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Behavior Change Following Implementation of Home-Based Life Saving Skills in Liberia, West Africa

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Abstract

Introduction—Home-Based Life Saving Skills (HBLSS) has been fully integrated into Liberia's long term plan to decrease maternal and newborn mortality and morbidity coordinated through the Ministry of Health and Social Welfare. The objective of this article is to disseminate evaluation data from project monitoring and documentation on translation of knowledge and skills obtained through HBLSS into behavior change at the community level.

Methods—One year after completion of HBLSS training, complication audits were conducted with 434 postpartum women in one rural county in Liberia.

Results—Sixty-two percent (n=269) of the women were attended during birth by either an HBLSS-trained traditional midwife or family member, while 38 percent (n=165) were attended by a traditional midwife or family member who did not receive HBLSS training. HBLSS trained birth attendants performed significantly more First Actions (lifesaving actions taught to be performed after every delivery) than the non HBLSS trained attendants. Fourteen percent of our sample (n=62) reported “too much bleeding” following the delivery. Of these women, approximately half (n=29) were attended by an HBLSS-trained traditional midwife or family member. There was a significant difference in Secondary Actions (those actions taught to be performed when a woman experiences “too much bleeding” following childbirth) that were reported to have been performed by HBLSS-trained attendants (mean = 5.26, SD = 1.88) and untrained attendants (mean = 2.73, SD = 1.97); p-value <.0001.

Conclusion—Our findings suggest HBLSS knowledge is being transferred into behavior change and used at the community-level by traditional midwives and family members.

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Keywords

pregnancy; maternal survival; newborn survival; midwifery; post-conflict; community-based evaluation; traditional midwives; Home-Based Life Saving Skills; Liberia

While pregnancy and childbirth pose potential risks to all women, a wide disparity exists between maternal mortality rates in developed compared to developing countries. According to UNICEF, ninety-nine percent of the estimated 536,000 maternal deaths worldwide occur in developing countries.¹ Nearly half of all maternal deaths occur in sub-Saharan Africa. Of those deaths, hemorrhage is the leading cause, followed closely by sepsis.² While some progress has been made toward achieving Millennium Development Goal 5, to reduce by three quarters the maternal mortality ratio by 2015, 58 countries contribute to 91% of the global burden of maternal mortality.³

On average, women in developing countries are 300 times more likely to die from complications related to pregnancy and childbirth than women living in a developed country.⁴ Of those who do survive, millions suffer from preventable injuries, infections, diseases, and disabilities, with lifelong consequences. Mothers and infants are most vulnerable to complications in the immediate postpartum period and the first several weeks after childbirth. This can be a crucial time for lifesaving interventions.

For women in sub-Saharan Africa, the normal physiologic stress of pregnancy is compounded by malnourishment, infectious disease, high birth rates, civil conflict, lack of equality, and limited access to skilled care and lifesaving treatments. In addition, each country has its own unique set of cultural and historical circumstances complicating large scale efforts to address maternal mortality.

The purpose of this article is to report evaluation data from project monitoring and documentation on whether the knowledge and skills obtained by traditional midwives and family members through Home-Based Life Saving Skills (HBLSS) effectively translates into behavior change at the community level.

BACKGROUND

In 1998, the American College of Nurse-Midwives (ACNM) developed HBLSS with the understanding that childbearing women in the developing world have high rates of home birth with limited access to skilled care.⁵ “HBLSS is a community and competency-based program that aims to reduce maternal and neonatal mortality by increasing access to basic life saving measures within the home and community, and by decreasing delays in reaching referral facilities where life-threatening problems can be managed”.⁶

HBLSS uses a participatory process that builds on local traditional knowledge and skills through discussion, demonstration, negotiation, and practice, working towards skills that are acceptable and thus more likely to be used when needed. To maximize effective communication and learning among participants, who may be unable to read, content is reinforced during training through pictorial *Take Action Cards* that are also provided for home reference.^{6,7}

Liberia

Liberia is a West-African coastal country recovering after a 14 year civil war. Its population is approximately 3.5 million (see Figure 1). Maternal mortality is estimated at 994 maternal deaths per 100,000 live births with the lifetime risk of maternal death 1 in 16, ranking it fifth

highest in the world for this indicator.⁸ The top direct obstetric causes of maternal mortality in Liberia include hemorrhage, complications of unsafe abortion, infections, hypertensive disorders of pregnancy (eclampsia) and obstructed labor.⁹ At the time of this study it was estimated only 39% of births occurred within a health care facility in Liberia.⁸

As Liberia rebuilds its infrastructure and works to increase the number of skilled healthcare providers, mobilizing communities for early problem identification and emergency prevention measures was identified by the Ministry of Health and Social Welfare as an important intervention. While it is critical women have access to a skilled attendant for childbirth, the lack of professional healthcare providers following the civil wars is extreme. There are currently only 412 certified midwives in the workforce. Positive steps have been taken by the Ministry of Health and Social Welfare to scale up midwifery education and establish career paths for midwives. Five midwifery education programs have been re-established since the end of the conflicts. Although rebuilding its infrastructure and human resource potential, Liberia still ranks near the bottom of the Human Development Index.³

HBLSS in Liberia

Three years post-conflict, with funding from the United States Agency for International Development (USAID), ACNM's Basic Life Saving Skills (BLSS) and HBLSS¹⁰ were introduced in three rural counties as part of the Improved Community Health Project to combat Liberia's high rates of maternal and neonatal morbidity and mortality.⁵ Prior to the civil wars, traditional midwives in Liberia were given a 72-day training by the Ministry of Health and Social Welfare. In the aftermath of the wars, no community based trainings had been done at any significant level in 14 years.

To reach all members of the community involved in the care of a woman during childbirth, a cascade training strategy was used in the implementation of HBLSS. Initial training in the HBLSS methodology was provided for 10 master trainers including registered nurses and certified midwives from governmental and non-governmental organizations; 20 second level trainers comprised of certified midwives/registered nurses from the rural clinic level; and 40 traditional midwives from the rural clinics' catchment communities. An additional 412 traditional midwives were trained by teams of master trainers and second level trainers in the following six months. This group of traditional midwives then trained approximately 3400 community members, expected to be present at a birth, in the subsequent six months. One year post-test evaluation with traditional midwives revealed significant knowledge and skills retention of the steps associated with First Actions, Too Much Bleeding After Birth, Woman Referral and Baby Referral.⁵

At present, the Ministry of Health and Social Welfare has adopted BLSS training for all clinicians, which ensures health care providers are capable of performing basic lifesaving functions at their respective level.¹¹ They are also working to establish a series of Emergency Obstetric and Newborn Care (EmONC) centers to provide comprehensive services for obstetrical patients. But these improvements do not remove the obstacles of geography and distance. Many women continue to deliver at home because they simply cannot make it to the clinic in time.

While studies report increased knowledge with community-based education in developing countries,^{5, 7} this does not directly result in behavioral changes, such as more timely referrals, nor has it significantly affected maternal or neonatal outcomes;¹²⁻¹⁴ whereas other studies have shown modest behavioral changes and improved outcomes.¹⁵

This article reports on whether HBLSS trained birth attendants performed more First Actions which are the basic steps used to maintain hemodynamic stability of the mother and

infant following childbirth than did attendants who did not receive the HBLSS intervention in Liberia. Additionally, we examined the actions to prevent, identify, and manage postpartum hemorrhage (PPH), within these two groups.

METHODS

As part of the Improved Community Health Project, complication audits were performed during the monitoring and evaluation phase of HBLSS. One year following implementation of HBLSS in Liberia, a team of Liberian certified midwives, working with two consultants from ACNM, interviewed women who had given birth at home during the previous 12 months. Using the *HBLSS Complication Audit Form*, a validated, structured survey, interviewers recorded participant's responses directly onto the survey. The survey contains both open and closed ended questions related to the woman's birth experience. The women were interviewed one year following the initial implementation of HBLSS in three of the fifteen counties in Liberia. Data collection included demographic information as well as information about their birth. To check reliability among interviewers, 5% of the sample was re-interviewed. Percent agreement on re-interview was 95%, similar to findings by Sibley, Buffington & Haileyesus.¹⁶

Approval and human ethic oversight for this project was provided by the Liberia Ministry of Health and Social Welfare. Although the primary intent of this project was for a specific community health project intended to help rebuild the health sector in Liberia, findings that emerged from the evaluation could potentially inform other programs.

Sample

Sixteen rural health clinics with a catchment population of approximately 300,000 residents provided the setting for data collection. A purposive sample of 434 women, who delivered within the past 12 months, was interviewed from more than 160 rural villages in Liberia. The objective of these interviews was to compare the practices during childbirth when women were attended by HBLSS trained attendants compared to the practices of attendants who did not receive the HBLSS training, through structured interviews with postpartum women.

Data Collection

Prior to data collection, the purpose of the interview, to identify the actions taken by the birth attendant, was explained. Interviews were conducted in a private area near the rural health care facility. Confidentiality was assured and verbal informed consent was obtained. Participants were informed they could decline to answer any questions or end the interview at any time. Each interview took approximately 45 minutes. Data from the interviews were concomitantly transcribed onto the audit forms by the data collectors.

Data Analysis

The responses obtained from the survey of the mothers and family members were recorded, coded, and analyzed in SPSS 17.0 using Pearson's chi-square test, and independent t-test. An independent sample t-test was conducted to compare the number of First Actions and Second Actions performed by attendants in each group. Analysis of the nine individual First Actions and Second Actions conducted when women had too much bleeding was performed using Pearson's chi square test for independence.

RESULTS

One of three original counties participating in the initial implementation of HBLSS served as the geographical area for this data collection. This county ranks first in communities with the greatest distance to a health facility. Only 11% of communities lie within 2 km of a health facility with 33% of communities greater than 10km from a health facility. The average distance from facility to community is 8.5km.¹⁷

The standardized complication audit forms were used for interviews with 540 women. Audits on women who reported a planned vaginal or cesarean birth at a health facility were excluded. A total of 106 complication audits were excluded from the analyses due to illegibility or incomplete data. Data were analyzed for 434 women (80.4%) with infants under one year of age.

Women in our study ranged from 15 years to 50 years of age (mode=20 years). Women reported on average four pregnancies (range=1–15) and 1–10 living children (mean=3).

Sixty-two percent (n= 269) of women in our sample were attended during birth by either a HBLSS-trained traditional midwife or family member, while 38 percent (n= 165) were attended by a traditional midwife or family member that did not receive the HBLSS training. There were no significant differences in demographics between the two groups.

First Actions

First Actions are those actions taught to be performed after every delivery in the HBLSS curriculum. These include the following nine actions: drying baby (wiped mouth and nose), covering the baby, rubbing the baby's back, tying and cutting the cord, squat and pass urine, externally rubbing the womb (eg, fundal massage), placement of the mother in semi-sitting position, putting the baby to breast, and proper disposal of the placenta. Each individual item was assigned one point for analysis. HBLSS trained birth attendants performed significantly more of the nine First Actions ($M = 5.88$ SD, 1.49) than the non HBLSS trained attendants. ($M = 4.98$, SD = 1.50) $p < .001$ (two-tailed). The magnitude of the differences in the means (mean difference = $-.898$, 95% CI: -1.20 to $-.59$) was moderate (eta squared = .007). Six of the nine First Actions were performed significantly more often when women were attended by an HBLSS trained attendant.

Too Much Bleeding

During the *Complication Audits*, the incidence of “too much bleeding” following the delivery was reported by 14 percent (n=62) of the women interviewed. Of these women, approximately half (n=29) were attended by an HBLSS-trained traditional midwife or family member.

First Actions to Prevent Postpartum Hemorrhage

Three of the First Actions; assist the woman to squat and pass urine, rub the womb, and put baby to breast, specifically target the prevention of postpartum hemorrhage, the leading cause of maternal mortality worldwide. There was a significant difference reported by the women attended during childbirth by an HBLSS trained provider in the performance of these three First Actions (mean = 1.87, SD = 1.02) compared to the reports of women attended by untrained provider (mean = 1.23, SD = 0.96); p -value $< .0001$.

Secondary Actions to Prevent and Manage Postpartum Hemorrhage

In the HBLSS curriculum, Secondary Actions are those nine actions taught to be performed when a woman experiences “too much bleeding” following childbirth. Secondary Actions

include: call for help (alerts others to help move the woman, get transportation and money for transport), squat and pass urine, rub womb, put baby to breast/ rub nipples, perform external 2-hand hold of womb, put pad firmly between legs, offer 1 cup of liquid hourly, put nothing in birth canal, and wash and cover hands. For our analysis, each action counted as one point. There was a significant difference in overall scores for HBLSS-trained traditional midwives in the 9 secondary actions to prevent and manage postpartum hemorrhage (mean = 5.26, SD = 1.88) compared to untrained traditional midwives (mean = 2.73, SD = 1.97); p-value <.0001.

The following Secondary Actions were initiated by the HBLSS trained attendants with significantly greater frequency: assist woman to squat and pass urine, drank 1 cup of liquid hourly, put nothing in birth canal, and washed and covered hands ($p<.05$). No significant differences were found between groups for the remaining 5 actions (Table 2).

DISCUSSION

Community education programs such as HBLSS have the potential to reduce maternal and neonatal mortality rates. Results from the data collected in Liberia, indicate HBLSS trained birth attendants performed more First Actions than non-trained attendants. This program evaluation found a statistically significant difference in six of the nine First Actions. This suggests HBLSS training is associated with more actions to manage the immediate postpartum period and newborn complications.

Traditional midwives and other birth attendants who did not receive the HBLSS training were less likely to perform any of the nine First Actions. This can lead to a missed opportunity for preventing hemorrhage and/or death. It is essential that all traditional midwives and family members understand the importance of early problem identification, emergency first aid actions and how to refer appropriately if there is any chance at decreasing mortality rates.

Fourteen percent of our sample reported “too much bleeding” when describing the circumstances surrounding their delivery as compared with 23% of postpartum women in a study conducted in rural northern India.¹⁸ In South Benin, three groups of women—with severe complications, mild complications, and normal deliveries—were interviewed. While all episodes of bleeding were correctly identified, based on an expert reviewer, severity was misjudged.¹⁹

HBLSS-trained birth attendants in our sample performed significantly more First Actions to prevent postpartum hemorrhage than their untrained counterparts in this report of women who gave birth and who were attended by both types of providers. Practices promoted through HBLSS, such as fundal massage (rubbing the womb), emptying the bladder, and breastfeeding help prevent uterine atony. By initiating these measures, and understanding the rationale behind them, the risk for complication is reduced. This is especially important in rural communities, where the majority of maternal deaths occur.

Our findings corroborate the work of Sibley et al.²⁰ who examined HBLSS management (First Actions) with 318 postpartum women in Ethiopia using the same complication audit tool. Findings from both Liberia and Ethiopia found a significant difference in four of the nine First Actions (rubbing baby’s back, squat and pass urine, rubbing womb, and proper disposal of placenta) among women attended by an HBLSS trained attendant. Additional First Actions performed significantly more often by HBLSS-trained birth attendants in Liberia included covering baby ($p=.04$) and putting baby to breast ($p=.01$). In contrast, HBLSS-trained birth attendants in Ethiopia placed the woman in a semi-sitting position significantly more often.²⁰

Despite measures to prevent postpartum hemorrhage, women in developing countries, such as Liberia, remain at higher risk than women who give birth in developed countries. Risk factors include anemia, compromised immunity, adolescent pregnancy and high parity. When excessive bleeding was reported, the HBLSS trained attendants were more likely to initiate the following Secondary Actions: squat and pass urine; increase fluid volume (“drink liquid 1 cup hourly”); put nothing in the birth canal; and wash and cover hands; promoting uterine contractility, counteracting blood loss and protecting against infection. This distinguishes HBLSS from other training models reviewed in the literature, which demonstrate modest increases in knowledge, but no change in problem identification or behavior.

Unlike earlier findings from evaluations in Ethiopia and India^{16,21} the following actions were not perceived to be performed with greater frequency in our cohort: fundal massage (“rubbing the womb”); breastfeeding/rubbing the nipples; external bimanual compression (“two-hand hold of the womb”); and putting a pad firmly on the bleeding site. These actions promote safety, improve uterine tone and decrease blood loss. Data suggests that additional, targeted training should be done in Liberia to increase the use of these skills and assure proper technique.

While HBLSS training alone may not reduce maternal mortality as much as we would like, educating traditional midwives, family members, and pregnant women on basic life saving measures is key. Working to prevent delays in reaching a facility equipped to handle emergency obstetric and newborn care and encouraging facilities to accept traditional midwife referrals is also necessary.

There are some limitations to this study. While the sample size was substantial, it was drawn from only one of the three original counties where HBLSS was implemented in Liberia. Therefore, data collected from the interviews cannot be generalized to other ethnic groups, regions or countries with different cultural perspectives. Although we collected demographic information on the women we interviewed, we have no demographic information on the birth attendants other than whether they had participated in HBLSS trainings.

Another potential limitation of this study is recall bias on the part of the interviewees. Recall bias is related to a subject’s perception or accuracy of memory of past events or experiences. Recall bias is of special concern when the situation being recalled was stressful. Earlier studies have revealed that reliability estimates of obstetric morbidity in West African countries are poor, especially when based on women’s recall of their birth experiences.²² In our study, incidents of postpartum hemorrhage were identified by the women interviewed. A quantifiable indicator was not used to capture the estimated blood loss. Additionally, the number of actions performed was based upon their recollection of the events surrounding their birth.

This study did not directly examine birth outcomes. Our findings are based on the assumption that bringing obstetric first aid skills to the community level will lead to better birth outcomes.

CONCLUSION

Data from the *Complication Audit Forms* demonstrate HBLSS knowledge is being transferred into behavior change and used at the community level by traditional midwives and family members. In most communities, approximately two-thirds of births are being attended by HBLSS trained attendants.²³ Analysis of the data revealed a significant difference in the number of First and Secondary Actions performed by the HBLSS trained group compared to the untrained group to maintain hemodynamic stability of the mother and

infant and manage PPH. A strength of this study is that data were reported by the women who gave birth. This provides a stronger, objective report than if the attendants are asked to recall the events surrounding a particular birth.

Providing access to emergency obstetric care is crucial for decreasing maternal and fetal mortality rates in low resource countries. Further studies are needed to develop and improve referral systems, birth preparedness, communication, and transport. Continuing education, process evaluation, and quality improvement also need to be undertaken for ongoing support. Additionally, more research is needed on how to create and sustain hospital environments supportive of traditional midwife referrals.

In Liberia, 61 percent of women give birth at home, attended by a traditional midwife.⁸ Home birth is the most desirable and often the only feasible option for women who live in rural villages and communities. HBLSS is a community-based approach to improving maternal and neonatal outcomes, while leaving cultural norms intact. In Liberia, HBLSS has now been widely implemented in all 15 counties and has had a positive impact on the practice of community-based care. Behavior change following the implementation of HBLSS has the potential to significantly improve the response at the community level to prevent complications following childbirth in Liberia.

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Figure 1. Map of Liberia

Used with permission from the United Nations Cartographic Section. Map No. 3775, Rev. 7, United Nations, Department of Peacekeeping Operations, Cartographic Section, October 2010. Retrieved at <http://www.un.org/Depts/Cartographic/map/profile/liberia.pdf>

Table 1

Performance Scores on Individual First Actions

First Actions	Women attended by HBLSS Trained Attendant n=269 n(%) ^a	Women attended by Untrained Attendant n=165 n(%) ^a	p-Value
Dried baby, wiped mouth/nose	258 (96)	157 (95)	.78
Covered baby	261 (97)	154 (93)	.04*
Rubbed baby's back	6 (19)	18 (11)	.02*
Tied and cut cord	261 (97)	158 (96)	.41
Squat and passed urine	137 (51)	45 (27)	<.001
Rubbed Womb	170 (63)	55 (33)	<.001
Semi-Sit	40 (15)	15 (9)	.11
Put baby to breast	199 (74)	104 (63)	.01*
Proper disposal of placenta	223 (83)	119 (72)	.01*

^a Rounded to the nearest whole percent

Table 2

Performance Scores on Secondary Actions to Manage PPH

Secondary Actions	Women attended by HBLSS Trained Attendant n(%) ^a n=29	Women attended by Untrained Attendant n(%) ^a n=33	p-Value
Called for help	15 (53)	15 (45)	.514
Squatted and passed urine	26 (88)	16 (48)	<.001
Rubbed womb	20 (69)	16 (48)	.112
Put baby to breast/ rubbed nipples	19 (65)	14 (41)	.077
Performed 2-hand hold of womb	22 (76)	18 (54)	.082
Put pad firmly between legs	17 (57)	12 (35)	.094
Offered 1 cup of liquid hourly	17 (57)	8 (25)	.015
Put nothing in birth canal	26 (88)	12 (35)	<.001
Washed and covered hands	20 (69)	13 (38)	.022

^aRounded to the nearest whole percent