A stakeholder analysis of the idea of a community-based obstetrical technician cadre in Haiti to replace aging traditional birth attendants

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A thesis

Submitted in partial fulfillment of the

Requirements for the degree of

Master of Public Health

University of Washington

2015

Committee:

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Program Authorized to Offer Degree:

School of Public Hea

University of Washington

Abstract

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Background

Haiti has the highest maternal mortality ratio in the Latin American and Caribbean region at 380 per 100,000. While a high percentage of women seek prenatal care, a majority (64%) deliver at home with traditional birth attendants (TBAs). In this study, we sought to: 1) assess the views of men and women of reproductive age in the health district of Jérémie regarding risk factors for adverse maternal outcomes during the perinatal period, and solicit opinions about whether a proposed Community Obstetric Technician (COT), trained to assist at routine home deliveries and refer complications, would be an effective intervention; and 2) to assess the acceptability to TBAs, community leaders and policy makers of a program to train the literate children of TBAs or other literate community members to become COTs.

Methods

We conducted four focus groups and 38 semi-structured interviews across seven different subgroups: women and men of reproductive age; women who recently delivered at the

regional hospital; TBAs; Ministry of Health policy makers; community leaders; literate children of TBAs; and other literate young people in the community.

Results

Participants cited distance and costs as the main barriers to delivering in the hospital. They expressed a desire for more skilled birth attendants in their community. TBAs welcomed the idea of more highly trained community-based provider. TBAs and community members were receptive to the idea of TBAs' children being trained to serve in this role. Ministry of Health participants described an underfunded health system with staffing needs at all levels. They recognized a need for more community-based services, but favored current strategies (focusing on strengthening institutional services) and noted limited resources.

Conclusions

A community obstetric technician is an acceptable option for women in this region. Policy considerations include placement of COTs in areas furthest away from health facilities; identification of COT candidates from the communities where they are needed; provision of COT services for free or on a sliding scale; and integration of COTs into the existing health system. The Ministry of Health should consider how to address a need for skilled community-based personnel and a referral system to higher-level facilities.

Table of Contents

Background

Timely access to emergency obstetrical care for women in labor is critical to reducing maternal mortality. Haiti has the highest maternal mortality ratio in the Latin America and Caribbean region, estimated at 380 per 100,000 live births.[1] The most common causes of maternal deaths in this region are hemorrhage (23%), hypertension (22%), and other direct causes (15%) such as obstructed labor. Indirect causes of maternal deaths account for 19% of maternal deaths in the region, and include pre-existing disorders such as HIV and tuberculosis.[2] Approximately 64 percent of Haitian women deliver at home without skilled birth attendance, despite other favorable perinatal care metrics. For example, 90 percent of pregnant women receive at least one prenatal visit and 67 percent receive the recommended four visits.[3] Women living in rural areas are even more likely to deliver at home (77%), but even in the capital city Port-au-Prince, where care is more accessible, one in three deliveries (36%) is assisted by a non-skilled caregiver, such as traditional birth attendants (TBAs).[2] Skilled attendants are present at delivery for only 10 percent of women in the lowest quintile based on household income.

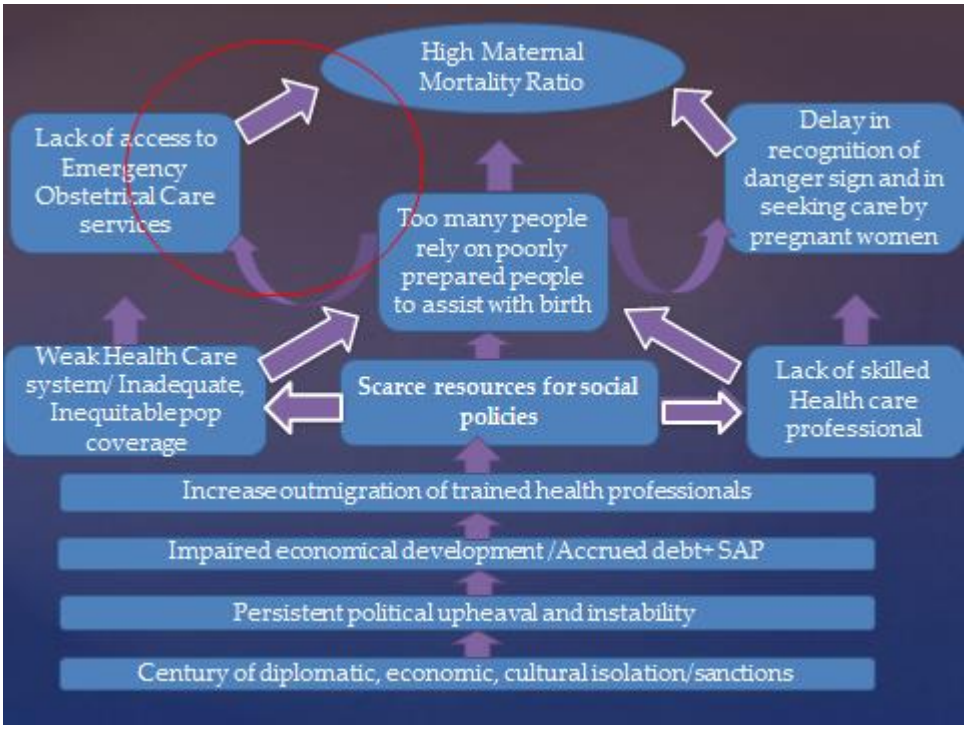
The Haitian health system has an insufficient number and inadequate distribution of both health institutions and skilled birth attendants to support its 10 million people. The Haiti public sector ratio of 1 physician and 3 nurses or midwives per 10,000 population compares unfavorably to the WHO threshold of 22.8 skilled health professionals per 10,000 population.[4,5] There is an additional large but ill-defined and unregulated private health care sector.[6] One public medical school and four recognized private medical schools produce a total of approximately 300 Haitian doctors each year. Cuba also trains Haitian physicians; more than 800 Haitian doctors graduated from medical school in Cuba between 2005 and 2012.[7] Five public nursing schools, and 44

recognized private institutions train approximately 200 nurses and auxiliaries annually.[8,9] One school of nurse-midwifery produced 530 graduates between 2000 and 2014 (although it is estimated that only several hundred remained in Haiti after the 2010 earthquake), and another school, aimed at training midwives straight out of secondary education, is scheduled to open in 2015.[10,11] The Ministry of Health (MOH) also envisions establishing new cadres of "midwife practitioners" as well as a "masters in midwifery." It is estimated, however, that between 50 to 97% of medical and nursing graduates leave Haiti sometime after graduation to work abroad.[9] Data from the Organization for Economic Cooperation and Development (OECD) show that 25,137 Haitian nurses and 2,093 Haitian doctors were working in OECD countries in 2010-11, expatriation rates of 97% and 52%, respectively.[12] The number of Haitian-born nurses working in OECD countries has almost doubled since 2000, when that figure was 13,001, whereas the number of expatriated doctors has held relatively steady.[13]

Geography, poverty and cultural norms in Haiti compound the challenges of workforce and institutional insufficiency. More than half (59%) of Haiti's population live in rural, often mountainous, areas.[14] These regions lack basic infrastructure, such as electricity, roads, potable water, sanitation, and may be more than six hours away by foot from the nearest health facility. Transport by vehicle is limited as only 24 percent of the road network is paved.[15] Challenging living conditions make retention of staff in rural areas more difficult, and the majority of skilled health workers—particularly specialists—live in urban areas.[16] Insufficient workforce, inequitable health coverage and poor maternal outcomes are manifestations of underfunded health systems, national political instability and external influences such as internationally-imposed structural

adjustment programs (imposed by lenders such as the International Monetary Fund to limit public expenditures including on health worker salaries), sanctions and political interference (as illustrated in Figure 1).

Figure 1: Conceptual Framework: Root causes contributing to maternal mortality in Haiti



Caption: Author conceptualization of contributing causes of maternal mortality in Haiti, based on literature review. Our focus in this paper is on the circled arrow.
Acronym definition: SAP=structural adjustment programs to privatize care and reduce public expenditures imposed by the International Monetary Fund and other lenders.

Studies have identified various determinants of institutional delivery for women in rural areas in Haiti, including younger age, receipt of antenatal care (and, further, of quality care), being less poor, higher level of education of mother and partner, shorter travel time to a health facility (e.g., proximity to a health facility, better road conditions, less mountainous terrain), media saturation in the community, and having an antenatal care provider in the community.[17,18,19,20] Qualitative data are limited on women's delivery

preferences, but include the challenges of limited service hours at health facilities, transportation challenges, lack of supplies at hospitals, and cost.[21] To increase access to care, the Haitian MOH has established Emergency Obstetrical Comprehensive care (EMOC) and Emergency Obstetrical Basic care (EMOB) units in existing facilities since 2009 (with a goal of 100 EMOC units by 2017), and has waived patient fees for deliveries in most of the public and regional hospitals. EMOC units are intended to provide cesarean sections and be staffed by six midwives each, according to the MOH.[10] Despite these programs, the proportion of women delivering at home remains high.

Given geographical and transport challenges in rural areas, high rate of poverty, and the inability of many health facilities to provide complete EMOC services to date, all three levels of the "three delays" model of pregnancy-related mortality apply in Haiti's context. Women experience delays in 1) identifying the need for care when experiencing a complication and deciding to go to a facility (also encompassing a lack of trust in the care that will be received at a facility); 2) reaching a facility and skilled providers that can provide care; and 3) receiving care upon arrival at a facility.[22] This model suggests early identification of obstetric emergency and confidence in quality of care can direct women to seek care at a health facility earlier and with better outcome.

Health and development experts both within and outside of Haiti have debated the best strategies to reduce delays in seeking care and make EMOC available to women in Haiti. The two predominant (and often competing) models are the professionalization of community-based delivery (expanding a lower-level cadre of trained birth attendants) and the institutionalization of deliveries (improving accessibility and encouraging women to plan to give birth in health facilities).

With World Health Organization endorsement, many international NGOs and Ministries of Health implemented TBA training programs in developing countries from the 1970s through early 1990s. The evidence on the effectiveness of these programs in reducing neonatal or maternal mortality rates was inconclusive, especially in the absence of other health system strengthening or supervision, and the recommendation in international policy shifted toward skilled birth attendance.[23] Nonetheless, TBAs in Haiti—locally known as "matrons" and usually older, illiterate women—are still culturally accepted and used by women with limited access to delivery in a health facility, and are still ongoing recipients of ad hoc trainings.[24]

To bridge the gap between the TBA and institutional models, we propose a new cadre of literate community obstetrical technicians (COTs) who will be formally trained to assist women in deliveries and refer women with emergencies to appropriate health facilities. This new COT cadre would be trained to manage normal home deliveries, and identify and refer conditions requiring transfer to a health facility (infection, hemorrhage, hypertension, obstructed labor). COTs would receive six months of training and would be equipped with basic materials for deliveries and stabilization of patients needing referral. With a shorter and less expensive training time than midwives, COTs could be rapidly scaled up and distributed in communities to complement the MOH strategy of expanding a midwife cadre in health facilities. Table 1 outlines the differences between existing cadres and the proposed COT cadre. According to our theory of change (Figure 2), the addition of COTs would expand the trained health workforce to include culturally attuned and connected providers in a community-based delivery system. COTs could provide more skilled care to detect and refer obstetric emergencies, leading to reduced maternal

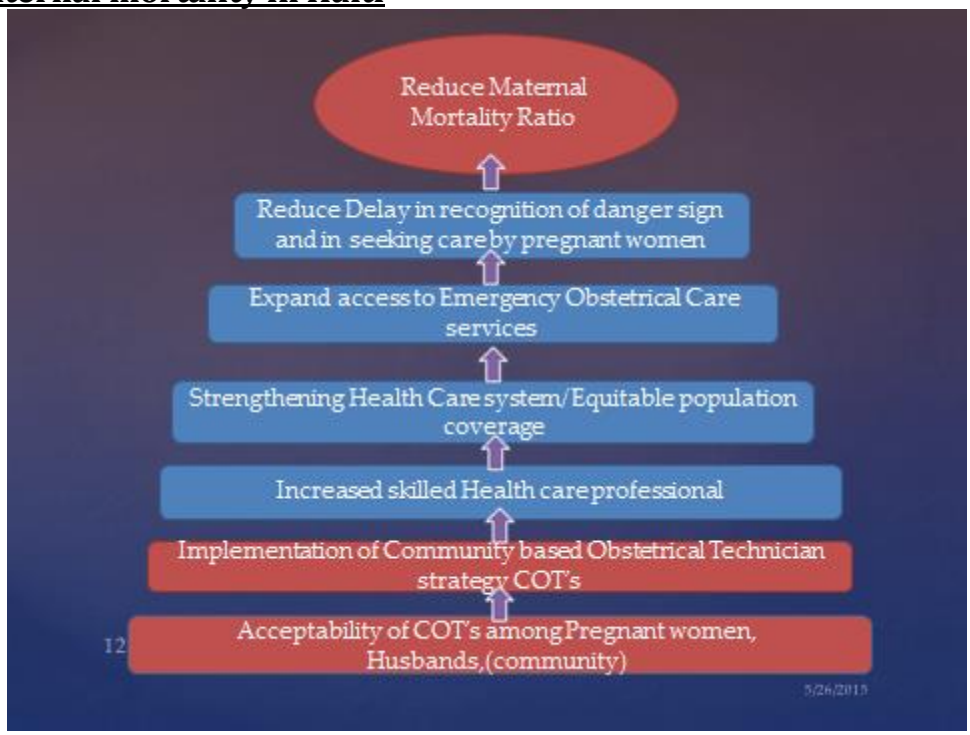
mortality. An important component of the development of the cadre is to identify and train the literate children of TBAs, as a way to value the work of TBAs and build on their cultural influence.

Table 1: Current and Proposed Birthing Assistant Provider Profiles in Haiti

	Traditional Birth Attendant	Skilled birth Attendant (MD, RN, Nurse midwife)	(Proposed) Community-based Obstetric Technician (COT)
Education level	Illiterate (little or no primary schooling)	2- to 6-year university degree plus clinical rotation	At least 9th grade education
Number	Estimated 1 per 500 women[25]	1 physician and 3 nurse/midwives per 10,000 population	Gradual scale-up (E.g., 6 per rural section, therefore 3,420 total for 570 sections)
Coverage area	Nationwide including rural areas	EMOC& EMOB units (urban areas)	Mostly rural and remote areas
Training	Informally trained via ad hoc short courses, e.g. prevention of sepsis	Formal university or other training: MD: 4 years RN: 3 years Midwife: 1 year	Six months of basic training to assist in non-complicated deliveries and refer patient in need of emergency obstetrical interventions. Should be able to recognize and stabilize infection, hemorrhage, hypertension-related illnesses, and obstructed labor.
Equipment and material	Rudimentary	Sophisticated	Basic materials and medications to address: infection, hemorrhage, hypertension-related illnesses, obstructed labor
Scope of practice	Perform deliveries in the community	Normal and high risk deliveries	Normal home deliveries; timely identification of high-risk deliveries. Emergency care and quick reference to health facility for proper management

Caption: Table 1: Author's representation of data gathered from Ministry of Health documents and current practices

Figure 2: Conceptual Framework of Theory of Change to describe pathway by which community obstetrical technicians could reduce maternal mortality in Haiti



Caption: Author conceptualization of factors that could reduce Haiti's maternal mortality ratio. COT: community obstetrical technician.

We conducted a study to investigate the acceptability, among the population in the health district of Jérémie, of this proposed new cadre of community-based skilled birth attendants to expand rural access to emergency obstetric care. The study aims were: 1) to assess the views of men and women of reproductive age in the health district (*Unité Arrondissement de Santé*) of Jérémie of the risk factors for adverse maternal and child health outcomes during the perinatal period, and solicit their opinions about whether a Community Obstetric Technician (COT) would be an effective intervention; and 2) to assess the acceptability to TBAs, community leaders and policy makers of a program to train the literate children of TBAs or other literate community members to become COTs. We hypothesized the creation of this new cadre of COTs would be acceptable in Haiti as

a means to improve maternal, neonatal and prevention of mother-to-child transmission of HIV indicators.

Methods

We used a Grounded Theory research design to collect data using elicitation methods, including semi-structured interviews and focus groups[26], of specific populations in the health district of Jérémie, located in the Grand'Anse department in the southwestern tip of Haiti. This health district was selected for the study as representative of much of Haiti, with two-thirds of the population of 89,000 living in rural areas, and a typical landscape of combined mountainous and flat land with the associated transportation challenges.[27,28] Use rates of facility-based obstetric care are still relatively low, in spite of the availability of a strong community-based primary care service delivery provided by the Haitian Health Foundation (HHF), including a well-established network of TBAs embedded in the community performing up to 82 percent of the deliveries.[27] The departmental reference hospital, Hôpital Saint Antoine, is located in the town of Jérémie and has the capacity to provide comprehensive emergency obstetric care.

We identified seven subgroups of interest and conducted a total of four focus groups and 38 semi-structured interviews with these subgroups (Table 2). The subgroups included 1) women and men of reproductive age (defined as age 25-35 years old, married or in free union status as defined by census to indicate stable relationship, and had a child within the last two years); 2) women who had recently delivered at Hôpital Saint Antoine; 3) TBAs; 4) MOH key informants; 5) community leaders; 6) literate children of TBAs (defined as age 25-30 and achieved at least ninth grade education); 7) other literate young people in the community (defined as age 25-30, achieved at least ninth grade

education). For the last two subgroups, adults aged 25-30 were selected because they were more likely to be settled in the area and have more respect in the community, unlike younger adults who might move elsewhere.

We relied on naturalistic methods within a grounded theory framework [26] to ensure an adequate dialogue with participants to collaboratively construct a meaningful reality. We used primarily an inductive epistemological approach[26] to understand the participants' experiences with and views on TBAs, health facilities, risk factors for maternal death, access to emergency obstetric services and decisions on place of delivery; and secondarily a deductive approach[26] to confirm our hypothesis about the acceptability of the proposed COT cadre.

Table 2: Interviews and Focus Groups conducted in Haiti's Jérémie health district by Subgroup

Subgroup	Interviews	Focus groups	Age of participants	Other Criteria
1. Men and women of reproductive age;	10 participants (4 women, 6 men)	1 focus group with 14 participants (9 women, 5 men)	25 to 35 years old	Stable relationship (married or free union) who had a child within the last 2 years
2. Mothers who delivered at Hôpital Saint Antoine	4 participants	-		Live at 2, 4 or 6 hours from the hospital
3. TBAs	6 participants (3 women, 3 men)	1 focus group with 10 participants (9 women, 1 man)	50-70 years old	Lay village people living in the community officially registered with local health organization HHF
4. MOH key informants (policy makers)	5 participants (3 women, 2 men)	-	35 to 55 years old	-National level decision maker -Regional decision maker

5. Community leaders	7 participants (4 women, 3 men)	-	35 to 55 years old	Local elected officials Community leaders
6. Literate children of TBAs	6 participants (2 women, 4 men)	1 focus group with 11 participants (5 women, 6 men)	25 to 30 years old	Children of TBAs in the community, with 9 years of schooling
7. Literate youth in the community	-	1 focus group with 10 (5 women, 5 men)	25 to 30 years old	Youth in the community, with 9 years of schooling
Total	**38 interviews**	**4 focus groups with 45 participants**		

Caption: Categorization of focus group and interview participants in the study.

Using inductive exploratory approach methodology [26 29], we conducted one-on-one interviews with men and women of reproductive age, and women who had recently delivered at Hôpital Saint Antoine, to collect participant views about perceived risk factors for adverse maternal and child health outcomes and whether a COT cadre would be a potentially effective intervention. We planned to conduct up to 20 interviews (10 women, 10 men) but reached saturation in finding new themes at 10 and four interviews, respectively. We conducted one-on-one interviews with TBAs, policy makers, community leaders, and TBAs' children until we reached theoretical saturation to understand the acceptability of the proposed program (six, five, seven, and six interviews, respectively). We also conducted focus groups with three of the subgroups listed above, as well as a fourth subgroup of literate young adults, to triangulate what we heard in the interviews and engage in a wider discussion. Depending on the subgroup, questions included: Where do women in your community typically choose to give birth, and why? Do you know of women who have died during or related to childbirth, and what could

have been the causes? Are you satisfied with the assistance you (or your partner) received during your last delivery? What is it like delivering with matrons/TBAs? What services exist to help women who experience a complication during labor at home? If more skilled human resources for childbirth were available in the community, would you and others in your community go to them for assistance? How would you feel if [the child of a TBA in the community] were trained to provide more skilled assistance? A summary of the interview and focus group semi-structured question guides (along with the proposed training plan for the COTs, which was shared in summary oral form with participants), are in Appendix Tables 3 and 4.

Sampling

For all subgroups except women who had recently delivered at the hospital and MOH policy makers, participants were selected from the villages of Bonbon, Moron and Roseaux to ensure that we included a purposive sampling of people living between two and six hours' walk from Hôspital Saint Antoine. Men and women of reproductive age meeting the study criteria were identified from health records from HHF, and contacted in person initially by an HHF community health worker. The ward nurse on duty identified women who had given birth at Hôpital Saint Antoine within the past two days and met other study criteria of age and distance of residence. Policy maker participants were senior-level staff at the national MOH office in Port-au-Prince or at the departmental office in Jérémie. We explained the study to a senior manager at the regional and national levels and requested volunteers to participate. Community leaders were identified by HHF staff and local elected officials, and contacted by the researchers. We contacted TBAs who appeared on a TBA registry maintained by the HHF, and who

matched the distance of residence criteria as for men and women of reproductive age. TBAs provided contact information for their literate children and we contacted them. Literate young adults were selected by approaching every fifth house in each village, starting with an index house selected by walking distance from the main hospital , until a target group of 10 participants (five men and five women) was recruited. For subgroups that had both interviews and focus groups, we recruited participants to one or the other method. Individuals participated in only one subgroup even if they also met the criteria for other subgroups, and only one person per household participated in the study across all subgroups.

Consent and Data Collection

The lead author (RF) and one trained recruiter led potential participants through a rigorous consent process, including explaining the study orally, informing individuals of their right to refuse participation, and presenting and reading aloud a written consent form. Participants were given an opportunity to ask questions about the study and, if interested in participating, signed the consent form. For illiterate participants, the interviewer read aloud and filled in the form for the participant, who marked it with an x. We received ethical review and approval for the study from the University of Washington human subjects review board and the Haitian Ministry of Health Research Ethics Committee prior to the beginning of field work.

Except for two subgroups (women who had recently delivered at Hôpital Saint Antoine and policy makers), the interviews took place in or near the participant's house, and focus groups took place under a tree or in another community meeting place in each of the three communities. Interview locations were chosen by asking participants their

preferences. We did not visit any participants' homes or other private spaces without prior invitation or consent. Participants were reimbursed for the cost of travel to and from the focus group location (up to 125 Haitian gourdes, roughly $3, per person). Women who had recently delivered were interviewed in the maternity ward, with privacy measures taken (people asked to leave the space and a separator was drawn around the bed). Policy makers were interviewed in their offices.

RF conducted all interviews in Haitian Creole. He audio recorded and transcribed each interview, then assigned the transcript an alphanumeric code based on the number of the interview and the study subgroup.

Data Analysis

We had planned to conduct up to 44 interviews, but stopped at 38 because we reached saturation in the answers we were receiving across all seven subgroups. Data coding was conducted immediately following the first interview to identify potentially useful concepts. A preliminary list of codes grew to include new codes as new text was added. These themes were then analyzed for broader theoretical constructs until saturation was reached. We used grounded theory thematic analysis[28] to analyze text from men and women of reproductive age to understand their level of satisfaction with current TBA services. A list of codes was created to categorize specific statements into clusters of meanings. Through the interpretive analysis process of decontextualization and recontextualization, we reorganized the data in a set of categories or concepts allowing us to identify central themes and associations.

Results

Perceived risks of home delivery and choice of delivery location

All subgroups perceived considerable risks to women who deliver at home with TBAs, regardless of their neighborhood. Participants see TBAs as a resource readily available to them. By contrast, participants reported financial and distance barriers to going to a hospital to get skilled assistance. In all subgroups, participants had witnessed situations of women suffering from a complicated delivery, followed by a request for evacuation to the hospital in Jérémie. Evacuations were described as often delayed either because of the weather or the distance over poor roads.

Some men would prefer to see their wives deliver at the hospital so they rely on God to avoid those complications that would prevent the transport. One man said, "My wish is to bring my wife to deliver at the hospital when she gets pregnant but I need to have the means for that." Another one said, "The world is changing, things are being modernized so people tend to like deliver with nurses." The female participants also expressed the desire to deliver at a hospital or with a more skilled professional, although since women tend to have to defer to their partners' decision, they were less expressive about their preference. The motivation for choosing to deliver at home with a TBA was described not so much as a desirable cultural practice, but rather an affordable alternative to more desirable modern facilities and trained personnel.

Some participants mentioned the work done by HHF to train TBAs in their area to establish a system of referral, including ambulances to transport women in labor to Hôpital Saint Antoine in Jérémie. They acknowledged that, while desirable, this system has limitations for communities far from main roads and during rainy seasons. One person described a situation where men had to carry a woman for three hours on a

stretcher on their shoulders to reach a road where they could find a motorcycle or a meeting point for an ambulance. A woman described her journey of waiting 18 hours to be picked up by the ambulance even though she lived two hours from Jérémie. "I had suffered so much that night that I felt I was pushing my womb out of my body."

Among the participants who delivered in the maternity ward at Hôpital Saint Antoine, there was a clear divide between those who lived within two hours of the hospital (who seemed to have chosen it as a convenient option), and those who lived at more than two hours' distance, who came to the hospital primarily because they experienced a complication while in labor. The farther away people lived from the hospital, the more they said they would appreciate the opportunity to have a more skilled person to assist them in their community. In addition, younger and more educated participants more often expressed preference to go to the hospital or have more skilled birth attendance. Less educated participants who had not experienced complications in past deliveries said that they saw it as a normal practice to deliver at home with a TBA, preferable because they could be at their own homes and pay less money. They did not express dissatisfaction with the TBAs' services, but would want to go to the hospital in case of a complication.

Participants who delivered at Hôpital Saint Antoine were overall positive about the quality of care received. The half who came in with complications said they felt being at the hospital saved their lives. Participants reported, however, that family members were not allowed to be present during delivery, which may be a perceived negative to delivering in a hospital. In general, participants did not express dissatisfaction with either

TBA or hospital services, but acknowledged different scenarios in which one setting would be preferred (e.g., hospital in case of complications).

Acceptability of COT cadre

Women and men of reproductive age expressed interest in having more highly skilled birth assistance in the community, especially those who lived at a far distance from the hospital. One woman said, "Having more qualified personnel available to assist us,that would be Jesus interceding for us."

The TBA participants were conscious of their limitations in providing care to women in their community. As one participant said, the main goal "is to help women deliver their babies and save them." They are open to receiving support from other people, and are used to it as they regularly undergo refresher training with HHF. All TBA participants stated they would not mind receiving assistance from a more skilled individual, especially if it were a relative. One TBA participant, expressing a common theme, said, "There is a lot of work to do and we are getting old. We sometimes have to walk long distances to assist women." Another said, "If we can find somebody who can assist us when we have problems with a woman that will be of great help." They are not hostile to the idea of their children or anyone else in the community being trained to become part of an intermediate-level cadre that can assist them with complicated cases.

Health officials at the regional and national levels as well as leaders in the community all recognized the need to have a stronger alert system responsive to the needs of women in labor throughout the country. One participant said, "There are not that many resources available. We have mostly TBAs available [but] we do not want to build the system on them." The participant went on to describe the Ministry of Health's

strategy of training and placing community health workers capable of recognizing a number of health conditions (called *agents de santé polyvalent*s in French) in rural areas, but noted that while these health workers "are trained to identify danger signs of pregnancies," they are not able to provide care. Another participant working at the national level acknowledged the barriers to usage of centralized care: "I would say that as the population is living scattered, this is a hindrance to the concentration of care delivery at the institutional level or at a fixed point in the community. How can we ask a pregnant woman to walk numerous kilometers on foot to seek care? It is not that she is not interested, [but] she will think about it twice."

Other participants discussed how a community-based cadre could align with the MOH's policy of promoting institutional deliveries at EMOC and EMOB units to reduce maternal mortality. One MOH participant said, "Even within the EMOC network we are putting in place, we have to think about a referral and counter-referral system to address the problem of competencies which are not available at some levels. Moreover, if we have to go further down the line to the community level by training an intermediate category of skilled professional, we need to think of a referral system [up to departmental hospitals]." Even high-level participants from the MOH agreed that Haiti needs to go further in its strategy to reach remote populations that lack access to roads and transportation to reach health facilities. One said, "Absolutely, for me you are opening an open door. I would like to see at the community level the identification and training of human resources that will stay to help women. If you embark on this boat, I will take my ticket."

Another policy maker acknowledged the challenge of where to focus limited resources to maximize outcomes, prioritizing institutional strengthening but citing a need for more support in rural areas: "Our health system is so weak and lacking so many resources that I would go first to strengthen existing structures that are not functional, to ensure continuity of care at the hospital-level EMOC unit before investing in the completion strategy [to have trained personnel at the community level]. So I have to endorse the current policy of the MOH, however I strongly believe that it will be insufficient to meet the needs of our rural women. (…) You are preaching to a believer." This sentiment was shared by several other decision makers.

Interest in becoming a COT

The young adults and children of TBAs expressed excitement about the opportunity to help their fellow citizens as a trained birth attendant. Most of the children of TBAs who participated in the study admitted to being influenced by their parents' work and wanted to have a career in the health field. Some of the children of TBAs mentioned they wanted to be nurses and even doctors, but a lack of resources prevented them from completing the necessary education. Some had taken advantage of free training, for instance a health prevention course in cholera or family planning. They expressed gratitude for the idea of an obstetrical technician cadre and hoped that "it will not take long to initiate this program." Some also made suggestions about the implementation of such a program, such as to have COTs be an employee of a hospital or health center (as community health workers often are), since their clients are poor.

Discussion

Overall, participants demonstrated a clear pattern in their responses. They tended to confirm our hypothesis that there is a perceived risk to home-based delivery with a TBA, and preference to be at a hospital if complications arise. They pointed to a need to secure skilled providers within the community to help pregnant women in labor, independent of the discussion of which category of professional it should be (i.e., whether a new COT cadre or expanding an existing cadre into rural areas). Young people increasingly prefer a more trained attendant at birth, as do those with higher levels of education. Economic factors, and perhaps a limited perspective on other alternatives, seemed to drive some women's preference for home delivery for a non-complicated birth. While most subgroups responded favorably to the concept of a COT cadre, including TBAs and those who would be potential recruits to the cadre, policy makers held a more nuanced view, mostly based on feasibility. While willing to explore the idea, they tended to cling to the current strategy, given resources available.

The study is consistent with previous findings in the literature about the barriers to choosing an institutional delivery and to accessing emergency obstetric care for women in Haiti. The study addressed gaps in the literature on women and men's choices about delivery location. We gathered the perceptions of women, TBAs and community leaders on the need for and acceptability of additional skilled birth attendants at the community level in Haiti, while contributing new insight on policy makers' views and priorities in improving obstetrical care.

The concerns expressed by some policy makers about the feasibility of a new COT cadre highlighted a potential conflict between the MOH's current adopted strategy

of strengthening institutional delivery (instead of investing in community-based skilled birth attendants), and the related issue of perceived insufficient resources to strengthen obstetric care services at multiple levels of the health care system simultaneously. This reflects a political and fiscal reality that may influence whether the COT strategy can ultimately be adopted. Policy makers strongly agreed, however, on the need for more community-based trained birth attendants in rural areas and a referral system to support in-hospital care, indicating that it may be acceptable as a pilot project in the short-term, and could be scaled up in the future.

Policy considerations suggested by this study include: 1) possible placement of COTs in areas at farthest distance from health facilities, since these women are least likely to reach health facilities; 2) identification of COT candidates who are already committed to living in their communities and will remain once trained; 3) provision of COT services for free (with COTs as paid employees of the Ministry of Health) or on a sliding scale to reduce barriers to usage; and 4) integration of COTs and any other community-based health workers into the larger health system. Community-based cadres could receive support and supplies, refer patients to higher-level facilities, and also provide follow-up when patients return. Use of Haiti's national electronic medical record, iSanté, can be leveraged to maintain health records regardless of where a patient receives care.

Study limitations

The study was conducted in one peri-urban area in the health district of Jérémie, and cannot necessarily be generalized to all of Haiti although other rural areas in the country may have similar conditions. Because we recruited the women and men of

reproductive age from health records of the Haitian Health Foundation, there is a possible selection bias toward people who are already willing and able to access healthcare. The economic context in Haiti where at least two-thirds of the population is unemployed or underemployed in the informal sector may have influenced participants to overstate their positive interest in being a COT, rather than simply being interested in any gainful employment.[30]

Conclusions

There is a clear need to strengthen Haiti's rural health system at the institutional level as well as address the gap in services for a majority of women. The proposed community obstetric technician cadre is acceptable to women and men, as well as to TBAs, community leaders and policy makers, although it is one of several possible solutions. Current MOH policy is to train and deploy midwives to staff obstetric facilities, and, in some settings, "polyvalent" community health workers to identify but not treat problems arising in pregnancy and childbirth. Given financial constraints that undermine the rapid scale-up of the MOH's proposed EMOC and EMOB units across the country, a lower-level cadre of community-based skilled birth attendant such as a community obstetric technician may be a desirable option. This study was envisioned as a first phase, to be followed by a costed implementation plan to establish a COT workforce.

The study suggests that the MOH plan for maternal care should include a referral system and skilled personnel starting at the home delivery level, up to clinics, hospitals and major referral centers. COTs can also support follow-up postpartum care and reduce neonatal mortality rates. As other research has noted, ongoing supervision, training and supplies are essential to the success of a community-based workforce. Without

addressing the gaps in quality of care and referrals at the community level, investments further up the health care delivery chain in Haiti are unlikely to yield significant improvements in the health outcomes of pregnant women in rural Haiti.

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Appendices

Appendix Table 3: Interview and focus group questions, by subgroup

Subgroup 1: Women and men of reproductive age
• Tell me about how the birthing process went for you. • Where does birth usually take place? • Are you comfortable with a family member assisting in birth? • Tell me what it is like delivering with *matrons*. • Tell me about the current perception of women and women of reproductive age about delivering with *matrons*. • Tell me about willingness of men & women of reproductive age to utilize the most trained birth attendant to be present at their delivery. • How difficult it is to find nurse midwives present in your area/neighborhood? • How many midwives are present in Jérémie? • Would you used a more qualified person [than a *matron*] if available?
Subgroup 2: Women (and partners) who delivered at Hôpital Saint Antoine
Women: • How far do you live from the hospital? • Why did you decide to come to the hospital? • Tell me about the quality of service in the clinics? • Who was present during the birth? • Tell me about is the current birthing practice of the community? Who is present at deliveries? **Men who attended their partners' hospital birth:** • Did you feel your partner received the appropriate care she needed? • Tell about your experience at the hospital. • Tell me about is the current birthing practice of the community? Who is present at deliveries?
Subgroup 3: Traditional birth attendants (TBAs)
• Tell me about your work as a *matron*. • Tell me about problems encountered while providing care to women. • Do you know of women who died and what could have been the causes? • Would you be open to receiving assistance from a more skilled professional if need be to better help pregnant women in labor? • Tell me how you would feel if one of your children or any youth in the community is interested in receiving training to become a skilled community obstetrical technician.

Subgroup 4: Policy makers / key informants from MOH
• Tell me about what resources are currently available to women giving birth in the community. • Tell me about challenges women face to access emergency obstetrical care. • Is it common to have people experience complications giving birth in your neighborhood? What do women and families usually do if there is a complication? • Tell me about current policies within the Ministry of Health regarding reducing maternal mortality and organization of service delivery. • Would it make a difference to have somebody with 9 years of schooling, preferably a TBA's child, that is trained to perform some basic care during deliveries? [Described proposed training plan.] Would this help people in the community? • Would people agree to use their services?
Subgroup 5: Community leaders
• Tell me the barriers to access emergency care related to pregnancy and childbirth in the community. • Tell me about the causes of delays in seeking care. • What is the role of *matrons*/TBAs? • Do people believe in the ability of the *matrons* to help in real emergencies? • Do you know of women who died and what could have been the causes? • What is the preference of women in your community for where to deliver? Why? (Hospital vs home?) • If more skilled human resources are available in the community, would you or other people in the community go to that person for assistance?
Subgroup 6: Literate children of TBAs
• What are *matron* practices your parent has taught you? • Is there any aspect you would change from what you know about *matron* training now? • Have you assisted your *matron* parent in any deliveries in your community? • Tell me about your interest in being a *matron* or providing assistance during labor?
Subgroup 7: Literate young adults in the community
• How common is it for women to experience complications giving birth in your neighborhood? What do women and families usually do if there is a complication? • Tell me about the current perceptions of women and women of reproductive age about delivering with *matrons*. • What is it like delivering with *matrons*? • Is there any aspect you would change from what you know about *matron* practices? • Tell me about your interest in providing assistance to women during labor?

Appendix Table 4: Proposed Community Obstetrical Technician Training Plan

Month	Competencies	Sub-competencies	Specific objectives
1-2	Infection Control/Prevention/Recognition	1-Infection Prevention 2-Risk & Recognition of Chorioamnionitis	-Hand Hygiene -Aseptic Technique -Sterile Vaginal Exam -Bodily fluids and waste management -Signs of Chorioamnionitis -Premature or Prolonged ROM -Frequent vaginal exams after ROM
1-2	Recognition of Normal Delivery, Prolonged Labor & Obstructed Labor	1-Evaluation of Women in Labor 2-Recognition of Prolonged Labor 3-Recognition of Obstructed Labor	-High-Risk vs. Low- Risk Pregnancy -Assessing Strength of Contractions -Identifying Fetal Presentation -Use of Fetoscope and Assessment of Fetal Heart Rate -Recognizing Stages of Labor and Normal Timing in Primiparous and Multiparous Woman -Laboring Positions Recognizing Dysfunctional Labor -Recognizing Prolonged ROM
3-4	Recognition of Preeclampsia & Eclampsia	1-Signs and Symptoms of Preeclampsia and Eclampsia 2-Seizure Management	-Recognition of Preeclampsia and Referral -Maternal Safety and First Aid -IM injection technique

3-4	Hemorrhage Management	1-Antepartum Hemorrhage 2-Intrapartum Hemorrhage 3-Post Partum Hemorrhage	-Definition and Causes of Hemorrhage -Signs of Placenta Previa -Signs of Miscarriage -Signs of Placental Abruption -Management of Postpartum Hemorrhage and When to Refer -Placenta Delivery
5-6 month	Full-Time Clinical Rotation		

Appendix Table 5.1: Responses by subgroup on risk factors for adverse maternal and child health outcomes and decision on birth location

Sub groups	Variables/Questions	Common themes
1-Men and women of reproductive age;	-Current birthing practice of the community?	-Home delivery with TBAs is the norm
	-Barriers to access emergency care/Causes of delays in seeking care	-Population lives far from health institutions - Delay in evacuation -Lack of infrastructure in rainy season -Lack of trained health personnel
	Do you know of women who died and what could have been the causes	-Heard stories about women who died, not close relatives -Lack of transportation in case of emergencies
	Preference in delivery site (Home vs Hospital)	-Belief in matrons/TBAs. -Custom with home delivery with TBAs to assist women in labor -TBA's services less expensive -Inability of TBA to help in real emergencies -Modern world, would favor hospital delivery - Unavailability /Inaccessibility of hospital care services
2-Mothers who have delivered at	Distance from the hospital.	-Live more than 2 hours from the Hospital of reference

the maternity ward in Hôpital Saint Antoine		-Lack of ambulances for emergency evacuation if obstetrical emergency occurs
	Tell me about decision to come deliver in the hospital? Tell me about the quality of service in the clinics?	-Think it is a risk to deliver with matrons (50% of interviews) -50% of participants preferred to deliver home but to come because of an emergency while in labor Satisfied with care received in general. Saved their life (in some cases).
3-TBAs	Current problems encountered while providing care to women in labor	-Transportation problems -Remote areas: walking time 4 to 6 hours in mountains -Ambulance not systematically available for evacuation -High transportation cost for the family
4-Key informants from MOH;	Tell me about the birthing process in the community? Where does birth usually take place? Tell me what is it like delivering with matrons	-Home delivery preferred -Population lives far from health institutions -Lack of transportation for emergencies - Delay in evacuation in rainy season -TBAs available -Lack of trained health personnel
	Tell me about willingness of men & women of reproductive age to utilize the most trained birth attendant to be present at their delivery.	-Want skilled health professional
	Tell me about trained skilled birth attendants or midwives present in Jérémie?	Insufficient 1 OBGYN 3 nurse midwives

5-Community leaders	Belief in matrons'/TBAs' ability to help in real emergencies Tell me about conditions women are giving birth in the community	- Some TBAs are old and sometimes have sight and mobility issues to walk long distance - Delay in evacuation in rainy season

Appendix Table 5.2: Responses by subgroup on whether establishment of COT cadre would be an effective intervention

Sub groups	Variables/Questions	Common themes
1-Men and women of reproductive age;	If more skilled human resources were available in the community, would you go to that person for assistance?	-Desire for more skilled health care professional readily available -Young educated people expressed willingness to deliver with skilled health care professional or at the hospitals
2-Mothers who have delivered at the Maternity ward in Hôpital Saint Antoine	Same	-Feel they need more skilled health care professionals readily available
3-TBAs	Same	-All TBAs would appreciate having a back-up support. -No problem to collaborate with new cadre. -Skilled young people available will help
4-Key informants from MoH;	Same	-Would be seen as a complementary intervention -National strategy to promote clinic deliveries with skilled birth attendants (midwives)
5-Community Leaders	Same	-Great opportunity -Great need. -Open to welcome new cadre

		-Quality of service of the new cadre will make the difference and help -Want to see the result of the study -Want to have a project as soon as possible

Appendix Table 5.3: Responses by subgroup on acceptability of children of TBAs to become COTs

Sub groups	Variables/Questions	Common themes
3-TBAs	How do you feel about opportunity for your children to be trained to become COT	-No problem -More knowledge is always welcome - All TBAs would appreciate having a back-up support
4-Key informants from MoH	Tell me what you think about training intermediate level technician to assist women in community while they deliver Do we have sufficient midwives are present in Jérémie area	-Would be seen as a complementary intervention. -National strategy promote clinic deliveries with Skilled birth Attendant
5-Community Leaders	Tell me about willingness of men & women of reproductive age to utilize the most trained birth attendant to be present at their delivery. How difficult it is to find nurse midwives present in your area/neighborhood? Would people in your community use a more qualified person if available?	Want more skilled health professionals Very rare Best to use trained professional
6- Literate children of TBAs and	Have you assisted your TBA parent in any deliveries in your community	-Great interest in their parent's work -Motivation for carrier in health services.

7- Literate youth in the community		-Have observed the TBA practices -Believe TBAs have limitations
	Do you have an interest in being a TBA or providing assistance during labor?	-Ready to enroll in a COT program. -Some want to be nurse but lack of resources -All have finished at least 10 years of schooling -Want to acquire competences to serve their community better than the TBAs