health Organisation (WHO), where main indicators to assess newborn status are based on international recommendations, and/or maternal indicators (WHO 2006; Diaz *et al.* 2013). Other studies used a partial list of the international recommendations, especially when assessing newborn needs at household-level (Ahmad *et al.* 2012). The main objective of this study was to test the feasibility of collecting information using a community-based approach to assess the level of coverage of essential newborn care, especially for rural settings, in order to contribute to the creation of a policy environment conducive to neonatal health for South Sudan.

Contribution to field

High coverage of basic, low cost and proven newborn essential care has the potential to prevent up to 70% of deaths (Darmstadt *et al.* 2005). To scale up neonatal care, two interlinked processes are required: a systematic, data-driven decision-making process, and a participatory, rights-based policy process. The first step is to assess the situation and create a policy environment conducive to neonatal health. The next step is to achieve optimum care of newborn infants within health system constraints. In the absence of strong clinical services, programmes can start with family and community care, and with outreach services. Systematic community-based collection of newborn indicators in hard-to-reach areas is needed to complement national data and provide an improved assessment of newborn status at the national level.

Literature review

Most newborn deaths occur at home in low or middle income countries as a result of a lack of access to health care, a limited number of trained health care personnel, and an overall weak health system. Although neonatal mortality accounts for 38% of under-five deaths, Lawn, McCarthy and Ross (2001) argue that there has been a general lack of interventions that address the dire situation because of the misconception that the type of interventions needed are too costly and technical to be applied in a poor resource setting.

Postnatal care has been identified by the WHO as an important component in addressing prevention of newborn mortality, and a critical package has been included in their guidelines since 2003. The WHO Commission on Information and Accountability for Women's and Children's Health (2012) identified early postnatal care as one essential indicator to measure progress for newborn health.

In many low-income countries, community health workers play an increasingly significant role in the delivery of

preventive and curative health care to populations for whom location, economic status, gender, and other factors make direct access with the formalised health system difficult (Haines *et al.* 2007). Furthermore, they 'provide health education, serve as role models and community advocates, increase access to healthcare resources, and collect data for research purposes' (O'Brien *et al.* 2009).

Whilst it is widely accepted that there is a package on evidence-based, low-cost, highly effective interventions for newborn, few of these high impact interventions for newborn care are systematically measured (Lawn *et al.* 2012). Furthermore, until recently there has been narrow consensus amongst global leaders in the monitoring and evaluation arena on indicators to measure newborn care (Moran *et al.* 2013).

Since 2008, efforts to develop standard newborn indicators to measure coverage of high impact interventions have been underway. In a study published in 2013, the Newborn Health Indicators Technical Working Group identified a set of indicators to be utilised in household surveys.

Research method and design

Materials

Questionnaires were created by World Vision staff based on set intervention indicators. Written in English, tools were verbally translated into Dinka, the local language, with group consensus of translation reached between supervisors and data collectors during the training period. The questionnaire was pre-tested in a nearby community.

Setting

Bomas (clusters of villages) from four payams – administrative centres – (Kuac North, Kuac South, Pathun East, and Pathun West) in Gogrial East and Gogrial West counties, Warrap State. Total population: 131 821.

Design

An observational, population-based, cross-sectional study was designed to determine current health care behaviours around select essential newborn care indicators: thermal care (drying, wrapping, and delayed bathing), cord care (clean cord cutting and applications to umbilical cord), eye care (applications to eyes), and breastfeeding (immediate breastfeeding). A two-stage stratified and weighted random sampling was carried out. During the first stage, 30 bomas were randomly selected according to population weight. The second stage involved the random selection of 17 households from each boma.

Procedure

Data collection was conducted for two weeks during February 2013. The sample size for this survey was calculated

TABLE 1: Baseline child demographics, age: Warrap State, South Sudan, 2013.

Child's Age	<i>n</i>	%
< 1 months	34	7
1–12 months	350	68
13–23 months	127	25

TABLE 2: Baseline child demographics, sex: Warrap State, South Sudan, 2013.

Child's Sex	<i>n</i>	%
Male	280	54.8
Female	231	46.2

using the following formula: $n = D [Z\alpha + Z\beta] * (P_1 (1-P_1) + P_2 (1-P_2) / (P_2 - P_1) ^2]$.¹ A total population of 511 respondents, chosen through purposive sampling, was included. Because of the nature of the research objective, only mothers of children under age two, including newborns, living in the four specified locations were included.

Respondents were given a structured household-level survey by local staff. Households were identified as all who share the same kitchen or the same 'pot,' and household selection was performed through random selection. If there was a child under age two within the household, the survey was given. If there were multiple children under age two living in the household, surveyors flipped a coin to determine which child to include in the survey. Once the first household was surveyed, data collectors continued from house to house until the predetermined number of surveys had been completed for each region.

Analyses

All collected data were coded and entered into Excel. Data were checked for inaccuracies and inconsistencies, and then entered into SPSS Statistical Analysis software. Data analysis was conducted in two steps. The first step consisted of the production of descriptive statistics for each variable included in the survey. The second included the calculation of *p*-values, confidence intervals, and odds ratios.

Results

General characteristics of the study population

All respondents were mothers of children under age two (*n* = 511). More than seven of every ten children included in the study were under age one (75 %, *n* = 384). Of the children under one year old, only 7% (*n* = 34) were neonates (birth to one month, Table 1). Male children represented 55% (*n* = 280) of responses (Table 2).

The average age of respondents was 29.6 years old with a median of 30 years. The majority of respondents reported not having any schooling (96%, *n* = 486). Dinka was the first and most comfortable language for all respondents. A total of 91% of households were reported as two-parent (*n* = 467), and 68% identified a male as the head of the household (*n* = 347).

1. Where *n* = sample size; D = design effect, since it is a cluster design this will be equal to 2; *P*₁ = estimated proportion of an indicator measured during baseline (30%); *P*₂ = estimated target proportion of an indicator (80%); *Z*_α = level of statistical significance of 90%; *Z*_β = statistical power of 80%.

The majority of mothers reported not working outside of the home (95 %, $n = 484$). Of those working outside of the home, selling food (2%, $n = 10$) and brewing alcohol (0.8%, $n = 4$) were the most common professions. Other occupations included handicrafts seller (0.2%, $n = 1$), harvester (0.4%, $n = 2$), shopkeeper (0.2%, $n = 1$), salaried worker (0.2%, $n = 1$), irrigation worker (0.2%, $n = 1$), and school worker (0.2%, $n = 1$). Older siblings were the most common additional caregivers when the mother was outside the home (18%, $n = 15$). Other caregivers include fathers (4%, $n = 3$) and grandmothers (5%, $n = 4$).

As shown in Table 3, the proportion of newborns with delivery attended at a health facility in the area of research was 2%; short of the 10% reported in the Sudan Household Health Survey of 2006. Of the 147 mothers reporting a visit to the neonate by anyone, the proportion of newborns visited by a trained worker within three days after birth was 11% ($n = 12$). Mothers who indicated knowledge of at least two newborn danger signs was 52% ($n = 264$).

Essential newborn care

The prevalence of newborns receiving all recommended elements of essential newborn care (thermal, cord and eye

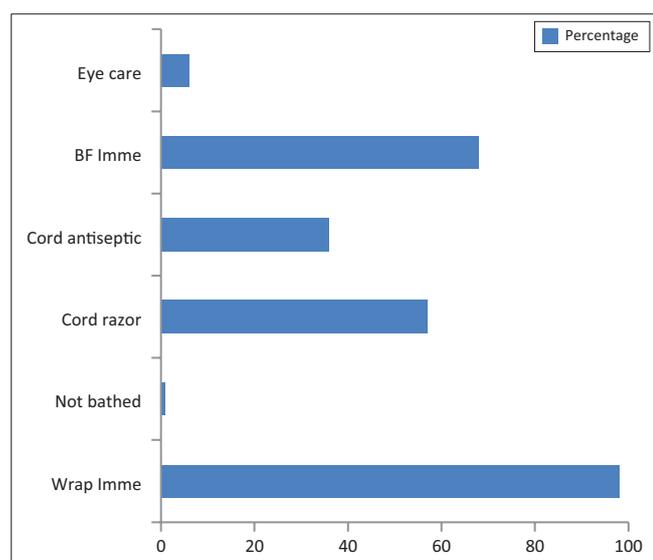


FIGURE 1: Percentage of essential new-born care coverage among new-borns, Warrap State, South Sudan, 2013.

TABLE 3: Survey indicators and descriptions, baseline (2013) and Sudan Household Health Survey (2006).

Indicator	Description/definition	Baseline 2013 (%)	SHHS 2006 (%)
Percentage of newborns who started breastfeeding within one hour.	# of newborns who were put to the breast within one hour of being born/ total # of breastfed babies.	68 (345/466)	-
Percentage of mothers of children under two who know at least two newborn danger signs.	# of mothers who reported that they would seek care for two or more newborn danger signs/ total # of mothers.	52 (264/511)	-
Percentage of neonates visited by a trained worker within three days of birth.	# of neonates visited by a trained worker within three days of birth/ total # of neonates visited by anyone.	11 (16/147)	-
Percentage of mothers whose newborn's cord was cut with a clean/new instrument or a clean birth kit was used for home deliveries.	# of infants whose cord was cut with clean instrument/ total # of infants.	58 (292/500)	-
Percentage of newborns with delivery attended at health facility.	# of infants who were delivered at a health facility/ total # of infants.	2 (12/511)	10
Percentage of newborns with delivery attended at home.	# of infants who were delivered at home/ total # of infants.	96 (491/511)	-
Percentage of mothers whose newborn was not bathed in the first six hours after birth.	# of infants who were not bathed in the first six hours after birth/ total # of infants.	1 (3/511)	-

care, and breastfeeding) in the surveyed area was 1% ($n = 5$). The most common element completed was wrapping the newborn immediately after birth (98%, $n = 502$), although only 1% ($n = 3$) was bathed six or more hours after birth. Only 57% of respondents reported using a new razor blade to cut the newborn's cord ($n = 292$); other items used included used razor blades, boiled scissors, knives, and sorghum stems, which were used 32% of the time ($n = 162$). Common items applied to the cord after cutting were ash or soot (41%, $n = 149$), antiseptic (36%, $n = 133$), oil (10%, $n = 38$), and dried cow dung (3%, $n = 10$). Eye ointment or drops were administered within the first hour after delivery to 6% of newborns ($n = 28$). Breastfeeding was common (93%, $n = 465$), with 74% reporting initiating breastfeeding immediately ($n = 345$).

Discussion

Outline of the results

Our findings suggest that coverage of essential newborn care interventions (cord cut with new razor, antiseptic applied to cord, newborn wiped immediately after birth, bathed six or more hours after birth, wrapped immediately after birth, and breastfed immediately after birth) in rural areas of South Sudan is almost non-existent. The magnitude of findings correlates with coverage of institutional deliveries, postnatal contacts, and health professional density of geographical area. Furthermore, the study suggests that household surveys including content related to six measurable signal functions for newborn essential care are feasible and seem to produce reliable information.

Practical implications

Extrapolating the findings of these areas of Warrap State to the rest of South Sudan has important implications, mainly for the two well-documented reasons mentioned above. Scaling up processes for coverage of these interventions have proved to be challenging, and very few successful experiences have so far been documented. Given the variation in newborn survival between and within countries, as well as between rural and urban populations, the first step in scaling up newborn interventions is to assess the situation and create a new policy environment conducive to neonatal health. Similarly, there is variation in the causes of newborn death and the capacity of the health system to respond; and even

in the capacity of communities and families to care for their newborns. Thus, knowledge of home neonatal care practices and underlying cultural beliefs is probably, in the context of South Sudan, the place to start in designing a successful programme to address newborn health. The cultural and ethnic variation within South Sudan, as well as the limited number of newborns included in this survey, might be a factor in precluding extrapolation of findings.

Limitations of the study

Recall and validity are the main limitations in this study. Whilst most information related to the six signal functions were answered by more than 90% of respondents, lack of any answer or answer of 'don't know' was higher than 70% for the questions related to postnatal checks by a trained provider. This may also reflect a lack of understanding of the questions. Since providers of information on newborn care were mothers of children between zero and 23 months of age, recall limitations of the newborn period might exist. Given South Sudan's variable cultural contexts, difficulty generalising results might be another type of limitation.

Recommendations

As documented by other studies, rapid reductions in newborn mortality in excess of 50% can be achieved by an integrated high-coverage programme of universal outreach and family-community care, plus universal facility-based clinical services. Given the classification of South Sudan as a country with a high newborn mortality rate, and the findings of this report as to the low coverage of essential newborn care as well as low maternal knowledge of danger signs, one logical first step in addressing this urgent problem would be to promote a phased approach to address newborn needs. This approach would focus first on outreach and family-community based services to effectively ensure access of basic services to poor and rural populations, whilst professional clinical care is strengthened and made more equitable. These family-community services would include newborn interventions within the integrated community case management approach of the government of South Sudan.

Conclusion

This observational study indicates that collecting information on health care behaviours around essential newborn care indicators (thermal, cord and eye care, and breastfeeding) can be reliably achieved, especially in hard-to-reach areas, at the community level. Moreover, gathering these newborn indicators in rural areas is needed to complement national data and provide an improved assessment of newborn status at the national level. Data collected were consistent with known high infant mortality and low health service coverage in South Sudan, and the findings supported the Ministry of Health's plan to increase community-level efforts – including the use of HHPs – to decrease the level of under-five mortality in that country. Future studies could determine the consistency of results across diverse cultural contexts,

and operational research to determine the impact of efforts to integrate essential newborn care at the family-community level is warranted to better understand, and therefore better respond, to the low coverage of essential newborn care in South Sudan.

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Competing interests

The authors declare that they have no financial or personal relationship(s) that may have inappropriately influenced them in writing this article.

Authors' contributions

A.C.R. (World Vision United States) designed the study and was the lead writer. J.A.H. (World Vision United States) developed data collection training tools and provided support to research and writing. D.T.C. (World Vision United States) developed the project into which the study was embedded and made significant conceptual contributions to the study. E.C.M. (World Vision United States) provided project management and research support. K.M.B. (World Vision United States) performed data analysis and provided research support. E.W. (World Vision South Sudan) contributed to the research report as field project manager.

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