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Case 3: Obstetric Fistula

Case of Sarah's second pregnancy

THE LANCET

Obstetric Vesicovaginal Fistula as an International Public-Health Problem, *Lancet (2016)*

A comprehensive review of obstetric fistula- epidemiology, consequences (physiological and psychosocial), and contributing factors. This is followed by a brief introduction to the public health issues fistulas create.

YouTube

Documentary on Obstetric Fistula, UNFPA

A 15-minute documentary entailing the devastating consequences of obstetric fistula in various communities (as told by patients). This video also showcases the successes of UNFPA Benin in treating and reintegrating these women back into society. https://www.youtube.com/watch?v=nz2g_VnnseA

BMC Pregnancy & Childbirth

Overcoming Phase I Delays: the critical component of obstetric fistula prevention programs in resource-poor countries, *BMC Pregnancy Childbirth (2012)*

A commentary discussing the barriers to seeking and obtaining obstetric care, and how these barriers can be addressed.

SOCIAL SCIENCE & MEDICINE

The Traditional Healer in Obstetric Care: A persistent wasted opportunity in maternal health, Soc Sci *Med (2015)*

This paper explains who Traditional Birth Attendants (TBA) and Traditional Healers (TH) are, and their roles. Various maternal complications and traditional remedies are discussed.

International Journal of GYNECOLOGY & OBSTETRICS Official publication of FIGO The International Federation of Gynecology and Obstetrics

How the Integration of Traditional Birth Attendants with Formal Health Systems can Increase Skilled Birth Attendance, *Int J Gynaecol Obstet (2011)*

A systematic review to describe the mechanisms for integrating TBAs with formal health services and increasing skilled birth attendance

"A Walk to Beautiful" Mary Olive Smith, Engel Entertainment *(2007)*

This documentary explores the stories and lives of five women suffering from obstetric fistula. Follow their journey to the Hamlin Fistula Hospital in Addis Ababa where they begin to rebuild their health and lives.

Case 3: Maternal M&M (Obstetric fistula)

Sarah is an 18-year old mother, expecting her second child. She lives with her family in Kondoa, in rural Tanzania. Growing up, Sarah and her two sisters never attended school past the sixth grade as they had to work to help support the family. During particularly challenging crop seasons, Sarah remembers how she and her family used to eat mainly *ugali* (maize-flour porridge) and *chapati* (soft flat bread). Like many of her friends, Sarah got married at fifteen and became a mother soon after.

Sarah's second pregnancy progresses without any complications, and she goes into labor at 39 weeks. However unlike her first pregnancy, Sarah labors at home for three days with her mother and a traditional birth attendant (TBA) by her side. The extreme pain and the prolonged labor prompts Sarah to be transported to the nearest clinic, a 12-hour bike ride away. Upon her arrival at the clinic, intra-uterine fetal death (IUFD) is determined and the next day Sarah delivers a stillborn male baby.

Approximately eight days post-partum, Sarah makes the arduous journey back to the clinic. She looks emaciated, pallid, and tired. She timidly explains to the clinic nurse that she has been leaking urine from her vagina over the last three days.

Questions for Discussion:

1. What are the healthcare problems in this case?
    a. Fistula formation in the context of obstructed labor
2. What are the roles of TBA in communities such as Sarah's?
3. Using the *Integrated Human Rights and Women's Health Checklist,* which human rights are protected or infringed in this case?
4. What are some contributing factors to obstetric fistula?
5. What are the primary and secondary prevention strategies for ending obstetric fistula?
6. What standards of practice are in place in your healthcare system to prevent a similar outcome?
7. What are the consequences of obstetric fistula?
    a. Physiological, psychological, and social

Obstetric vesicovaginal fistula as an international public-health problem

L Lewis Wall

Vesicovaginal fistula is a devastating injury in which an abnormal opening forms between a woman's bladder and vagina, resulting in urinary incontinence. This condition is rare in developed countries, but in developing countries it is a common complication of childbirth resulting from prolonged obstructed labour. Estimates suggest that at least 3 million women in poor countries have unrepaired vesicovaginal fistulas, and that 30 000–130 000 new cases develop each year in Africa alone. The general public and the world medical community remain largely unaware of this problem. In this article I review the pathophysiology of vesicovaginal fistula in obstructed labour and describe the effect of this condition on the lives of women in developing countries. Policy recommendations to combat this problem include enhancing public awareness, raising the priority of women's reproductive health for developing countries and aid agencies, expanding access to emergency obstetric services, and creation of fistula repair centres.

Lancet 2006; 368: 1201–09

See Perspectives pages 1146 and 1147

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Vesicovaginal fistula is an abnormal opening between the bladder and the vagina that results in continuous and unremitting urinary incontinence (figure 1). In industrialised countries, such fistulas are rare, and arise mainly from malignant disease, radiation therapy, or surgical injury (usually to the bladder during hysterectomy).[1,2] In the poor countries of Africa and south Asia, however, vesicovaginal fistulas are a common problem, afflicting many women. In these countries, fistulas are usually caused by prolonged obstructed labour, which was also once the most common cause of fistulas in Europe and the USA. Fistula from obstructed labour was eradicated from industrialised nations by the middle of the 20th century as effective systems of obstetric care were developed to cover the entire population of childbearing women. As a result of this success, contemporary published work on obstetric fistulas is woefully inadequate by the standards of 21st century evidence-based medicine, a situation that is not uncommon for medical problems that are largely confined to poor countries. A comprehensive review in 2005 of existing medical and surgical reports on obstetric fistulas concluded that "the Western medical literature on obstetric fistulas is old and relatively uncritical by current scientific criteria. This literature consists mainly of anecdotes, case series (some quite large), and personal experiences reported by dedicated surgeons who have labored in remote corners of the world while facing enormous clinical challenges with scanty or absent resources at their disposal."[3] The precise extent of the fistula problem in developing countries is, therefore, unknown, but review of the available evidence suggests that this problem is both enormous and neglected.

Figure 1: **Moderate-sized vesicovaginal fistula from obstructed labour**
A metal catheter passed through the urethra is clearly visible through the bladder base, which is missing. Copyright Worldwide Fistula Fund, used by permission.

Epidemiology

In 1993, a generally accepted estimate (admittedly not well grounded in hard data) suggested that at least 2 million women in the developing world had unrepaired obstetric fistulas, and even this number was regarded by many observers as too low at that time.[4] A recent conservative attempt to estimate the incidence of obstetric fistulas with a population-based survey of severe obstetric morbidity in West Africa concluded that there were probably at least 33 000 new cases each year in sub-Saharan Africa.[5] At the other end of the spectrum, the most recent estimate from the WHO

Search strategy and selection criteria

A MEDLINE search was done from 1966 onwards with the keywords "fistula," "vesicovaginal fistula," and "obstructed labor," along with intensive bibliographic checking of older published books and journals. The material was reviewed by a select committee of fistula experts currently working in developing countries, who supplemented published sources with their own personal experience, as part of the Third International Consultation on Incontinence in Monaco in 2004, and updated since. The full report of the committee has been published.[3]

Global Burden of Disease Study suggested that obstructed labour affects at least 7 million women every year, 6·5 million of whom live in the least-developed regions of the world where access to competent obstetric care is poorest and the likelihood of serious complications is greatest.[6] If only 2% of obstructed labours in the developing world result in a subsequent fistula, 130 000 new cases would be added each year, and because women may live for decades with this condition, the burden of suffering borne by these women measured in quality-adjusted life years is enormous. Because the capacity to repair obstetric fistulas lags far behind the incidence in these countries, as many as 3·5 million women might be suffering from this condition. Results of a qualitative survey of the extent of the fistula problem in nine African countries by EngenderHealth on behalf of the UN Population Fund confirmed that this condition is widespread.[7]

Although much talk and many conferences have been devoted to safe motherhood over the past 20 years, the *British Journal of Obstetrics and Gynaecology* recently referred to the maternal health crisis in the world's poorest nations as "the scandal of the century".[8] A 100-fold disparity exists between maternal mortality ratios in affluent industrialised countries and those in poorer countries; 99% of the world's 529 000 annual maternal deaths occur in the developing world; and if a woman's lifetime risk of dying as the result of a complication of pregnancy or childbirth is considered, the disparity is even greater.[9] For example, a woman's lifetime risk of dying as the result of a pregnancy-related cause is estimated to be one in 29 800 in Sweden, but as high as one in six in the most impoverished, least developed regions of Africa and Asia (such as Sierra Leone and Afghanistan).[9] The international aid community has been largely uninterested in funding programmes that provide emergency obstetric services for the poor women of the world. As a result, many have come to regard "safe motherhood" as an "orphan initiative".[10,11]

Tragic as any maternal death is, the loss of life that occurs from avoidable obstetric causes is dwarfed by the number of women in developing countries who sustain crippling, non-fatal obstetric injuries. The precise prevalence of serious maternal morbidity in developing countries remains unknown, but evidence suggests that it is alarmingly high. For example, Fortney and Smith[12] calculated the ratio of serious maternal morbidity to maternal mortality for Indonesia, Bangladesh, India, and Egypt and estimated that 149, 259, 300, and 591 serious maternal injuries occurred in these countries, respectively, for every maternal death. The most dramatic maternal birth injury is vesicovaginal fistula. Although substantial numbers of fistulas are caused by trauma, by sexual abuse or coital injury in child brides, by infection (particularly with lymphogranuloma venereum), and by harmful traditional practices such as female genital cutting or other forms of unwarranted surgery, the most common worldwide cause of vesicovaginal fistula is obstructed labour.[13–15]

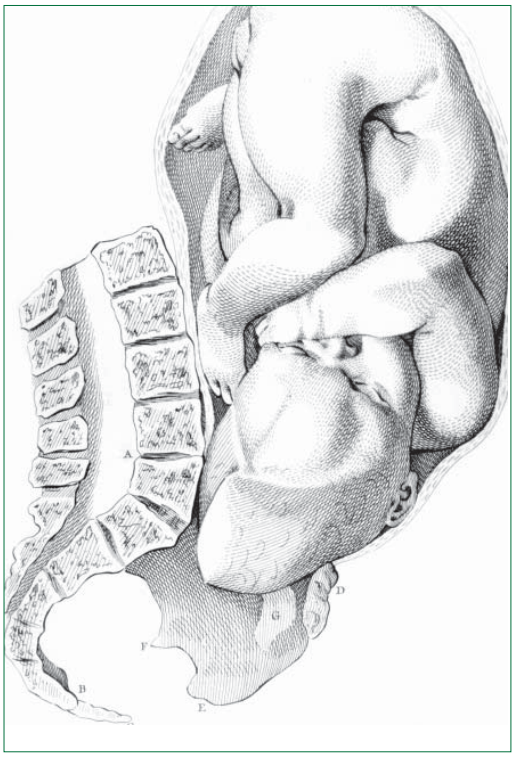

Figure 2: **18th-century obstetrical drawing of obstructed labour from absolute cephalopelvic disproportion**
From William Smellie's *Sett of Anatomical Tables*, 1752. Note overlapping parietal bones.

Obstructed labour and its consequences

Labour becomes obstructed when a woman cannot deliver her baby through her birth canal because of a discrepancy between the size of the fetus and the space available in her pelvis (figure 2). Two major evolutionary forces have made human females uniquely susceptible to this cephalo-pelvic disproportion: the assumption of an erect bipedal posture, which has imposed structural constraints on the architecture of the human pelvis; and the increasing size of the human brain over time. As a result, the mechanics of childbirth are more complicated in *Homo sapiens* than in any other mammalian species.[16] To negotiate the changes in pelvic anatomy imposed by an upright posture and bipedal gait, the human fetal head must constantly readjust its position in the pelvis throughout the second stage of labour. If the passenger will not fit through the passage, a pelvic impasse results. The disproportion between the

Panel: **The obstructed labour injury complex**

Urological injury
Vesicovaginal fistula
Urethrovaginal fistula
Ureterovaginal fistula
Uterovaginal fistula
Complex combined fistulas
Urethral damage, including complete urethral destruction
Bladder stones
Stress incontinence
Marked loss of bladder tissue from extensive pressure necrosis
Secondary hydroureteronephrosis
Chronic pyelonephritis
Renal failure

Gynecological injury
Amenorrhoea
Vaginal stenosis
Cervical injury, including complete cervical destruction
Secondary pelvic inflammatory disease
Secondary infertility

Gastrointestinal injury
Rectovaginal fistula formation
Rectal stenosis or complete rectal atresia
Anal sphincter incompetence

Musculoskeletal injury
Osteitis pubis

Neurological injury
Foot-drop from lumbosacral or common peroneal nerve injury
Complex neuropathic bladder dysfunction

Dermatological injury
Chronic excoriation of the skin from maceration by urine or faeces

Fetal injury
Fetal case-fatality rate of about 95%

Social injury
Social isolation
Divorce
Worsening poverty
Malnutrition
Depression (sometimes with suicide)
Premature death

presenting fetal part (usually the head) and the available space in the maternal pelvis is the key to the development of obstructed labour.[17] This problem is especially prevalent in parts of the world where girls grow up malnourished, marry early, and become pregnant before they have achieved full pelvic growth.[18,19]

The problem faced by women trapped in obstructed labour must be solved by surgery (caesarean delivery), but timely access to emergency obstetric services is often non-existent in developing countries.[20] In such cases these women might be in labour for as long as 4 or 5 days without any effective intervention.[3,21–24] What this problem means for the unfortunate woman has been succinctly summarised by Deborah Maine: "...we have all had our hearts wrenched by photographs of starving children. But how many people have imagined what it means to be in labour for five days, in pain, exhausted, knowing that your baby is already dead and you will die soon because the hospital where a cesarean section could be done is out of reach, either physically, financially, or socially?".[25] In Africa, obstructed labour is a major cause of maternal mortality, but for many women the consequences of surviving this ordeal may be worse than death itself.

In obstructed labour the soft tissues of the pregnant woman's vagina, bladder, and rectum are compressed between the fetal head and the maternal pelvic bones by the contractions of the uterus. As the fetal head is forced tighter and tighter into the pelvis, the blood supply to the mother's soft tissues is progressively constricted, and, ultimately is shut off completely. The result is a widespread ischaemic injury that produces massive tissue damage throughout the maternal pelvis as well as fetal death from asphyxiation. In a day or two the dead fetus becomes macerated, softens, and changes its conformation in the maternal pelvis sufficiently that it can be expelled through the vagina. A few days later a slough of necrotic tissue comes away, leaving a fistula between the bladder and the vagina (or sometimes between the rectum and the vagina) in its place (figure 2).

Vesicovaginal fistula that occasionally occurs after a hysterectomy is a relatively simple injury: it is caused by a discrete wounding of otherwise normal tissue (such as a misplaced clamp or a suture in combination with a pelvic haematoma or abscess). By contrast, the fistula produced by obstructed labour is the product of a massive field injury caused by the impacted fetal head. The most visible evidence of this process is the area of central necrosis in which the fistula develops, but the fistula itself is surrounded by a variable area of living but still abnormal tissue that has sustained a sublethal ischaemic injury. This damage in turn may result in dense scarring that makes subsequent surgical repair extremely difficult.[21] Although the focus of clinical interest has traditionally been the injury to the bladder that occurs in these cases, vesicovaginal fistula is only one of a range of devastating injuries that can be produced by obstructed labour. Because the crush injury in this condition affects a broad area that corresponds to the size of the presenting fetal part, the tissue destruction is often extensive, resulting in a cascade of related multisystem injuries known as the obstructed labour injury complex (panel).[22] These additional injuries include vaginal stenosis due to scar

tissue formation and subsequent vaginal contracture (sometimes with virtual obliteration of the vagina),[26,27] amenorrhoea and secondary infertility,[28] rectovaginal fistula formation,[21,23,29] hydroureteronephrosis and renal failure,[30] damage to the pubic symphysis,[31] and foot-drop caused by compression injuries to the nerves supplying the lower extremities.[32]

Classification

The location of an obstetric fistula depends on where in the course of the second stage labour becomes obstructed and which tissues are trapped between the bony pelvis and the fetal head.[33] Thus, a fistula can involve almost any series of contiguous structures in the pelvis: ureterovaginal fistula, vesicouterine fistula, vesicocervical fistula, vesicovaginal fistula, urethrovaginal fistula, rectovaginal fistula, and combinations of such injuries. Since the work of J Marion Sims in the 19th century, surgeons have devised various systems for classifying and describing the nature and location of obstetric fistulas,[34] but there is still no general agreement on how this should be done. As McConnachie noted in 1958, "It is common to find that each author has either used his own form of classification based solely on the anatomical structures involved, or the size of the fistula, or even one of convenience".[35] Fistulas are most commonly described simply by location, as mid-vaginal, juxtacervical, urethrovaginal, and so on. Although new systems for classification continue to be proposed,[36,37] there is still a general lack of agreement about what a classification system ought to do. In oncology, for example, many internationally accepted systems exist for staging cancer. These systems have all been correlated with the prognosis for treatment of the particular cancers for which they have been developed. Similarly, any useful classification system for obstetric fistulas should be more than descriptive: it must evaluate or score prognostic factors relevant to treatment outcome. To date, no proposed classification system for obstetric fistula has been prospectively evaluated to investigate how it correlates with surgical outcome. Until this is done, classification systems for obstetric fistulas will remain intellectual exercises of limited clinical use.

Detailed review of published work suggests that the main prognostic factors affecting the treatment of obstetric fistulas are the degree of scarring in the operative area, whether the continence mechanism of the urethra and bladder neck is involved in the fistula, the size of the fistula (particularly if there has been extensive loss of bladder tissue from necrosis), and the presence of other serious injuries, such as a concurrent rectovaginal fistula.[3]

Treatment

The treatment of obstetric vesicovaginal fistula depends on when the patient presents for care after obstructed labour. Because of the shortage of accessible emergency obstetric services in areas of the world where fistulas are prevalent, most women present months or years after their injuries.[3,21,23] If a woman presents within the first 3 months after injury, prompt initiation of continuous bladder drainage with an indwelling catheter can allow spontaneous closure of the fistula, particularly if it is small (<2 cm in diameter).[38,39] Because fistulas from prolonged obstructed labour occur as the result of a broad field injury with an area of central necrosis surrounded by living but still severely damaged tissues, the traditional teaching has been that 3 months should elapse before any attempt at surgical closure is made so that the full extent of the injury is manifest. In 1994, Waaldijk advocated early surgical intervention in vesicovaginal fistulas from obstructed labour, apparently with good success,[40] although his practice of doing such operations without anaesthesia must surely be regarded as unethical in the 21st century.[41]

The ultimate goal of fistula surgery is to restore normal function of the lower urinary tract and any other pelvic structures affected. This process is more challenging than simply closing the fistula, which has been done with a high degree of success in 80–95% of cases in most series.[3] The best chance of fistula closure is generally agreed to be at the time of the first operation. In a large series of 2484 patients, Hilton and Ward[42] reported successful fistula closure in 83% of patients at the first attempt, whereas successful closure was achieved in only 65% of patients who needed two or more operations. Similarly, there is general agreement that the fistula, which may be encased in scar tissue, should be freed completely from the surrounding tissues so that the edges can be coapted easily and closed without any tension on the suture line. The repair should be watertight at the time of closure. Where possible, it is generally preferable to close the fistula in several layers and to drain the bladder for 14 days after surgery to prevent overdistension of the repair, although the precise duration of postoperative bladder drainage remains more a matter of tradition than evidence-based practice. Especially in complex fistulas where extensive pressure necrosis of surrounding tissues has occurred, it is often prudent to bring in a new blood supply by use of a bulbocavernosus or other tissue graft as an adjunct to repair.[43,44]

Urinary incontinence after fistula closure

The emphasis on vesicovaginal fistulas as a cause of urinary incontinence in developing countries often leads to the assumption that closure of the fistula is all that is necessary to restore continence in affected women. Unfortunately, even in cases where the fistula has been successfully repaired, 16–32% of women remain incontinent.[21,45] Although urodynamic assessments of women with obstetric fistulas who have undergone repair are infrequent because of the absence

of appropriate equipment in most facilities seeing large numbers of fistulas,[46] the most common reasons for successful closure but continence failure seem to be damage to the bladder neck and urethral sphincter mechanism during labour, altered detrusor activity, bladder fibrosis, and (in some cases) markedly reduced bladder capacity after closure of extensive fistulas, which can result in a bladder with a functional capacity of less than 50 mL. Treatment of women with persistent stress incontinence after fistula closure is frequently challenging, because of the extensive scar tissue that often forms around the affected tissues. Several authors have recommended the routine placement of urethral suspension stitches at the time of fistula closure to prevent post-repair incontinence, but these techniques have only had limited success.[47,48] The best results seem to be obtained with procedures that involve some combination of urethrolysis, which frees the urethra from entrapment in scar tissue, and the addition of some type of compressive suburethral sling.[49–52] If the urethra has been completely destroyed by obstructed labour, some form of urethral reconstruction is necessary if continence is to be restored.[53]

Psychosocial damage resulting from obstetric fistula

Published work on obstetric fistula often focuses exclusively on the hole in the bladder and does not pay enough attention to the whole patient. The psychosocial circumstances in which these women find themselves as the result of having sustained an obstetric fistula can be even more devastating than the physical injuries themselves. Rather than experiencing the joy of first motherhood, vast numbers of young women become social pariahs every year because of these injuries.

Although husbands and family members may initially be supportive and compassionate to these women, when it becomes clear that the constant loss of urine or faeces is a chronic condition (viewed as incurable in the context of the traditional local culture) these women are usually divorced or abandoned by their husbands and are often cast out by their families.[21,24,54–57] In an analysis of patients who presented at the Addis Ababa Fistula, Muleta[24] found that women who owned property of value were less likely to be divorced or abandoned by their husbands, but since obstructed labour and fistula formation is more common in young, primiparous adolescents who are likely to be illiterate and from impoverished rural areas, these injuries are most likely to affect women of low social status who are already among the most vulnerable members of society.

Additionally, the cause of fistula is not readily apparent to the surrounding community, who may view these injuries as a punishment from God for sexual misbehaviour or as a form of venereal disease, in essence blaming the victim for her predicament and further adding to the social stigma she encounters.[55,57]

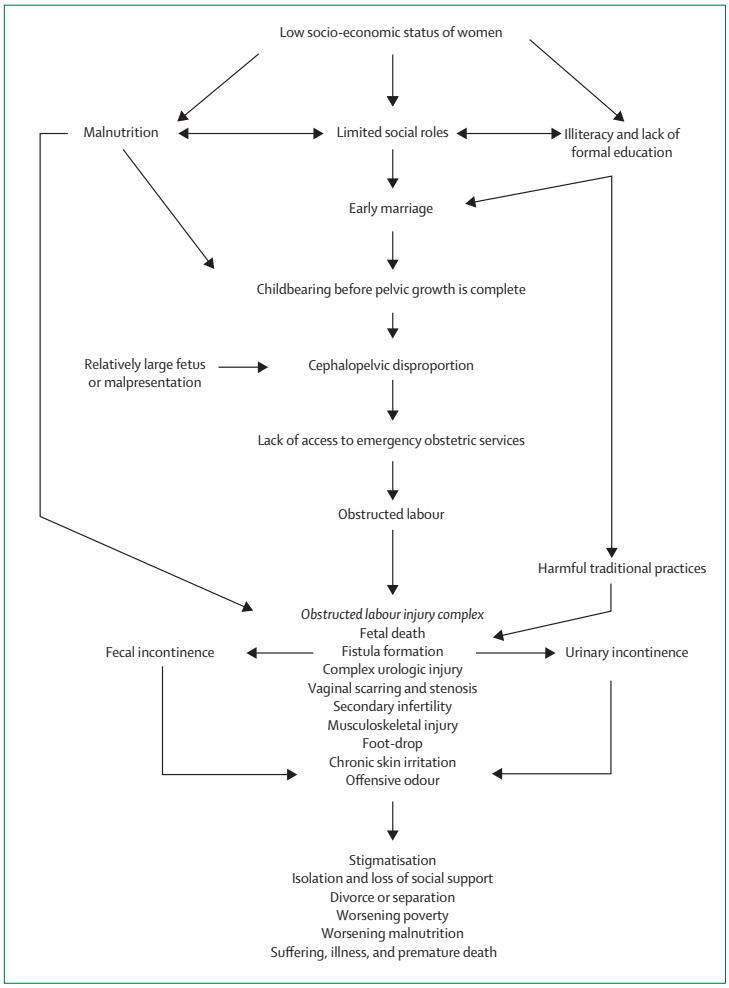

Figure 3: **The obstetric fistula pathway**
Copyright Worldwide Fistula Fund, used by permission.

Although little detailed research has been done on this issue, results of preliminary surveys suggest that depression, anxiety, and other forms of mental health dysfunction are widespread among women with vesicovaginal fistula.[58]

Socioeconomic factors in obstetric fistula formation

Why is fistula so prevalent in developing countries? The answer lies in a complex interplay of biological, social, and economic forces (figure 3).[3,57] Obstructed labour and subsequent fistula formation are most common in young primigravid women. African women are predisposed to dystocia because of the relatively narrow architecture of their pelves compared with Europeans.[59] Additionally, many African girls are married at a very

early age. The likelihood of obstructed labour is increased in areas where early marriage and childbearing are common, because although growth in height stops or slows with the onset of menarche, the capacity of the bony pelvis normally continues to expand after the epiphyseal growth plates of the long bones have fused.[19] These problems are worsened if girls have been undernourished throughout childhood and adolescence.[18] Thus, although girls are capable of becoming pregnant at a relatively early age, their pelves do not develop their full capacity to accommodate childbearing until much later, and many will have their lives destroyed by obstetric injury before they have even crossed the threshold into true adulthood. In most case series, the average age of a fistula patient is younger than 25 years, and many are as young as 13 or 14 years.[13,14,21,23,24,60,61] Although the risk of obstructed labour is greatest in younger mothers, any woman can develop the condition if the right combination of obstetric factors converge: large fetal size, malpresentation, intervening disease or malnutrition, etc. A bimodal distribution of fistulas has often been reported, with the highest peak in primigravid women and another peak among women who have had four or more pregnancies—a reflection, perhaps, of the tendency of birthweights to increase with subsequent gestations.[60]

Probably the most important factors contributing to the high incidence and prevalence of obstetric vesicovaginal fistulas in Africa, however, are socioeconomic (figure 3).[57,62,63] Poverty is the breeding-ground where obstetric fistulas thrive. Early marriage, low social status for women, malnutrition, and inadequately developed social and economic infrastructures are all more common in poor areas. Most importantly, lack of access to emergency obstetric services is ubiquitous in the poor areas of the world.

Fistulas are most prevalent where maternal mortality is high. Most maternal deaths are due to preventable causes: haemorrhage, infection, hypertensive disorders of pregnancy (pre-eclampsia and eclampsia), unsafe abortion, and obstructed labour. Although the prevention of maternal death from these causes requires skilled medical and surgical care, none of these interventions requires high-technology resources. The essential elements of emergency obstetric care are intravenous fluids, antibiotics, blood transfusion, oxytocic drugs, and basic surgical services (which can usually be provided under spinal anaesthesia).[8,10,64] However, even these simple life-saving services are usually unavailable in low-resource areas.

From a historical point of view, it should be noted that maternal mortality rates in western Europe and the USA at the beginning of the 20th century were similar to those in the developing world. The widespread diffusion of access to emergency obstetric services accounted for the dramatic fall in maternal deaths between 1935 and 1950, and it is largely the absence of effective access to emergency obstetric services that accounts for both the high levels of maternal death and the tragic prevalence of vesicovaginal fistulas throughout Africa today.[8,10,62,65] In parts of the world where obstructed labour is a major contributor to maternal mortality, the rate of vesicovaginal fistula might even approach the maternal death rate.[42,60]

Prevention and treatment: the public-health challenge

Virtually all obstetric fistulas could be prevented by adequate intrapartum care that would detect the abnormal progression of labour and would allow timely intervention before labour became obstructed. Simple graphic analysis of the progress of labour (the partograph) used by trained birth attendants reduces maternal deaths, prevents prolonged labour, and even results in a decrease in operative intervention (by allowing normal labour to proceed without unnecessary interference);[66] yet even this level of basic obstetric care is absent throughout most of the developing world.[8,10,62] The provision of essential obstetric services has never been a top priority for the governments of countries where the fistula problem is most severe. The maternal health programmes that do exist are often restricted to provision of rudimentary prenatal care or emphasise birth control, but family planning programmes and antenatal health care services by themselves will never have more than a marginal effect on maternal mortality. Most maternal deaths are due to unexpected complications that cannot be predicted in advance but that demand prompt intervention when they occur: haemorrhage, hypertensive crises, sepsis, complications of unsafe abortion, and obstructed labour. The international public health community has not emphasised the critical need for surgical services in the developing world, and this problem has been made worse by lack of meaningful ongoing communication between the public-health community and clinical obstetrician-gynaecologists.[8,10,67]

In the meantime, the backlog of unrepaired fistulas continues to increase throughout these impoverished countries. Since fistulas by themselves are not fatal, the millions of women thus afflicted continue to live lives of unremitting misery, while tens of thousands more are added to their ranks every year. The basic techniques needed for fistula repair have been known for more than 150 years.[3,68] Most recent advances in fistula surgery have come in the areas of improved anaesthesia, synthetic suture materials, better urinary catheters, and techniques of tissue grafting, rather than from breakthroughs in basic science. Fistulas can be repaired at minimal cost with low-technology surgical operations done under spinal anesthesia, yet even these basic surgical services are unavailable in most developing regions.[3] Pilot studies have shown that the techniques

needed to repair uncomplicated fistulas can be taught quickly and efficiently to doctors who already have basic surgical skills.[69] There are even spectacular cases in which intelligent but uneducated individuals with good manual dexterity can be taught to become expert fistula surgeons.

However, possession of surgical skills is not enough. Numerous other problems are associated with providing fistula repair services in developing countries.[3,21,24,55,70,71] Fistula sufferers tend to be young, illiterate, destitute women from rural areas, without political influence or economic resources.[21,24,30,56,57] These women cannot pay even the modest rates charged for surgery at most hospitals in Africa. Fistula repair must be an act of charity, but other surgical patients who are required to pay for their own care resent the provision of free services of this kind. Furthermore, fistulas are severely stigmatising. In many African countries, difficult labour is believed to be a punishment sent by God or the ancestors for adultery on the part of the woman, loading a moral stigma on top of a physically offensive condition.[54–57,72] The necessity for prolonged catheter drainage after surgery (10–14 days) to permit the bladder to heal means that fistula patients need longer hospital stays and more intensive nursing care than do many other surgical patients—which, in turn, makes them unpopular with nursing staff. Furthermore, fistula cases are rarely emergencies. In hospitals that provide general surgical services, scheduled fistula cases are frequently bumped from the operating list because of road traffic accidents or other life-threatening emergencies. In no area of the health-care systems of developing countries are fistula patients a high priority. They are at the bottom of the heap socially, sexually, economically, politically, and medically.

There is, therefore, an urgent need for countries with large numbers of women who have vesicovaginal fistulas to develop specialised centers dedicated exclusively to the care of these women. Not only does this focused factory approach allow maximum efficiency of patient care (the Addis Ababa Fistula Hospital, the outstanding model of this kind, has now treated more than 25 000 fistula patients), but it also allows for the development of a uniquely supportive sisterhood of suffering among these women that is a key component in healing their psychosocial wounds.[55,72] Much of the nursing care in such a hospital can actually be provided by current or former fistula patients, which further strengthens the sense of community among these women.

The most important need, however, is for the obstetric fistula problem to move up the list of international health-care priorities. The launch of an international campaign to end fistula spearheaded by the United Nations Population Fund (UNFPA) and partnering organisations such as Engender Health and the Worldwide Fistula Fund is a step in the right direction, but little true progress will be made until politicians and health administrators in developing countries put this issue on their national health-care agendas themselves. As Shiffman and colleagues have shown, the factors that raise the priority of safe motherhood and related issues in such countries are complex, but individual case studies suggest that cooperative relations between ministries of health and international organisations, creation of inclusive international health-policy networks, and provision of adequate external aid, coupled with pressure from dedicated local activists, can reshape health-care priorities for women in countries as diverse as Indonesia and Honduras.[73,74] A heightened awareness of the burden of injuries such as vesicovaginal fistulas might help to rekindle the faltering international commitment to reduce maternal mortality, especially if dedicated fistula champions mobilise support at the local level to demand that action be taken on this issue.[70,71,74,75]

Although the obstetric vesicovaginal fistula has vanished from the collective memory of more developed countries, it continues to ruin the lives of tens—if not hundreds—of thousands of young women every year. This situation is a mark of shame on the world medical community and demands urgent and sustained action.

Conflict of interest statement

I am the founder, President, and managing director of the Worldwide Fistula Fund, a not-for-profit charitable organisation registered in the state of Illinois, which is recognised as a public charity under section 501[c][3] of the United States Internal Revenue Code. The purposes of this charity are to provide direct clinical services to women in the developing world suffering from childbirth injuries, especially vesicovaginal fistulas from prolonged obstructed labour, and to advance public awareness, education, surgical training, and advocacy for these women.

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COMMENTARY Open Access

Overcoming phase 1 delays: the critical component of obstetric fistula prevention programs in resource-poor countries

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Abstract

Background: An obstetric fistula is a traumatic childbirth injury that occurs when labor is obstructed and delivery is delayed. Prolonged obstructed labor leads to the destruction of the tissues that normally separate the bladder from the vagina and creates a passageway (fistula) through which urine leaks continuously. Women with a fistula become social outcasts. Universal high-quality maternity care has eliminated the obstetric fistula in wealthy countries, but millions of women in resource-poor nations still experience prolonged labor and tens of thousands of new fistula sufferers are added to the millions of pre-existing cases each year. This article discusses fistula prevention in developing countries, focusing on the factors which delay treatment of prolonged labor.

Discussion: Obstetric fistulas can be prevented through contraception, avoiding obstructed labor, or improving outcomes for women who develop obstructed labor. Contraception is of little use to women who are already pregnant and there is no reliable screening test to predict obstruction in advance of labor. Improving the outcome of obstructed labor depends on prompt diagnosis and timely intervention (usually by cesarean section). Because obstetric fistulas are caused by tissue compression, the time interval from obstruction to delivery is critical. This time interval is often extended by delays in deciding to seek care, delays in arriving at a hospital, and delays in accessing treatment after arrival. Communities can reasonably demand that governments and healthcare institutions improve the second (transportation) and third (treatment) phases of delay. Initial delays in seeking hospital care are caused by failure to recognize that labor is prolonged, confusion concerning what should be done (often the result of competing therapeutic pathways), lack of women's agency, unfamiliarity with and fear of hospitals and the treatments they offer (especially surgery), and economic constraints on access to care.

Summary: Women in resource-poor countries will use institutional obstetric care when the services provided are valued more than the competing choices offered by a pluralistic medical system. The key to obstetric fistula prevention is competent obstetrical care delivered respectfully, promptly, and at affordable cost. The utilization of these services is driven largely by trust.

Keywords: Obstetric fistula prevention, Vesicovaginal fistula, Obstructed labor, Phases of delay, Trust

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Background

Labor becomes obstructed when the progress of the fetus through the pelvis is arrested, in spite of ongoing, vigorous uterine contractions [1,2]. Untreated prolonged obstructed labor is one of the five most common causes of maternal mortality in poor countries (the others being hemorrhage, hypertensive disorders of pregnancy, sepsis, and complications of unsafe abortion) [2]. In addition to being a major cause of maternal death, obstructed labor also creates obstetric fistulas, one of the most devastating kinds of severe obstetric morbidity [3]. An obstetric fistula is formed when the tissues that normally separate the vagina from the bladder and/or rectum are destroyed by the prolonged impaction of the presenting fetal part (usually the fetal head) against the soft maternal tissues that are trapped between the fetal head and the woman's boney pelvis. The destruction of these tissue barriers joins these adjacent structures through a fistula, which results in continuous incontinence of urine or stool (sometimes both) and turns the affected woman into a social outcast. The misery experienced by a woman with an obstetric fistula is incalculable [4,5]. Estimates suggest that as many as 3.5 million women currently suffer from this condition in developing countries (primarily in sub-Saharan Africa and south Asia), with an annual incidence of between 50,000 and 130,000 new cases per year [3,6].

A fistula forms when obstructed labor puts enough pressure on the soft maternal tissues trapped between the fetus and the woman's pelvic bones to compromise their blood supply. As blood flow is cut off, the tissues eventually cross a threshold at which tissue death occurs. This threshold is affected by many different factors, including the amount of force acting on the tissues, the location at which obstruction occurs, the length of time labor has been obstructed, and the inherent resilience of the affected tissues (itself a complex summation of many interconnected biological factors). Because a complicated interplay of factors sets the threshold at which injury occurs, there is no obvious minimum time limit after which an obstetric fistula will be produced. Relatively short labors less than 12 hours in length may result in a fistula if the conditions for "a perfect storm" are present [7]. In practical terms, this means that all cases of obstructed labor should be regarded as emergencies and treated promptly to avoid the development of serious complications. As Thomas Addis Emmet recognized nearly 150 years ago, "...the amount of injury is by no means in proportion to the length of labor. Therefore, the only safety consists in as speedy a delivery as the circumstances of the case will admit" [8], (p. 20). In addition to the formation of obstetric fistulas, a wide array of other pelvic injuries--- commonly referred to as "the obstructed labor injury complex" [9]—may accompany obstructed labor.

Discussion

Reducing maternal mortality and severe obstetric morbidity

It has been obvious for many years that reductions in maternal mortality and serious maternal morbidity can only be accomplished through three mechanisms [10]:

1. The risk of becoming pregnant can be reduced. Since only women who become pregnant are at risk for maternal death or severe maternal morbidity, family planning programs can reduce the number of pregnancies in a given population and thus reduce the number of women at risk for pregnancy complications [11,12].
2. The risk of a woman developing a complication during pregnancy might be reduced. This is the rationale for antenatal screening programs. Unfortunately, the risk-approach to reducing maternal mortality and morbidity has not worked in practice because the vast majority of life-threatening obstetric complications arise unexpectedly and cannot be predicted in advance [13-15]. In spite of decades of effort using both high- and low-technology approaches, there are still no screening tools with adequate sensitivity and specificity for routine clinical use that will predict which women will develop obstructed labor in advance of labor itself [16-20]. The most reliable predictor of obstetric outcome is past obstetric history, a fact that is particularly unhelpful for evaluating potential complications during a woman's first pregnancy [21].
3. Outcomes can be improved for women who develop complications during pregnancy, labor, and delivery. Obstetric emergencies such as hemorrhage, eclampsia, sepsis, or obstructed labor require prompt treatment if death or serious morbidity is to be avoided. Improving the outcome for women who develop complications is the rationale for enhancing rapid access to emergency obstetric services. This has emerged as the cornerstone of current efforts to reduce maternal mortality and morbidity in developing nations [22,23].

The treatment that is most likely to improve both maternal and fetal outcomes in obstructed labor is cesarean section, which by-passes the obstruction in the birth canal by creating an abdominal alternative to vaginal delivery. For injury to be avoided, delivery must take place expeditiously, with minimal delay. The longer labor remains obstructed, the longer potentially damaging forces are applied to the vulnerable soft tissues of the affected woman's pelvis, and the more likely it is that pressure necrosis will produce an obstetric fistula.

Therefore, the key to obstetric fistula prevention is prompt diagnosis and treatment of obstructed labor.

The three phases of delay in obstetric emergencies

In their groundbreaking article "Too far to walk: Maternal mortality in context," Thaddeus and Maine proposed a three part framework for evaluating delays in accessing emergency obstetric care [24]. This framework is based on the understanding that most life-threatening emergencies cannot be predicted in advance and that once a complication arises, a bad outcome can only be avoided by the prompt provision of effective treatment. In any emergency scenario, a similar series of steps occurs: development of a complication, recognition that a complication has arisen, a decision to seek treatment for the complication, movement to a center where emergency obstetric services are provided, and delivery of care that resolves the complication. Not all cases of maternal death or serious maternal injury can be prevented, but if the time between the onset of the complication and the delivery of appropriate treatment is minimized, overall outcomes will be dramatically better. This is particularly true in cases of obstructed labor, where trauma to maternal tissues sufficient to produce an obstetric fistula is likely to take at least several hours before the injury threshold is crossed. Of all of the major complications that a woman could develop during labor, the formation of an obstetric fistula should be the most preventable.

Thaddeus and Maine articulated three principal "phases of delay" impacting the successful resolution of life-threatening obstetric emergencies: 1) delay in deciding to seek care; 2) delay in arriving at a suitable obstetric care facility; and 3) delay in receiving appropriate care at that facility [24]. The three phases of delay are each influenced by different factors and the solutions to the impediments that cause delays in each phase can be provided by different actors. In this scheme of things, phase two and phase three delays appear to be the most amenable to solution.

There is abundant evidence that maternal death and serious birth injury increase with increasing distance from medical facilities [22,25-28]. Most travel delays (phase two delays) could probably be overcome by a combination of community mobilization and the establishment of emergency obstetric transportation networks (ambulances, etc) linked by an effective communications system that ties the various components of the healthcare system together [29-31]. This is the kind of project that people can reasonably demand from their governments and healthcare systems. Doing this is an essential part of public service. For example, in the 1990s when the government of Honduras set about trying to reduce the high maternal mortality that existed in the Department of Intibuca, an inaccessible mountainous region in the west of the country along the border with El Salvador, they constructed hospitals and health centers, linked them with an ambulance service, created a radio communications network to improve efficiency, and in the case of the town of San Francisco de Opalaca (which had the highest maternal mortality in the country and which was inaccessible except by foot), they pushed a new road through to open the community to outside access [32]. Sustained efforts to develop infrastructure in this way have also played a major role in improving maternal health in countries such as Sri Lanka and Malaysia [33].

The problem of phase three delays (delays in the delivery of competent emergency care) properly falls within the purview of public health officials, hospital administrators, physicians, midwives, and their professional organizations. Deaths and injuries that occur after a woman has arrived at a hospital are often due to incompetent decisions, neglect of patients, shortages of supplies and personnel, or other logistical factors [34-37]. It is not unreasonable to demand accountability within the medical system for such shortcomings and to demand that such problems be solved. Instituting tight administration, vigilant oversight, protocols for the treatment of common problems such as obstructed labor, and ongoing professional development and self criticism will go a long way towards resolving phase three delays. People should rightly demand timely deliverance of competent medical care from the hospitals and health centers that serve them [38-42].

Overcoming phase I delays: the critical component of obstetric fistula prevention

In both phase two and phase three delays, it is at least theoretically possible to allocate responsibility for poor system performance and to demand accountability for the high rates of maternal death and disability that result. This fact offers at least the possibility of leveraging improved performance for the public good. This is largely a political problem, but one that can be overcome even in low-resource countries [43,44]. The more complicated problem appears to be changing the causes of phase one delays, because these depend largely upon individual behavior. For this reason we refer to phase one delays as "the critical component in obstetric fistula prevention."

If the process of accessing emergency care outlined by Thaddeus and Maine is to function effectively in the first phase, several things must happen in rapid sequence: a problem must be present, it must be recognized as a problem important enough to require action, the action needed to solve the problem must be identified and agreed upon (usually invoking some conception of cause

and effect or at least identifying the "repository of knowledge" where the solution to the problem can be found), and a decision to act must be made that moves the process into the second and third phases of care-seeking. The factors that impact attitudes and decisions in this critical first phase are far more diffuse, intangible, and difficult to control than those impacting delays in the second and third phases because these factors operate at the level of individual and family dynamics. As Edward de Bono has written, "Most of the mistakes in thinking are inadequacies of perception rather than mistakes in logic" [45], (p. 58). In the first phase of delay, perception is everything. Understanding that a problem is present, understanding what the problem is, and understanding how the problem may be solved are absolutely critical for the successful resolution of obstetric emergencies.

Obstetric fistula has been eliminated in wealthy countries where educational standards are good and prompt access to emergency obstetric care is the cultural norm. If a woman in an affluent country develops a serious injury from obstructed labor, the event is remarkable enough to be written up and published as a case report in a medical journal [46,47]. In contrast, there are millions of unrepaired obstetric fistulas in sub-Saharan Africa and south Asia. The epidemiology of obstetric fistula clearly indicates that women who develop this condition come predominantly from poor communities, usually located in the rural areas of resource-poor nations, where women have limited access to formal education, marry early (often while still children themselves), have high rates of fertility, and usually lack employment opportunities that would generate a significant cash income and lead to greater personal autonomy [7,48-52]. For example, among 899 women who developed an obstetric fistula and presented for care at Evangel Hospital in Jos, Nigeria, the mean age at marriage was 15.5 years, most were illiterate, 78% had no formal education, only 4.5% had ever used contraception, and only 10 women had any kind of regular paid or salaried employment. The rest were all housewives, agricultural workers, menial laborers, or earned what little income they had through petty trading [48].

Because fistula patients tend to be poor, lacking in formal education, and immersed in rural African or Asian culture, there are deep social components to the obstetric fistula problem which have not yet been adequately explored by researchers. Although all three phases of delay are influenced by cultural factors, these influences appear to be most pronounced in the first phase of delay during which the existence of a problem is perceived, the possible solutions to the problem are debated, and a decision is made to seek a solution to the problem as perceived. Perhaps the most fundamental point to be made is that the decision to seek therapy is not simply a decision either "to do nothing" or to "go to a hospital." Women with pregnancy complications in rural African and Asian communities can utilize many competing therapeutic options, albeit of greatly differing therapeutic efficacy, especially when it comes to obstructed labor. Therapeutic pluralism is the norm in these communities and the quest for therapy often involves the concurrent use of multiple different healing pathways depending on how the presenting problem is understood and how the efficacy of competing therapies is evaluated [53,54]. From the standpoint of bioscientific obstetrics, obstructed labor is a problem of faulty obstetrical mechanics---the fetus will not fit through the birth canal---but those most intimately affected by a case of obstructed labor may be more worried about social factors than about simple mechanics. Their concerns may lie more with metaphysics than with physics proper. They may be more concerned with placating the supernatural forces they fear may be responsible for the delay in delivery than with understanding and rectifying the faulty obsetrical mechanics involved. Such concerns have significant implications for what happens next.

How long should a normal labor last?

The formation of an obstetric fistula is a problem that originates during prolonged labor when that labor is obstructed. The critical problem in the first phase of delay is recognizing that labor is prolonged. By WHO standards, labor is prolonged if it lasts more than 24 hours [55] and there is an old adage in tropical obstetrics that "the sun should not rise twice on a laboring woman." If a woman is laboring under the supervision of a skilled birth attendant, the diagnosis of prolonged/obstructed labor should not be difficult to make, but in parts of the world where fistulas are common, most women deliver by themselves, in the company of family members, or using other forms of traditional birth assistance [56,57]. Under these circumstances, what is regarded as the "normal" length of labor may be quite different from accepted obstetrical norms. For example, The Prevention of Maternal Mortality Network in West Africa found that in Bo, Sierra Leone, and in the Nigerian cities of Sokoto and Zaria, prolonged labor was not considered a problem of sufficient importance to seek medical care until two to five days had elapsed [58]. As Douglas and Wildavsky have pointed out, "risk" is constructed differently in every culture, based on local perceptions and values, and "substantial disagreement remains over what is risky, how risky it is, and what to do about it" [59], (p 1). The concepts of "risk" and "blame" are deeply anchored in local cultural constructs and underlying assumptions about the nature of the world [60,61]. Determining when labor is actually prolonged depends very much upon local notions of

what the "normal" length of labor might be [54]. Anthropologists are only just beginning to investigate cross-cultural notions of time in relation to pregnancy, labor and delivery—concepts which are critical to obstetric fistula prevention [62]. Added to the problem of determining the "normal" length of labor is the difficulty of distinguishing "false" labor (irregular uterine contractions that may mimick labor but which do not produce cervical change) from "true" labor (uterine contractions of sufficient force, duration, and frequency to produce effacement and dilatation of the cervix)—a diagnosis that is difficult to make without performing serial cervical examinations [63]. Distinguishing labor that is prolonged due to ineffective uterine contractions from labor that is truly obstructed, also takes obstetrical experience. Tracking the progress of labor with a partograph (a simple graphic depiction of the progress of labor) is extremely effective in determining when labor is prolonged [64,65]. Intensive and ongoing community education programs that emphasize the importance of seeking skilled care if labor lasts more than 24 hours are likely to be fundamental in altering traditional attitudes about the "normal" length of labor.

What is to be done?

Once it has been determined that labor is prolonged, a solution to this problem must be proposed. For effective fistula prevention, the laboring woman should be transported rapidly to an emergency obstetric care facility where proper treatment (often cesarean section) can be provided. At this point, however, there are many possible and very divergent therapeutic pathways that can be chosen by the actors involved. Some of these pathways—perhaps many---will lead to adverse outcomes including death or severe morbidity when labor is obstructed.

One decision is simply to do nothing. In clinical medicine this is referred to as "watchful waiting," and while avoiding *unnecessary* intervention is often a virtue in obstetric practice [66], this approach can be disastrous if it allows labor to drag on for several days. In some cases the decision to do nothing is based on religious fatalism—if God so wills, the problem will resolve itself. In other cases the parties involved may simply have no idea of what to do or where to turn, and so do nothing. In the study of 899 fistula cases from Jos, Nigeria, by Wall and colleagues, 6.5% of patients reported that they were unaware of the availability of hospital obstetric care and nearly 27% could not give any reason as to why they delayed seeking help [48].

In some cases an intervention *other* than transporting the patient to an obstetric emergency care facility will be chosen. One common therapeutic option is to seek help from someone local who is regarded as an authority on problems associated with childbirth. Such individuals function as repositories of "authoritative knowledge" with respect to childbearing difficulties, "the source" in which solutions can be found within the local cosmology [67]. These authorities may be midwives or shamans or religious figures (pastors, priests, imams, etc) who are thought to possess special skills or information that may be of therapeutic utility in difficult cases of labor. In Christian Africa, churches are often the first place of refuge in cases of dystocia. Therapy typically consists of prayer and religious rituals that do not effectively address the problem of mechanical obstruction [68,69]. Muslims often resort to versions of Islamic folk medicine, attempting to harness the power they believe resides in the Koran. In northern Nigeria, for example, a common treatment for many ills is writing out on a wooden slate a verse from the Koran that is thought to be "therapeutically potent," washing off the ink that has been used to write (and therefore embody the power of) God's words, thereafter drinking the inky water as a medicine [70]. In other parts of Africa traditional lineage priests or clan elders may be convened to discuss the case, particularly if there is suspicion that the pregnant woman has committed adultery or other sins which are blocking her delivery [58,71-74]. The Prevention of Maternal Mortality Network found "In all of the areas studied, certain behavior (including infidelity and disregarding the authority of one's husband or elders) is believed to lead to obstructed labor and hemorrhage. Women in Accra, Benin, Bo, Calabar, and Freetown reported that when complications arise, the oracles are consulted, and if, for example, the oracle says the complication is due to the woman's insubordination to her husband or elders, she has to apologize and perform cleansing rites before she is taken for treatment. Similarly, in Bo, a woman suffering from a complication thought to be due to infidelity is forced to confess her sins, and her husband must spit water on her abdomen to appease the gods; only then is she taken for further help, if the complication is thought serious enough to warrant hospital treatment. In most of the communities studied, people believe that the will of God, heredity, and evil spirits can cause obstetric complications. In such situations, the care of traditional healers and diviners is sought, and the modern health-care system is used only as a last resort" [58].

Beliefs that problems in labor arise from disturbances in the social environment rather than as simple problems of obstetrical mechanics are common in many cultures, and women are often blamed for these, and other, health misfortunes. Among the Esan people of Edo State, Nigeria, "It was observed from discussions with both men and women that illnesses in adult women

are mostly caused by offenses against tradition or custom. In contrast, the illnesses of adult males and children are seldom self-inflicted but are often caused by the misdeeds of women. In essence, a woman is blamed for disasters to her child, her co-wives' children, and her husband; but she alone must bear the responsibility for her own state of health" [71]. Obstructed labor—recognized as a condition potentially fatal to both mother and child—is thought to be caused by factors such as "having sex in the afternoon or in the fields, incest, adultery, practicing witchcraft and taking a husband's property (such as money) without his knowledge or permission. Most of these supernatural factors can be brought promptly under control when the woman confesses her offence, which is necessary before ritual can be successful; otherwise, no cure can be provided and death becomes inevitable" [71].

According to Monica Wilson, the Nyakyusa of East Africa believe that "A delayed delivery is commonly attributed to the woman's adultery, and she is pressed by the midwife to confess the name of her lover or lovers, but it is also believed that it may be due to *imindu*, that is the shades [ancestral spirits]. The husband consults a diviner who indicates whether the *imindu* is on his side or that of the woman's father and the one who is thus indicated should pray. 'Sometimes the woman herself tells of a quarrel which would lead to *imindu* and then her husband or father goes to pray'" [72] (p. 144).

Denise Allen described a belief called *usangalija* among the Sukuma of west central Tanzania. *Usangalija* is the Sukuma term for prolonged or stalled labor. It refers to the phenomenon of "mixing," when a woman allows "foreign" sperm to enter her while pregnant with a baby fathered by a different man. This "mixing of men" is potentially dangerous for both the mother and child, for the outcome of such cases may be fatal. It is said to produce a sort of revulsion on the part of the fetus, who "instead of moving down the birth canal, . . . moves up in uterus instead" [73] (p.205). Allen recounted several stories of women who were accused of adultery after they experienced difficulties during childbirth. The proposed local treatments of *usangalija* included such therapies as taking a pinch of sand from the exact spot where a dog—a notoriously promiscuous animal species---had previously given birth, mixing it with water and giving it to the laboring woman to drink, or taking a root found growing in the middle of the road---a place through which much traffic has passed---grinding it, mixing it with water, and giving to the woman to drink.

In other cultures sexual misbehavior on the part of the husband is also thought to affect a pregnancy. According to Chapman, among the Shona of Mozambique, "Adultery on the part of the husband can also kill his pregnant wife: if the woman with whom he has had the affair comes near the wife while she is in labor, the wife will begin to sweat and then die." [74] (p.125). More commonly, however, the problem is attributed to infidelity on the part of the pregnant woman. This has profound implications for family dynamics. As Chapman writes, "In a patrilocal marriage, where a wife moves to live with her husband and his patrikin, a mother-in-law [*sogra*] can also exercise considerable influence over her son's wife if she experiences trouble with childbirth. Infidelity on the part of the pregnant woman is widely believed to cause problems during childbirth, especially prolonged or blocked labor, and it is the right and duty of a mother-in-law to extract this information from her daughter-in-law. Armed with such a confession, the *sogra* can inform her son, often initiating a break in relations between the young couple or even catalyzing divorce proceedings, thus fortifying her own position of influence with her son. Senior women's power in this setting is linked to their ritual control over certain diagnoses in pregnancy and birthing that carry social meaning" [74] (p.215).

It is critical to understand that for women in many cultures, obstetric problems such as prolonged labor are not viewed as random physiological events but rather are tied directly to their unique individual relationships with their family and community. Anthropologist Nicole Berry recounted the following explanation from one of her Mayan informants in rural Guatemala: "Sandra told me that one of her births had taken more than five days. Why did it take so long, I asked? Probably, she said, because she had been fighting a lot with her sisters-in-law during the pregnancy. As the birth is a family event, if things are not going well within the family, they might not go well within the birth. A bad relationship between a husband and wife, the central actors in the birth narrative, can be the root of even worse problems. Husbands who don't take care of their wives and fight a lot with their wives while they are pregnant were also blamed for causing birthing problems" [75] (p.171).

When traditional midwives are consulted for obstetrical problems, they follow their own culturally-derived diagnostic and treatment logic, which is usually quite different from that advanced by biomedical obstetrics [54,73,76,77]. This may lead to therapeutic decisions that seem logical within the local context but which are ineffective or even directly harmful to the laboring woman. For example, it may be decided that the uterus is not contracting strongly enough. To combat this, an oxytocic drug may be administered, either in the form of a traditional recipe using locally obtained bioactive materials [78] or in the form of a standard pharmaceutical preparation obtained on the black market or

elsewhere [79,80]. In obstructed labor this will usually increase the force applied to the impacted fetal part, thereby increasing the likelihood of uterine rupture or fistula formation. In some cases violent external force—such as sitting on the pregnant woman's abdomen—may be applied to try to force the baby out, with disastrous consequences [72] (p.181).

In other cases crude attempts may be made to release "the obstruction" by cutting inside the vagina. The traditional ethnomedical system of the Hausa people of northern Nigeria, for example, recognizes the existence of a condition called *gishiri*. *Gishiri* is the Hausa word for "salt," and when used as a medical diagnosis it refers to a condition believed to occur when dietary imbalances in the intake of salty and sweet substances cause a web or membrane to grow over the vagina, resulting in obstructed labor. (The term *gishiri* is also used to refer to the salts that encrust the bottoms of water-pots as the water leaches through the clay and evaporates on the outside—a process of encrustation seen as analogous to the pathophysiological process that obstructs the birth canal). This condition is treated with surgery: a barber or midwife takes a razor, knife, or other sharp object and make a series of cuts inside the vagina, often filleting the urethra, in an attempt to remove the obstruction. This practice itself frequently creates a fistula through direct urethral or bladder injury [48,70,81,82].

Who decides what. . .and why?

Because traditional ethnomedical therapies have little efficacy in relieving obstructed labor, the most critical decision in the prevention of obstetric fistulas is the decision to seek help from a biomedical facility that provides competent emergency obstetrical services, including cesarean delivery. It is the decision to seek help in such a venue that starts the laboring woman down the therapeutic pathway that may save her life as well as prevent the development of a fistula. Who decides this? In many cases the woman herself may have little or no say in this critical decision.

In many societies where obstetric fistulas are common, women often have little independent agency [83-85]. They may have little choice as to when they have sexual relations and whether or not to use contraception when they do [86,87]. Contraceptive agency is affected strongly by male attitudes [88], but also by social factors unknown in the West such as the presence of co-wives in polygamous households [89]. When women in fistula-prevalent areas become pregnant, they may have little say as to whether or not they get antenatal care---and where and under what circumstances—they deliver their children. In many societies "proper" social relationships require that female reproductive capacity is always under clearly delineated male control, usually by the girl's father before marriage and by her husband after marriage. Money and material goods ("bridewealth," in anthropological parlance) [90,91] are transferred by the husband and his family to the girl's family as part of the marriage contract in exchange for the use of her reproductive capacity and the assumption of other obligations on their part. The rights and obligations entailed by such practices vary enormously from society to society, but if males believe that they in some sense "own" a woman's reproductive capacity, this may significantly impact decision-making during obstetrical emergencies. Among the Hausa of northern Nigeria, for example, children are referred to as "the profit" (*riba*) from the marriage transaction [70,92]. Analogies of children being the "harvest" obtained by a man as the result of "tilling" his wife's "field" are explicit agricultural analogies in many countries [93]. The control of such a valuable resource is not easily relinquished, and if wife seclusion (*purdah*) is the prevailing cultural practice (as it is among the Hausa), a woman may not be allowed to leave her family compound without explicit permission from a controlling male authority [70,92-94]. The consequences can be devastating. There is a famous anecdote concerning a woman from northern Nigeria who lived a 10 minute walk from the hospital but because her husband was away on business and could not give her permission to travel, she labored at home for several days only to deliver a dead child and develop a fistula [58]. Wife seclusion also greatly limits female economic opportunity, further reducing women's agency and making them financially dependent on their husbands [95-99]. Lack of formal education further increases this sense of helplessness in the face of obstetrical complications [100,101]. Fistula patients almost invariably have low educational attainments, as noted previously [48].

Weeks and colleagues interviewed 30 Ugandan women who had 'near miss' obstetrical experiences at Mulago Hospital that might have proved fatal if circumstances had been different. In analyzing the recurrent themes in their interviews, they noted "The most striking feature is the women's descriptions of their powerlessness, which was seen in all aspects of their lives" [102]. The authors explained: "Traditionally in Ugandan culture, the roles of men and women are strictly defined with men being breadwinners and the women homemakers. Their background of poverty and limited education restricts their ability to control their own lives. For many families, this places women in a subservient role within relationships, relying heavily on their male partner for financial support and decision-making, and being sexually compliant and looking after the home and family in return. A dysfunctional form of this arrangement was seen in many interviews, with women left hungry, ignorant, or even raped" [102].

The power of fear in promoting delay

Fear of the biomedical healthcare system is also a potent factor which delays the decision to seek help when labor is obstructed. There are many different facets to this fear: fear of the unknown, fear of ridicule and abuse by the hospital staff, fear or receiving poor quality care, and fear of being forced to undergo an unwanted---and perhaps unnecessary--- surgical operation—all fears which may be justifiable, depending on the locale and the context. For women (and their families) who live in rural areas with little formal education and limited interactions with more cosmopolitan communities, the prospect of going to a biomedical health facility may be daunting.

In many cultures where a woman's status is determined primarily by her reproductive capacities, the ability to deliver a baby "on her own" is important in validating her status as a fully adult woman. Failure to deliver vaginally may be stigmatized as a form of reproductive failure. The fact that cesarean delivery may be life-saving is not always widely understood. In a study of the use of maternity services in Uganda, Grace Kyomuhendo reported that Ugandan women regarded pregnancy and childbirth as a journey "on a thorn-strewn path," the successful traversal of which entitles a woman to be praised as *garukayo* ("dare to go back") [103]. She writes, "The traditional praise *garukayo* far supercedes mere praise of the new mother, but is also meant to remind her that the hardships experienced notwithstanding, she has no option but to prepare to get pregnant again. . . . The way a woman endures pregnancy and birth therefore has implications for her position in her household and community. One who experiences no problems and needs no assistance is held in much esteem, having walked bravely and emerged unscathed. One who experiences a difficult pregnancy, perhaps requiring hospitalization, an episiotomy or caesarean section, is not respected and is referred to as *omugara* (lazy), though the circumstances are beyond her control. To seek external help is to stumble and such women even after delivery do not deserve a genuine *garukayo*" [103] Attitudes of this kind are very common in parts of the world where obstetric fistulas are prevalent [54,104].

Aside from the belief that cesarean delivery is somehow "unnatural" and therefore represents a failure at the most elemental level of womanhood, a cesarean section is also a major abdominal operation that inevitably causes pain and may be accompanied by complications, particularly when the surgery is performed for difficult cases of obstructed labor in low-resource settings by surgeons who may not have top-notch obstetrical skills [105-107]. The combination of unfavorable attitudes towards cesarean section [108-112] and the frequent need for repeat cesarean delivery in subsequent pregnancies due to recurrent dystocia and the risk that the uterine scar may rupture during labor, means that many women have already been told that if they have the operation they will need a repeat cesarean later. Dissatisfaction with earlier experiences may contribute to delay until catastrophe strikes.

Fear may be compounded by linguistic confusion. As Nicole Berry points out in her study of maternal health in Guatemala, "Operations have no parallels in 'traditional' medicine that Kaqchikel villagers used, and on an intuitive level it is not difficult to understand why they are so unpopular. Cutting a body open seems inherently invasive and dangerous, and it is difficult to imagine that anyone weak, sick, or compromised could have the strength to survive such an ordeal." [75] (p. 174). Blood is often needed and frequently is not available. Constant requests to donate blood for operations make villagers leery of being exploited by having a valuable resource extracted from their bodies by powerful government officials and the word "*operacion*" was frequently used to refer both to cesarean delivery as well as to tubal ligation, which would end a woman's chances of having further children. The result of this situation was that "Women and their families feared that if they went to the public hospital for a c-section, they might come out unable to have more babies," [75] (p. 182).

The conditions under which care is provided and the attitudes of hospital staff towards patients may create a situation in which going to the hospital or health center is seen as a decision of "last resort." Many healthcare facilities in low-resource countries are understaffed, poorly supplied, and overwhelmed with patients, thereby producing highly stressful conditions in which, even with the best of intentions, adequate care cannot be provided [110-121]. Abuse and neglect of patients by under-skilled and overworked doctors and nurses is commonplace in such circumstances. One study in Gabon documented a much higher case fatality rate among women seeking care for abortion complications compared to other obstetric emergencies, a fact that was linked to a delay between diagnosis and treatment that was 20 times longer for abortion complications than for post-partum hemorrhage or eclampsia. The delay in treatment and the high case fatality rate was attributed by the authors to cultural stigmatization of patients by health care personnel. In these cases, disdain for patients turned out to be fatal [119]. In China, where the government has adopted a rigorous policy of limiting family size, women who become pregnant "outside permitted limits" (perhaps in quest of a son), often avoid institutional maternity care so that they will not be abused, harassed, stigmatized, or punished for their pregnancies, sometimes with fatal results [122].

Economic constraints on the decision to seek care

Even when the problem is clear, when the location at which help may be obtained has been identified, and when the fears surrounding possible treatments (such as cesarean section) have been overcome, there may still be substantial economic barriers that delay or prevent access to necessary care. The economic costs of obtaining medical care at a hospital or clinic derive from many sources and the sum of these costs may be beyond the budget of all but the most affluent families [123-133]. Particularly in remote areas, the costs of transportation required to reach a hospital may be substantial, sometimes more than the cost of care itself [124]. There are costs not only for the patient herself, but also for accompanying family members. There are food costs for the patient and her family members both while traveling and during the period of hospitalization. There are opportunity costs that result from going to the hospital rather than selling goods in the market, working in the fields, or engaging in other forms of economic activity. In Tanzania, Kowalewski has reported that women over age 35 and women with more than four children actively avoid hospital delivery because they need to provide farm labor and child care and nobody else is free to provide these necessary services [124]. For people in subsistence or marginal economic circumstances, such opportunity costs may be an insurmountable barrier.

Emergency obstetric care often involves both "formal" charges from the healthcare system, as well as "unofficial" (but still very real) costs incurred for necessary goods and services. In many cases healthcare institutions have instituted user fees to help recoup the costs of providing services, but such fees disproportionately affect women, children, and the poor, with adverse health consequences [134-137]. Such charges also diminish the utilization of services, adversely affecting the most vulnerable population groups. But even if care is ostensibly "free," the patient and her family may still incur substantial "informal" charges---costs of supplies and medications as well as bribes and gratuities for access and services—that can dwarf other expenditures [138]. As Afsana wrote of her research on obstetric costs in Bangladesh, "When emergency surgical procedures such as caesarean sections were required, the urgency put poor villagers under tremendous stress to secure the money. Families would arrive at the hospital with some cash, but the amount of money required was beyond their imagination." [133]. Furthermore, "Collecting the required money was difficult for poor villagers, who usually had no assets or savings. No one wanted to loan them money either. Some families borrowed money from moneylenders at very high interest rates, which tripled within six months. Some raised money by selling domestic birds, cattle or land or even a tin shed roof" [133].

These combined costs—opportunity costs, formal charges, and informal payments—often reach catastrophic levels which may consume over half of a family's annual income [125,126,128,130,133]. Nahar and Costello found that over 20% of families were spending between 51% and 100% of their monthly income to pay for a "free" delivery in Bangladesh and that 27% of families were forced to spend between 2 to 8 times their monthly income to cover the costs of complicated maternity care [128]. A Pakistani study on obstetric costs found that both vaginal delivery and cesarean section were beyond the limits of what three-quarters of Pakistani households could afford [139]. Similar results have been found in Ghana and Benin, leading the authors to conclude that "For those women who require hospital delivery, accessing sufficient cash to cover the bill can cause significant delays in receiving treatment" [126]. Among the poorest of the poor, the need to finance expenditures of such magnitude may result in permanent financial struggles and submersion in a cycle of debt and impoverishment from which they cannot escape [140]. After investigating the costs of emergency obstetric care in Burkina Faso, Storeng and colleagues wrote: "A pervasive theme in in-depth interviews was anxiety about the costs of care. . . . A caesarean section, which in Burkina Faso is performed almost exclusively as a life-saving intervention, was widely held to presage unaffordable costs, potentially accompanied by social calamity if it meant that a woman was divorced or abandoned on account of being 'too expensive'" [130]. The result of these economic factors is that large segments of the population in the world's poorest countries have almost no access to cesarean section and it is among these women that the obstetric fistula problem is most pressing [141]. While many women are *willing* to pay to receive life-saving care, even under the best of circumstances they may simply not be *able* to pay [142]. The consequences of this economic situation are tragic. The terse observation that "inequities in maternal mortality are largely shaped by social, economic and political vulnerabilities that disproportionately affect the world's poor" is quite accurate [130].

Summary

The importance of trust

Women in prolonged or obstructed labor will use scientific obstetric care when they and their families value the services provided by healthcare institutions more than they value the competing choices offered by a pluralistic medical system. For biomedical obstetric services to be valued, the community must understand that obstructed labor is a physical impasse that develops from abnormal obstetrical mechanics which can be reliably corrected by

an appropriate mechanical intervention—if that intervention occurs in a timely fashion. The community must also understand that the consequences of not intervening quickly during obstructed labor can be devastating and deadly. The care that patients receive must be perceived to be both effective and of high quality. Care must be socially as well as physically accessible and it must be regarded as worth the social and economic costs involved. Those costs must also be affordable within the local socio-economic context. This does not necessarily mean that care must be free. As Kruk and colleagues noted in their study of maternity services in rural Tanzania, "The fact that at least some women in this population were willing to pay more than twice as much to deliver in mission facilities rather than government facilities underlines the importance of quality of care to women in rural areas" [124].

None of these conclusions is particularly striking by itself. What is striking are the ways in which all three phases of delay are linked together. Delays in obtaining effective emergency care depend in large part upon the feasibility of getting to an appropriate healthcare facility in a timely fashion (Phase 2 delay), but the decision to set out on such a journey is tied directly to the perceived quality of the care that will be obtained at the final destination (Phase 3 delays). At the most fundamental level all healthcare systems are driven by trust [143-145].

Phase 1 delays occur when the decision to seek effective care is postponed. There is abundant evidence that emergency obstetric care is sought more quickly and is rendered more effectively to women who are registered in an antenatal care system. Prenatal care plays a crucial role in obstetric fistula prevention, not because those women who will develop obstructed labor can be predicted accurately in advance, but because women who are already "booked" in the system are more likely to get emergency care promptly than are unregistered women. Kelsey Harrison's magisterial study of nearly 23,000 hospital births in Zaria, northern Nigeria (a work which almost single-handedly launched the Safe Motherhood Initiative), demonstrated the dramatic effects of antenatal care and formal education in improving maternal and child health in resource-poor settings [146]. Among illiterate, unbooked women (33% of his study population), the maternal mortality ratio was a stunning 2,900 maternal deaths per 100,000 deliveries with a perinatal mortality of 26%. Among educated women registered for antenatal care (10% of the study population), the maternal mortality ratio was over ten times lower (250 deaths per 100,000 deliveries) with a similar reduction in perinatal mortality (only 3%). Multiple studies of uterine rupture (an often-fatal end result of prolonged obstructed labor) show similar outcomes: delay and disaster are far more common among unbooked pregnancies [147-151]. Taken together, the data indicate that competent obstetrical care which is delivered respectfully, promptly, and at affordable cost is the key to obstetric fistula prevention, but such care will not be effective unless it is utilized by the women who need it.

Overcoming the cultural barriers to the utilization of care requires a multifaceted approach. Intensive community education about obstructed labor combined with an efficient, welcoming system of prenatal care and competent, accessible emergency obstetric services is fundamental to reducing the burden of obstetric fistulas. Particularly in the rural communities where fistulas are prevalent, it is critical that men understand the vital stake that they themselves have in the health of their mothers, wives, sisters, and daughters. Men can play an extremely important role in making the system of maternity care function effectively in such settings. Thoughtfully structured programs that increase the availability of skilled midwifery care at the local level can be particularly effective in raising awareness of these issues, especially if such programs are combined with a vigorous, ongoing social marketing and community education campaign. Even in circumstances in which skilled midwives cannot be placed in local communities due to logistical barriers, lack of financial resources, or shortages of trained personnel, it may still be possible to reduce the consequences of obstructed labor by training, supporting, and utilizing local childbirth monitors who can at least insure that the sun does not rise twice on a laboring woman without her being sent for competent evaluation and treatment.

Competing interests
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Authors' contributions
LLW conceived this paper, wrote and revised the manuscript, and approved the final draft submitted for publication.

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The traditional healer in obstetric care: A persistent wasted opportunity in maternal health

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ABSTRACT

Traditional medical systems in low income countries remain the first line service of choice, particularly for rural communities. Although the role of traditional birth attendants (TBAs) is recognised in many primary health care systems in low income countries, other types of traditional practitioners have had less traction. We explored the role played by traditional healers in northern Ghana in managing pregnancy-related complications and examined their relevance to current initiatives to reduce maternal morbidity and mortality. A grounded theory qualitative approach was employed. Twenty focus group discussions were conducted with TBAs and 19 in-depth interviews with traditional healers with expertise in managing obstetric complications. Traditional healers are extensively consulted to manage obstetric complications within their communities. Their clientele includes families who for either reasons of access or traditional beliefs, will not use modern health care providers, or those who shop across multiple health systems. The traditional practitioners claim expertise in a range of complications that are related to witchcraft and other culturally defined syndromes; conditions for which modern health care providers are believed to lack expertise. Most healers expressed a willingness to work with the formal health services because they had unique knowledge, skills and the trust of the community. However this would require a stronger acknowledgement and integration within safe motherhood programs.

1. Introduction

In 1987, the World Health Organisation launched the safe motherhood initiative (SMI). The purpose of the initiative was to ensure that all women receive a minimum basic standard of care needed to be safe and healthy throughout pregnancy and child birth (Berer and Ravindran, 1999). SMI programs were designed to increase the prevalence of contraceptive use, increase the number of births attended by a skilled birth attendant, improve access to emergency obstetric care and improve the monitoring of maternal morbidity and mortality. The initiative was welcomed by resource-poor countries because it had the potential to address the significant maternal mortality burden (United Nations, 2008). The guidelines established through SMI are the basis of the standard of obstetric care within health systems around the world (ICPD, 1994).

By 1992 it had become clear that the effectiveness of SMI, particularly in low income settings, was limited, largely as a result of poor access and utilisation (WHO et al., 1992). Extant traditional medical systems in low income countries in Africa and Asia remained the first line service of choice, particularly for rural communities (WHO, 2002). SMI programs however, had failed to adequately acknowledge the importance of the role played by traditional birth attendants (TBAs). The WHO therefore advocated for the integration, where appropriate, of TBAs in the primary health care system (WHO et al., 1992). TBAs were trained to improve their skills for the management of normal births and the recognition of potentially high risk cases that required referrals for emergency management in health facilities. The strategy formally recognised the importance of pluralism of health care systems for traditional societies and to some extent, the recognition has persisted through more recent 'task-shifting' strategies (WHO, 2012). However, the approach has been restricted to a shallow pool of practitioners and to a narrow field of practice (Allotey, 1999).

Reviews of progress towards meeting MDG targets show that in excess of 30% of women in rural communities do not have access to skilled attendants at birth (Ghana Statistical Service (GSS) et al.,

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2009; World Health Organisation, 2014). Furthermore, community based studies suggest that for some obstetric complications, including those that might be regarded as life-threatening, a broader range of traditional practitioners are consulted within the traditional health system (Goodburn et al., 1995; Mills and Bertrand, 2005). These traditional practitioners – diviners, spiritualists, herbalists – are not in the formal category of 'TBA' but are often the preferred care provider for some women for obstetric complications, even where there is access to obstetric care (Aborigo et al., 2014; Mills and Bertrand, 2005).

Without a clear knowledge and understanding of the range of practitioners involved in the management of pregnancy-related complications and the nature of their practices, maternal health services will continue to ignore what might be a significant entry point to the provision of 'skilled' attendants. In this study, we explored the role played by traditional practitioners, other than just TBAs, in managing obstetric complications. We also examined their relevance in current initiatives to reduce maternal morbidity and mortality. Specifically, the study explored questions on who they were, how they acquired their knowledge, the range of complications they managed and the nature of the management.

1.1. Background

Maternal deaths are rare but complications in pregnancy are common. Estimates suggest that for every maternal death, 15 to 30 women experience severe complications including obstetric fistula, ruptured uterus or pelvic inflammatory disease (Bang et al., 2004; Starrs, 2006). Furthermore, research in Ghana suggests that about 9.6% of women who have home births suffer severe maternal complications (Ghana Statistical Service (GSS) et al., 2009). Under the Ghana Health Service safe motherhood guidelines, these complications need to be referred to and managed within a health care facility equipped to manage emergency obstetric care (GHS, 2007).

However, preference for home deliveries and use of traditional medical systems continue to limit utilisation of health facilities for child birth and management of complications (Ngom et al., 2003; Ronsmans and Graham, 2006). Studies in Tanzania and Bangladesh show that women still trust TBAs to intervene when severe complications occur during child birth – and although TBAs were found to refer appropriately to other practitioners when the complications were beyond their capability to manage, mothers often did not follow upon the referral due to financial costs, transportation bottlenecks and fear of maltreatment from health care providers (Moyer et al., 2013b; Vyagusa et al., 2013).

In spite of several years of implementing referral systems for maternal health, reporting to health facilities with maternal complications in many low income countries occurs only as the final treatment option, when all others have been exhausted (Aborigo et al., 2014; Adisasmita et al., 2008). These other treatment options include herbal remedies based on general folk knowledge, or prescribed by local healers. Treatment in this context could also require the imposition of strict dietary changes or rituals that serve to restore a malcontent ailing spirit that may ultimately be responsible for the poor health outcome (Hevi, 1989). It is important to note that although there is widespread recognition of the role of a traditional health care system other than through TBAs, sanctioned practice does not extend to maternal health and pregnancy complications (GHS, 2007).

2. Study context

Safe motherhood was launched in Ghana in 1987 to make childbearing safer for all women and to improve infant health. The initiative coincided with other debates about the integration of other traditional practitioners into the health system within the broader context of comprehensive primary health care (Jarrett and Ofosu-Amaah, 1992). However, while the importance of a limited role of trained TBAs was recognised for maternal and child health programs (Odoi-Agyarko, 2003), there was significant resistance to the formal integration of other types of traditional medicine practitioners such as the traditional healers. A traditional healers (THs) association was established in the 1960s and more recently, a directorate for traditional and alternative medicines has also been established. All traditional healers who intend to practice are required to register with the Traditional Medical Council (Odoi-Agyarko, 2003). Although to some extent, these acknowledge the importance of the traditional medical system to the population, the veracity of their evidence base is still questioned by professional associations (Tsey, 1997).

Within this broader health system context, the study was carried out in the Kassena-Nankana East and West Districts (KND) in northern Ghana. The KND is a relatively poor rural and agrarian district with a population of about 153,263 people from the Kassena and Nankani tribal groups (Oduro et al., 2012).

Polytheism is common among the Kassena-Nankanis. Animism, the traditional religion, predates the arrival of Christianity and Islam and while there have been many converts, the different religions and deities are believed to serve different functions (Allotey, 1999; Mills and Bertrand, 2005). The traditional religion holds to a supreme being – consistent with conversion to Christianity or Islam – but also served by lesser gods or spirits that dwell in rivers, trees, stones, animals and other objects (Manoukian, 1951; Yoder, 1982). Ancestors live with these spirits and act as the link between the individual and the deities. Ancestors are revered deceased family members who are believed to intercede to alter the fortunes of individuals or the family. They are regularly called upon through the pouring of libation – a ritual that involves the spilling of animal blood and ritual foods and alcohol on an object that embodies the spirit. The pouring of libation averts misfortune from the family and brings prosperity. There is also a belief in reincarnation and soothsayers (*vuru)* are able to foretell during pregnancy for instance, which ancestor is to be reincarnated (Allotey, 1995). Converts to other religions continue to maintain their belief in the power and wisdom of the ancestors and the spirits (Yoder, 1982).

Households in the KND are made up of extended patriarchal family units in relatively isolated compounds. A compound is a group of households that are physically linked. They are headed by males who have absolute authority over the compound members. In addition to the role as provider, the compound head is a mediator and the link between the dead and the living – the ancestors and compound members.

The traditional medical system in the KND is based on a belief in spirits – including ancestors, practice of soothsaying and the healing abilities of herbs and other natural products and objects. Illnesses and other misfortunes are attributed to either spiritual forces or disgruntled ancestors. The ancestors impose misfortune where family members make decisions without seeking advice (Adongo et al., 1997). Soothsayers are believed to have the ability to communicate with the ancestors and an individual's personal gods to foretell the future and give advice. Soothsayers provide a preliminary diagnosis of an ailment and recommend the type of traditional practitioner that should be consulted. Key practitioners within the traditional medical system include herbalists, spiritualists and TBAs. These practitioners function alongside formal health care providers throughout the district.

2.1. Maternal health facilities

Government health facilities are strategically located

throughout the district to offer formal health care. There are 33 community health compounds in the district run by resident community health officers. These facilities are supported by six health centres and a district hospital. The hospital is located in the urban centre and serves as a referral facility for all cases in need of emergency obstetric care. The hospital has two general physicians responsible for medical care, including obstetric emergencies that arrive at the hospital. Financing of health care in the district is largely through a district mutual health insurance scheme, but all maternal health care services are provided at no cost within public health facilities.

The Ministry of Health has retained a commitment to improve maternal and child health. The establishment of new centres and the provision of free maternal services are designed to improve geographical and financial access respectively. This notwithstanding, 40% of childbirths in the KND are not attended to by skilled professionals (DHMT-E, 2011; DHMT-W, 2011). It is known that there are still a significant number of TBAs, with little or no formal training who use herbal remedies or other traditional practices to stimulate labour or facilitate child birth (Moyer et al., 2013a).

3. Methods

3.1. Study design

A qualitative study was used to explore the nature of practice of the various traditional practitioners, the context in which they work, and their interaction with the community, maternal health services and pregnant women. This was part of a larger doctoral study that investigated community perceptions of near-misses and how they are managed within the community. Other aspects of the study are described elsewhere (Aborigo, 2015).

3.2. Sampling

The Navrongo Health and Demographic Surveillance System (NHDSS) is a research platform which runs through the Navrongo Health Research Centre (NHRC). The NHDSS conducts routine census updates and data collection every 120 days (Oduro et al., 2012). The system registers and monitors pregnancies and pregnancy outcomes including live births and maternal and perinatal deaths. A detailed description of the NHDSS methods has been reported elsewhere (Oduro et al., 2012).

The NHDSS has demarcated the KND into five zones – central, north, south, east, west – made up of 247 clusters. Each cluster contains a maximum of 99 compounds. The central zone is the urban centre of the district and hosts the district hospital. This zone was excluded from the sampling frame to focus the research on those rural populations where the influence of traditional practitioners is more profound (Adongo et al., 1997). Five clusters were randomly selected from each of the remaining zones for focus group discussions (FGDs) with TBAs. One FGD was conducted in each cluster.

In establishing the NHDSS, community key informants (CKIs) were engaged by the NHRC to record all pregnancies, births and deaths that occur in their localities to complement routine census updates (Aborigo et al., 2013). CKIs work closely with other community-based health providers such as Community Health Officers (CHOs), TBAs and THs. CKIs compile records of all the different providers (Aborigo et al., 2013). The CKIs in the selected clusters provided the research team the list of TBAs (both trained and untrained) who serve the selected clusters.

In order to manage the discussions effectively, the field team used convenience sampling to select the first 12 TBAs on the list who were available and consented to participate in a focus group discussion. The focus groups provided an opportunity for TBAs to identify the best known THs in the community able to treat severe maternal complications. The list of THs was further expanded through snowball sampling. THs who consented to participate in the study were interviewed individually.

3.3. Training of data collectors

Interviews and discussions were conducted by one of the researchers. Three graduate level staff (1 male and 2 females), were recruited to assist with data collection. They were selected to meet the following criteria: fluency in at least one of the main languages in the study area – Kasem and Nankani; more than five years research experience, particularly with conducting FGDs and IDIs and experience in producing accurate translated transcriptions. They were trained over a period of two weeks to understand the research protocol, the data collection tools, the consent procedures and to hone their skills. A pre-test was used to evaluate their performance as well as finalise the study guides. Data collection was undertaken between March and November 2012.

3.4. Focus group discussions (FGDs)

We explored the knowledge and treatment of maternal complications with 20 groups of TBAs. A discussion guide was developed based on the aims of the study. Each focus group was attended by 8–12 individuals with each lasting approximately 2 h.

3.5. In-depth interviews (IDIs)

In-depth interviews were conducted with 19 THs to elicit rich descriptions of their knowledge acquisition and management strategies. We also explored their experience of and preparedness to work with the Ministry of Health. Open-ended questions permitted the natural flow of the interaction and created the opportunity for the interviewer to follow-up with relevant questions and probes. Each IDI lasted approximately one hour.

3.6. Data processing and analysis

All interviews and discussions were conducted in the local languages – Kasem or Nankani. Interviews and discussions were audio recorded and transcribed directly into English while maintaining key cultural terminology in the local languages.

Transcripts and field notes were imported into QSR NVivo 10.0 software for thematic analysis (QSR International Pty Ltd, 2014). Open coding was used to identify themes based directly on the research tools. Segments of texts in the respondent's own words and expressions relating to the themes were extracted and labelled. Subsequent texts that were coded under the same themes were constantly compared to previous texts coded under the same theme and contrasted with other themes. Similarities and differences in each theme and sub-theme were examined. Observations and field notes were coded together with the main transcripts and used to provide more context information. A Grounded theory building approach was used to develop further areas of inquiry for the larger study (see (Aborigo, 2015).

The research was approved by the Monash University Human Research Ethics Committee (MUHREC CF11/3669: 2011001926).

4. Results

All the THs who participated in the study practiced traditional religion. Most of them were illiterate. The socio-demographic

profile of the TBAs who participated in the focus groups is presented in Table 1.

Due to their interaction with THs, most TBAs have knowledge of the traditional management of maternal complications. A few played a dual role of TBA and healer and therefore in this section, THs is used to refer to both traditional healers and traditional birth attendants.

THs described several aspects of their roles within the community, including how one becomes a healer, how the knowledge is managed, who the clients are, how various maternal complications are managed and the limits of their practice.

4.1. How does one become a TH?

> "My grandfather started it and died and my father inherited from him and was treating people until he passed away and before he died he taught me where to get the herbs and the way to treat the illness and that is how I am a healer here today. For the past 20 years or more I have been treating pregnant women "IDI-TH08-MANYORO"

There were two major pathways to becoming a TH; for most, it was a family tradition but others were "spiritually chosen". Where the practice was handed down within the family, it was through an apprenticeship model starting from a young age.

It is the duty of the practicing healer to ensure that the successor gained knowledge about the profession in order to sustain the reputation of the family. Knowledge of the herbs is acquired either through apprenticeship or spiritual guidance. The instruments of practice are formally and ceremonially handed over when the main healer in the family is elderly, begins to feel weak and senses death. Some of the healers claimed their parents learnt the craft from a "higher being" or by observing and absorbing the skill from their natural surroundings but others could not tell how their families came to be associated with the practice.

Table 1
Socio-demographic characteristics of focus group participants.

Variables	Freq (n = 215)
Gender	
Male	3
Female	212
Age group	
<45	26
≥45	189
TBA status	
Trained	122
Untrained	93
Education	
Ever been to school	44
Never been to school	171
Occupation	
Farmer	142
Trader	65
Weaver	1
Housewife	7
Marital status	
Still Married	94
Widowed	121
Religion	
Christianity	167
Muslim	14
Traditional Religion	34
Ethnicity	
Kassena	120
Nankani	90
Builsa	5

Healers who did not inherit their craft said they acquired it from "spirits". They were chosen by the spirit and gifted the knowledge of treating a range of conditions including maternal complications. Some received their gift from a *buga* (river) or from *chuchuru-bia* (spirits). The chosen individual is usually directed by the river or spirit through visions. Usually the spirit haunts the individual persistently, forcing him or her to consult a soothsayer for an interpretation of the events. Haunting ceases only when the individual accepts to work with the spirit. Alternatively, the individual may seek to have the spirit exorcised. Invariably however, individuals accept the role as it ultimately becomes the main source of income for the family. The role of traditional healer carries proscriptions; for instance, the acceptance of food and drink from the home of a patient or looking back at the house of a patient after administering treatment. The healer becomes a channel through which the spirit works and because of the mode of acquisition of the knowledge, it cannot be shared or passed on to descendants.

4.2. What is the consultation process for maternal complications?

> "We take a chicken to him (consultation fee), and then he comes to do the treatment. When a woman delivers and the placenta is not expelled, we have someone who we go to consult using a chicken. When he comes and rubs his hands all over the woman's abdomen, the placenta will be expelled." FGD-TBA-KAYORO

The strong patriarchal system that operates in the district places health related decision making solely within the domain of the compound head. In the first instance, the compound head consults a soothsayer on behalf of the patient. The choice of soothsayer depends not only on relationships and networks, but also on reputation. The soothsayer in turn, determines the type of healer to be consulted if further referral is required. The type of healer is based on the soothsayer's understanding of the pregnant woman's complication. Some of the healers then continue to work with soothsayers to further refine the diagnosis. Healers also work with the 'spirit' that guides their practice to work through the diagnosis and appropriate treatment of the condition.

Participants noted different payment mechanisms for traditional remedies. Some healers give free treatment, others are paid with livestock or cash. Some healers actively avoid monetary payments due to a belief that it could weaken the potency of their treatments. Those who accept money said that due to widespread poverty in their communities there are no fixed charges and so they accept whatever the client considers appropriate.

> "We are not a community that has money so when I go and finish with the work, they give me a chicken, if they have a new "wan'ne[Nankani](a calabash used as a serving bowl), they put some millet into the calabash and give to me; yes that is the payment." IDI-TH11-NAAGA

Sacrificing livestock or poultry to the gods or ancestors is a critical ritual used to evoke the gods or spirits to oversee the treatment. There are pre- and post-treatment rituals. Pre-treatment rituals include the offering of a fowl to the ancestors or gods to seek their blessings. Other items include kola-nuts, shea-nuts and/or millet. These serve two purposes; first to satisfy traditional expectations when visiting a healer and second as an invitation for the healer to attend to the woman.

Post treatment rituals include the slaughtering of a goat, dog, guinea fowl or a fowl of a particular colour (usually black or white) to evoke healing power. A rooster is given to the healer if the baby is

male and a hen if female. Other items include bambara beans (a local variety of round beans), cow milk, Shea-butter, Shea-nuts, kenaf seeds, mud-fish, cowpea, vegetables, tobacco, *pito* (a locally brewed alcoholic drink) and a *wan'ne*. These requirements vary across healers.

Herbal medicines are usually packaged in a broken clay pot while payments to the healer are conveyed in a calabash. Traditionally, the herbs are ground in the broken clay pot and are left in the pot for ease of storage. The practitioners indicated that after the treatment, the pot with any leftover medicines is usually returned to the healer to signify the completion of the treatment and to assure the healer that indeed, the patient used the medicine. The leftover medicine is discarded by the healer. According to the healers, most complications in pregnancy occur among primigravidae and so traditionally, the new calabash is used to indicate that the woman is a first time mother. Multi-gravidae are expected to use an old calabash. Post treatment presentations are usually done within 3 days for male and 4 days for female babies.

4.3. Who are the clients?

> "Can I count them? From Navrongo, Bolga, everywhere; a lorry takes me there, I get there and they say doctors have failed, I remove it, if it is alive, I remove it, if it is dead I remove it and wash my hands. It is they who call me; if they are hard pressed, they will come. I do not go round asking which woman has prolonged labour." IDI-TH14-KURUGU

People from different backgrounds, communities and tribal groups use traditional healers and their choice of a healer is usually informed by the reputation of treatment successes of the healer. The use of traditional healers, they explained, is partly due to the lack of confidence in formal maternal health services and a perception of overuse of surgical procedures.

The healers reported that some complications can only be recognised and treated by traditional medicine and are not understood by doctors and midwives. These included *namunu* (similar description to haemorrhoids), *chapia* (breast disease), and *bunaga-fia* (jaundice). Others were culturally specific such as *waafo*, a condition characterised by severe abdominal pain caused by seeing a python. They reported that these conditions are likely to be exacerbated by hospital treatments and could lead to death.

> "Most of these local illnesses are not treated in the hospital; for example the Namunu, even if you go there you wouldn't get medicine because they don't have medicine for it. The other time, they sent a woman who lives behind that farm land not far from here, to the hospital who was suffering from that Namunu illness, they couldn't treat her and they brought her back to me and I used my herbs to treat her". IDI-TH01-PUNGU

> "When a pregnant woman comes to you and you realise that she is suffering from bunaga-fia (jaundice), don't allow her to go to the hospital. Get the jaundice herbs for her to boil and drink. If she drinks it in the morning, when she passes urine, it will be foamy, it will be "fuga, fuga,fuga," that is the jaundice. If you send her to the hospital and they inject her, you will bury her." FGD-TBAs-GAANI

Complications that are believed to be caused by witchcraft, spells or charms can only be managed by healers. Also, based on particular features of the infant or on the health of the pregnant woman, community members could declare the baby a *chuchuru* (spirit child) with the intent of killing its mother. *Chuchuru* exhibited abnormal behaviours or had birth defects and/or their birth was followed by a series of misfortunes for the family. Again this presented a situation which could not be managed through the maternal health services.

Traditional healers described an extensive range of conditions that they diagnosed and managed; many with less than orthodox methods. These included prolonged labour, *pu-gara* (breech presentation), retained placenta *(naaba*), obstructed labour, *gwalla* (nuchal cord), still births, *pumasigo* (ulceration of the womb), *pua* (malaria), haemorrhage, terminations and abortions. A description of traditional management of these conditions are summarised in Table 2.

THs also identified instances where families were obliged to use their services because there were family taboos and restrictions that prevented them from using hospitals. In the event that a woman from such a family could not avoid hospital treatment, they could only return to the home through the back door and could not step across the front threshold.

All healers reported guaranteed success of their treatments with no fatalities. Their ongoing practice was testimony of the effectiveness of their treatments. Indeed, they boasted about the lives they had saved and for most, they are too many to remember. Some reported that their clients often return long after they are cured to thank them.

4.4. What are the limits of the healers?

> "I am not a doctor; I cannot give a pregnant woman water or blood"IDI-TH14-KURUGU

Despite the reported successes in treating many maternal conditions, traditional practitioners acknowledged some limitations in their practice. Conditions such as excessive bleeding, dehydration and caesarean sections were clearly outside their area of expertise. Pregnant women in need of such care were usually referred for formal care.

Even though some of the healers said they have had negative encounters with some formal health care providers, they still expressed interest in working with the health system. The shared goal was to save lives even if the approaches were different and opportunities to work together could be mutually beneficial. Some shared their experiences working with formal providers.

> "I work with the nurses here; a woman was in labour for two days, their senior had gone to Navrongo and they were called. When they got to the compound, they said their senior had gone to Navrongo and they have never handled such a case so if I could help them, I should help them. The woman had laboured for two days and on that third day the baby had already died in her womb. I went and removed it".IDI-TH11-NAAGA

None of the healers that participated in the study reported being registered with the Traditional Medical Council because they had never been approached to do so. Those who were still active were asked how recently they had treated an obstetric complication. The shortest period reported was two weeks.

5. Discussion

Healers are available, accessible, affordable, acceptable and trusted by communities to provide care as reported in this and other studies (Fakeye et al., 2009; Mills and Bertrand, 2005; Tamuno, 2011). The common religious faith and practice shared by healers and the community is also an important binding force.

Table 2
Maternal complications and traditional remedies.

Risk factor	Perceived causes	Traditional remedies
Retained *naaba/nyeene* (Placenta)	➢ Eating "*kunkwa*" (overnight remains of a burnt traditional meal made from millet flour) ➢ Eating raw flour from millet (usually soaked using water and shea-butter and eaten raw) ➢ Pregnant woman sleeping in cold weather without protection ➢ "*Namunu*" (description like haemorroids) ➢ Negligence of attendants at child birth	➢ Healers give herbal tea prepared with the bark of a tree sited at where two paths cross each other ➢ Healers rub their hands around the abdomen of the woman and then downwards ➢ Healers smear "*buruma*" (the by-product of shea-butter) on their hands and insert them inside the vagina of the woman to pull out the placenta ➢ Baby suckling mother's breast ➢ Insert a stirring stick into the mouth of the woman until she gags ➢ Let the woman blow into a bottle
Pubusi (Haemorrhage)	➢ Negligence of attendants at child birth	➢ Healers treat with herbs using *luaor sanavooru* (tamarind leaves) to stop the bleeding. ➢ A decoction is given to the woman to drink to arrest the bleeding
Puga-chogem (Abortion)	➢ Inserting or drinking a variety of abortifacients. e.g. sharp sticks, alcohol and traditional herbs	Healers do not encourage abortions but they have herbs for stopping the bleeding
Prolonged labour/ Obstructed labour	➢ Lack of physical activity ➢ Recall of the baby by the gods ➢ Unborn baby has some demands which the compound head must meet ➢ Negative intentions on the woman's part such as divorcing the husband after giving birth ➢ Anger against husband or some family member ➢ Cord around foetal neck ➢ *Pu-gara* (breech presentation) ➢ Negative intentions of a delivery attendant ➢ Infidelity of the woman referred to as *digeru* "dirt" ➢ Eating *to'ro* (the fruit of the baobab tree) ➢ Eating fatty foods, meat and milk ➢ Oversized baby ➢ Excision	➢ TBAs coax the woman to confess her infidelity or bad intentions and if that fails, the woman is coerced to confess ➢ Pregnant woman performs a stimulating activity e.g. running or kneeling until her body is "heated" to allow the delivery of the baby ➢ Healers touch the abdomen with a staff purported to have spiritual powers ➢ Healers smear concoctions on their hands and forcefully push their hands into the woman's vagina to pull out the baby ➢ Remove all delivery attendants who may be using spiritual powers to prevent the delivery ➢ Make an incision with a razor blade to extend the posterior end of the vagina to the anus to ease child birth

As noted in other studies, trust between healers and their clients comes from a shared culture and world view (Abdool et al., 1994; Mills and Bertrand, 2005). Beyond access to skilled care, beliefs about the etiology of complications, patient dissatisfaction with formal health care providers and failures of modern medicines in terms of efficacy and therapeutic outcomes contribute significantly to the enduring role of healers.

From our data, the activities of THs have an impact on maternal health. The extent of this impact, whether positive or negative, is unknown due to systemic failures to engage them. This will generally require data on the activities of THs in maternal health care to inform on either formalising their operations in managing some complications under the WHO task-shifting strategy or refocusing them to play roles that do not involve life-threatening conditions. It is evident from our study that for the most part that there is a system of training and acquisition of knowledge amongst the traditional healers (Tabi et al., 2006). Furthermore other studies have reported a range of skills of traditional healers, which like our study, range from single focus to generalist treatments (Tabi et al., 2006; Truter, 2007). The low level of literacy is important to note. Nonetheless, the ethos of training provides an important point of entry and a potential resource for the health services.

In Sudan, a study showed that after engaging THs in distributing oral contraceptives, the proportion of women aged 30–34 using contraceptives increased from 25% to 38% over a two year period (El Tom et al., 1989) and in Nepal, the overall use of contraceptives rose from 13% to 21% for a similar duration (Shrestha and Lediard, 1980). It is also clear that trained TBAs are skilled at recognising complications and referring to health services. Less well explored and persistently resisted is training for the management of obstetric complications (Lee et al., 2011). This could involve extension of the TBA workforce by providing training to other traditional healers, and either equip them with skills to manage minor complications in places where they are the only primary care providers and help stabilise patients during emergencies before getting them to the next level of care. The impact of training other cadres requires concerted effort and evaluation (Lee et al., 2011).

One facilitating factor for engaging THs is their willingness to work with the formal health sector even though the nature of their interest was not clearly defined in our study. Findings from a review of projects in several countries showed that traditional practitioners are willing to work in primary care and establish a good relationship with formal health care providers (Hoff, 1992). A similar finding was reported in Ghana where about 96% of traditional practitioners expressed interest in working with formal health care providers (Gyasi et al., 2011).

Ghana has opted for the integration of traditional medicine in its health care system, but the process has been slow and more academic than practical. Registering and accrediting traditional practitioners, though challenging, has not been proactive. As of 2005, the ministry of health in Ghana identified problems with traditional practitioners to include the absence of data on their education, registration of their products, inappropriate premises for practice, inadequate record keeping and inadequate facilities for diagnosis (MoH, 2005). Evidence from our study suggests that most THs may not be able to meet most of these expectations due to high illiteracy, the nomadic nature of some of their operations and strict secrecy of their recipes. Besides, investigations to determine the potency and therapeutic efficacy of their products before registration may be misleading as the power of their products are linked to the pre- and post-treatment rituals which cannot be verified through any scientific enquiry.

Clearly, accessing information from healers for registration and licensing would demand careful negotiation with the health system. The process would have to be guided by understanding of the traditional set up, respect for the work of healers and trust that their knowledge will be protected (Hoff, 1992). The health system stands to gain, if for instance, nurses and other health professionals working in remote areas, where the consumption of traditional

Table 3
Recommended guide for engaging traditional healers.

Intervention	Strategy
Registration/ Licensing	Use community health officers and volunteers to identify, register and license qualified traditional practitioners
Trust	Careful negotiation for information, protect intellectual property rights through legislation and transparency
Training	Train traditional providers to offer some level of intervention in case of emergency
Refocus	Gradual shifting of roles from managing complications to recognising maternal danger signs, making referrals, and distribution of contraceptives
Collaboration	Recognise them as partners in maternal health, encourage working closely with modern health care providers with mutual respect and understanding as cherished values

medicine is common, initiate strategies to identify and engage healers in order to streamline their activities. A recommended guide for engaging healers has been provided in Table 3. These recommendations are broad in nature and should be adopted based on the particular context of the health system.

5.1. Limitations of the study

We did not get an opportunity to observe actual treatment practices of the healers during the study period. Ethical and privacy restrictions also precluded the identification of women 'patients' through traditional healers so it was not possible to explore women's direct experiences of treatment by traditional healers. However, there was a consistency across the healers in the descriptions of their understandings of complications and the treatments they provided. This consistency provides some internal validity of the data.

6. Conclusions

Efforts to meet millennium development goals have seen several innovations and investments in the technology to address obstetric complications and emergencies. Recent approaches for monitoring emergency obstetric care (EmOC) have attempted to balance enhanced access with efficiency, given the scarcity of resources (Nesbitt et al., 2013). Furthermore, task shifting efforts have attempted to extend the responsibilities of allied health professionals to compensate for the limited numbers of highly trained medical staff (Schack et al., 2014).

However these strategies rely on a persistent assumption that women will report to formal health care facilities. It also assumes that failure to do so reflects 'delays' along the way (Thaddeus and Maine, 1994). Such an idealistic approach to health care provision however fails to recognise choice, and the perennial lack of both health infrastructure and professionals in many rural communities. The focus on health facilities, although important, fails to provide guidance for traditional societies which depend on the traditional healing system to save lives. This has limited the design of maternal health interventions over the years to improve the management of maternal complications within such communities.

Traditional health beliefs and systems have endured despite the widespread adoption of evidence based medicine and practice. Arguably, the slow growth in various complementary medicine practices is evidence not only in the recognition of the efficacy of some of these practices, but also of the critical challenges of ensuring access to some form of care to those who would otherwise have nothing. Three decades following the launch of the SMI, access to and utilisation of emergency obstetric care remains less than optimal for some communities and failure to explore locally acceptable, albeit suboptimal alternatives seem like a missed opportunity.

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REVIEW ARTICLE

How the integration of traditional birth attendants with formal health systems can increase skilled birth attendance

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ABSTRACT

Background: Forty years of safe motherhood programming has demonstrated that isolated interventions will not reduce maternal mortality sufficiently to achieve MDG 5. Although skilled birth attendants (SBAs) can intervene to save lives, traditional birth attendants (TBAs) are often preferred by communities. Considering the value of both TBAs and SBAs, it is important to review strategies for maximizing their respective strengths. *Objectives:* To describe mechanisms to integrate TBAs with the health system to increase skilled birth attendance and examine the components of successful integration. *Method:* A systematic review of interventions linking TBAs and formal health workers, measuring outcomes of skilled birth attendance, referrals, and facility deliveries. *Results:* Thirty-three articles met the selection criteria. Mechanisms used for integration included training and supervision of TBAs, collaboration skills for health workers, inclusion of TBAs at health facilities, communication systems, and clear definition of roles. Impact on skilled birth attendance depended on selection of TBAs, community participation, and addressing barriers to access. Successful approaches were context-specific. *Conclusions:* The integration of TBAs with formal health systems increases skilled birth attendance. The greatest impact is seen when TBA integration is combined with complementary actions to overcome context-specific barriers to contact among SBAs, TBAs, and women.

1. Background

The world pledged to improve maternal health within Millennium Development Goal (MDG) 5—to reduce the maternal mortality ratio (MMR) by 75% and ensure universal access to reproductive health by 2015. Although the global MMR is falling, up to 358 000 women lose their lives during pregnancy and childbirth each year [1,2], and for every death 20 women are affected by injury, infection, or disease [3]. Maternal mortality remains a public health priority, with MMRs high (above 300) in 45 countries [2]. With progress toward MDG 5 slow and unequal, discussions concerning reorientation of the safe motherhood approach are emerging.

In the 1970s, the international response to maternal mortality purposely included traditional birth attendants (TBAs). After 2 decades of training TBAs [4], minimal MMR reductions prompted a shift toward promoting skilled birth attendants (SBAs), capable of averting and managing complications [5]. Twenty years of this latter approach have not led to achievement of maternal health targets in many countries [6].

Limitations have constrained both approaches. TBAs have contributed to a range of successful maternal, neonatal, and child health interventions [7–15]; however they are ill-equipped to manage obstetric complications. Universal skilled birth attendance is challenged by personnel shortages and persistent financial, transport, and geographic barriers [16–18]. In examining such obstacles, the 3-delays model has proved useful: delays in seeking; accessing; and receiving timely and effective care [19].

Skilled birth attendance has increased to 66% [6] globally. However, 45 million women deliver without skilled care each year [20], two-thirds of whom will be assisted by a TBA [11,21–23]. The continued popularity of TBAs in many settings can be attributed to persistent barriers to SBA access and the affordability, accessibility, and cultural acceptability of TBAs [24,25]. It has been argued that failure to link TBAs, SBAs, and health systems has limited progress in the past [26].

Most literature regarding TBAs deals with training. Two meta-analyses by Sibley and Sipe revealed that training can improve TBAs' knowledge, attitude, behavior, and advice [27], in addition to increasing referrals and use of maternal health services [28]. In a systematic review [7], the same authors linked TBA training with a non-statistically significant decrease in maternal deaths, although sample sizes precluded MMR as a reliable outcome measure. They called for research linking TBA training with facility-based care. Reviewing 15 studies, Ray and Salihu [8] observed substantial reductions in maternal mortality through inclusion of TBAs with multi-sectorial initiatives. In their systematic review, Darmstadt et al. [9] reported that training can connect TBAs with health facilities. The meta-analysis by Lee et al. [16] revealed multiple means

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of connecting women with SBAs, although the authors did not consider TBAs.

There is now renewed interest in TBAs, their influence on skilled birth attendance, and how they could be incorporated into a health-system-oriented approach to safer motherhood.

2. Objectives

The present systematic review had 2 objectives: to describe mechanisms for the integration of TBAs with formal health services; and to describe complementary activities for increasing skilled birth attendance in various contexts.

3. Methods

The present systematic review included relevant materials produced prior to October 2010.

Literature was sourced from MEDLINE, Cinahl, and Scopus databases; the Eldis and WHO websites; and reference lists of pertinent documents, citation lists on Google Scholar, and related articles' lists of databases.

Terms pertinent to the paper and search were clearly defined, as shown in Web Appendix 1. Terms relating to TBAs were coupled with terms for the concept of integration, for which a summary is shown in Web Appendix 2 and detailed search in Web Appendix 3. The words "tradition*," "birth," and "attend*" were searched through full text, and combined with the midwifery MeSH to overcome the challenge posed by the myriad of terms for TBAs.

The specific inclusion and exclusion criteria are outlined in Fig. 1. Inclusion was dependent on integration, outcome measures, and study design. High-income countries, based on UNICEF classifications, were excluded [29].

The search yielded 7116 citations, which were managed using Endnote version X4 (Thomson Reuters, New York, New York, USA).

The data collection process consisted of 4 phases (Fig. 2). First, duplicate citations were removed. Second, articles were added from reference and related citation lists, although most had been retrieved from databases—indicating a sufficiently robust search strategy. Abstracts, and occasional full-text documents, were examined for relevance and quality through phases 3 and 4. Finally, 6 citations [30–35] were excluded because the abstracts or full-text documents could not be located. Database search alerts yielded 35 articles, none of which met the inclusion criteria.

Studies were analyzed for means of TBA integration, commonly applied complementary activities, and change in coverage of skilled birth attendance. Selected articles were appraised using GRADE criteria [36], assessing both study design and quality. Details are shown in the matrix of Table 1, and application to each study in Web Appendix 4.

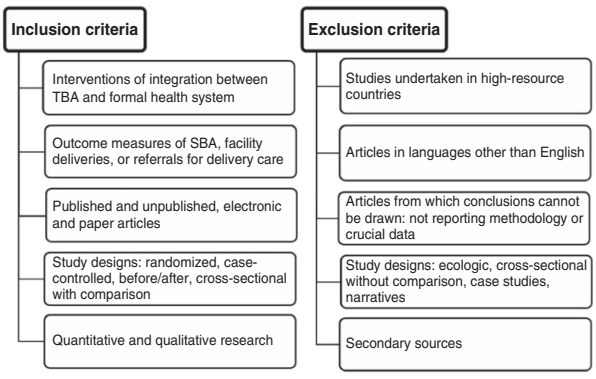

Fig. 1. Summary of inclusion and exclusion criteria.

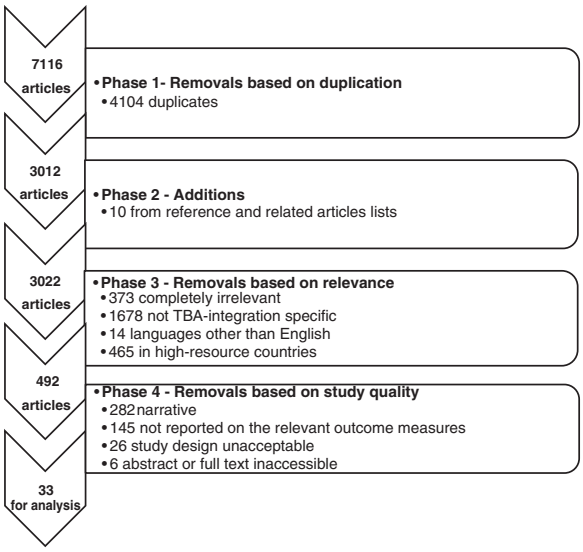

Fig. 2. Process for selection of articles for analysis.

Thirty-three articles satisfied the inclusion criteria, describing interventions in 20 countries. The majority examined cross-sectional studies in rural settings undertaken between 1977 and 2010. Most reported quantitative studies, with occasional supplementary qualitative components.

Five mechanisms for TBA integration were identified: training and supervision of TBAs; collaboration skills for health workers; inclusion of TBAs in facility-based activities; systems for communication between TBAs and SBAs; and defining roles for TBAs and SBAs. Additionally, 5 complementary activities were commonly employed in conjunction with TBA integration: specific selection of TBAs; community participation; accessibility changes; health system development; and improved affordability. The impact of TBA integration on skilled birth attendance ranged from a 15% below control to a 58% increase from baseline—in study sizes from 35 to 153 000 live births.

With regular supervision by formal health workers, training becomes a tool for TBA integration. The impact is influenced by the scope of training, quality and regularity of supervision, and accessibility of health personnel.

Training of TBAs, updated annually, and facility-based supervision every 1–2 months increases skilled birth attendance and referrals more substantially than training with irregular supervision. Yadav [37] reported that this mechanism increased skilled birth attendance for both home and facility births from 53% to 75% over 7 years. A chain-of-command approach to supervision was shown—with moderate rigor—by Mullany et al. [38] to increase skilled birth attendance 43% above baseline. Eades et al. [39], Kelly et al. [40], and Goldman and Glei [41] reported increased TBA referrals with training and supervision (from 50% to 85%; from 0% to 32%; and from 12% to 38%, respectively), although the evidence holds limitations. In the study by Eades et al. [39], only 28% of women acted on referrals because of negative experiences with health workers and financial barriers. The study by Goldman and Glei [41] risked overestimation because TBA interviews were not validated with facility records.

The supervision of trained TBAs has also been successfully applied within communities. In Bangladesh, Chaudhury and Chowdhury [42] reported that skilled birth attendance rose from 3% to 30% through paramedic supervision of TBA-attended domiciliary deliveries with

Table 1
Critical appraisal grading system.

			Quality					
			Very strong association Confounders adjusted Peer reviewed			High risk of bias Imprecise or sparse data Indirect outcome measure		
		Design	1 of	2 of	3 of	1 of	2 of	3 of
Grade	**High**	Randomized controlled trial	+	+ +	+ + +	−	− −	− − −
	Moderate	Observational studies: Longitudinal Case-controlled Interrupted time series Cross-sectional control/before–after	+	+ +	+ + +	−	− −	− − −
	Low	Other evidence: Cross-sectional Ecologic Narrative	Excluded by selection criteria					

complications. Andina and Fikree [43] described a component of the "Obstetrics Flying Squad" program, where SBAs supervised trained TBAs for complicated deliveries and intervened in 394 obstetric emergencies in 3 years.

Integration of TBAs through training and supervision demands sufficient numbers of skilled health personnel. In a cluster-randomized trial, Bhutta et al. [44] demonstrated that supervision of trained TBAs by female health volunteers increased facility births (30% in intervention vs 12.8% in control areas), although SBAs attended only 88%. Dehne et al. [45] described similar difficulties in Burkina Faso, where trained TBAs were supervised only occasionally, coinciding with a decrease in facility-based deliveries over 2 years.

Training and supervision of TBAs had limited impact in some studies. Lynch and Derveeuw [46] reported substantial differences in activity levels and referrals between trained and untrained TBAs (18 vs 5 deliveries annually, and 77% vs 30% referrals), but no differences between supervised and unsupervised trained TBAs. Gloyd et al. [47] attributed the low impact of TBA training and supervision in Mozambique—15% fewer facility deliveries than the control—to health system insufficiencies.

Building the interpersonal and communication skills of formal health workers to improve their interactions with TBAs is a mechanism for integration and raises TBA referrals and skilled birth attendance.

Training health workers to collaborate effectively with TBAs and women was applied by Gabrysch et al. [48] and Mullany et al. [38] to increase skilled birth attendance substantially: from 37% to 95% and from 5% to 48.7%, respectively. In Guatemala, O'Rourke [49] reported a 2.8-fold increase in TBA referrals following training of hospital staff regarding standards of care and cultural practices of women and TBAs. After a 6-month delay, TBA training was introduced but produced no further increases in skilled birth attendance.

Ronsmans et al. [50] reported a rise in domiciliary skilled birth attendance, from 37% to 59% over 6 years for 23 792 live births, and Skinner and Rathavy [51] reported an increase from 43% to 56.8%. These studies lacked control groups, preventing assertion of direct causation. A large controlled trial in Guatemala reported by Bailey et al. [52] supported a positive association: skilled birth attendance for complicated deliveries increased from 20% to 35%, and TBA referrals were 49% in intervention versus 38% in control.

One qualitative study [21] found training health workers for collaboration improved the likelihood of TBAs referring and accompanying women to facilities.

Integrating TBAs by including them in health facility activities, through regular facility-based duties or as permanent staff members attending deliveries, increases skilled birth attendance.

Traditional birth attendants became delivery attendants in health facilities in 3 interventions. Posting select trained TBAs in health centers, where SBAs were on-hand to supervise, increased skilled birth attendance from 59% to 76% in an isolated area of Brazil [53] and was also effective in an urban area of Pakistan [43]. In a rural conflict setting in Burma, SBAs attended more births, from 5% to 48.7%, when they teamed with TBAs who became paid employees who delivered infants both in homes and in semi-permanent health units [38].

Integrating TBAs by allowing them to remain with women during facility-based deliveries has increased skilled birth attendance. Consistent with this, Gabrysch et al. [48] presented moderate-quality evidence and Bailey et al. [52] reported high-quality evidence. Lynch and Derveeuw [46] showed that the inclusion of TBAs in hospital maternity wards for prenatal care, health education, and general duties—but not delivery attendance—contributed to a 1.5-fold increase in referrals.

Integrating TBAs through only intermittent contact at facilities for collection of supplies was not associated with increased skilled birth attendance in Pakistan [12].

Communication systems such as radio, phone, or referral cards have integrated TBAs with health services for improved management of high-risk women and obstetric emergencies. In an isolated Ugandan setting, radio communication between TBAs and health facility staff "eased the trouble" [54] for TBAs who referred high-risk women more frequently, although Musoke [54] noted that transport and service quality improvements were essential complementary activities. Similarly, radio contact fostered TBA risk-based referrals and increased facility-based complicated deliveries in Indonesia (30.7% versus control of 11%) [55]. Communication systems proved impractical in Bangladesh, where TBAs struggled to access phones [56].

In a multi-country study, Shah et al. [57] reported mixed results on TBA integration through color-coded pictorial referral cards. Substantial referral increases occurred in the Philippines (94%, compared with 51% of controls) but not in Senegal, Pakistan, or Zambia. However, conclusions could be contentious because intervention and control groups were unmatched. This mechanism was constrained by failure to train SBAs and TBAs in card use, lack of transport, service fees, and culture. Referral cards did please women, who felt linked with "someone who knows our problem and takes better care of us at the center" [57].

Integration through definition of the roles of TBAs—and, at times, SBAs—has increased skilled birth attendance when applied as simple clarification or substantial expansion of TBA duties, but not when limited to tasking TBAs to promote facility use.

Role definition as a singular intervention united TBAs and village-based midwives with a long history of rivalry in Malaysia, and increased skilled birth attendance at home births from 35% to 63% [58]. In Cambodia, TBAs' roles incorporated registration of pregnant women for free delivery vouchers, and TBAs were paid for referrals—increasing facility-based deliveries from 16.3% to 45% [59].

Substantial expansion of TBA roles, reported in moderate-quality studies by Mbonye et al. [14], Mushi et al. [60], and Swaminathan

et al. [61], was associated with increased skilled birth attendance: from 34.4% to 41.5%; from 34% to 51.4%; and referrals of 9.5% versus 20%, respectively. In these interventions, TBAs promoted and assisted iron and folic acid distribution, hygiene education, prenatal care, obstetric services, and data recording. Hossain and Ross [62] reported that facility upgrading with TBAs assuming defined roles increased skilled birth attendance more substantially (from 2.4% to 20.5%) than did exclusive facility upgrading (from 7.2% to 12.5%) or control (from 4.4% to 5%).

Directing TBAs to promote facility services without additional activities does not increase skilled birth attendance, as shown by Kumar [63] and Schooley et al. [64]. In Nigeria, TBAs initially referred

Table 2
Summary of included studies with TBA integration mechanisms and complementary actions by change in skilled birth attendance coverage.

Author, year	Integration mechanism	Complementary actions	Outcomes: proportion change from baseline	Sample size (live births)
Gabrysch [48], 2009	Collaboration skills Inclusion at facilities	Community participation Healthy system development	SBA: increased by 58%	217
Nwakoby [65], 1997	Role definition	Selection of TBAs Community participation Physical access reform	Referral: 54%, from 0. New	129
Lynch [46], 1994	Training and supervision Inclusion at facilities Role definition	Selection of TBAs	Referral: above control by 47%	417
Mullany [38], 2010	Training and supervision Collaboration skills Inclusion at facilities	Selection of TBAs Community participation Physical access reform Healthy system development Affordability changes	SBA: increased by 44%	2800
Shah [57], 1993 (Philippines)	Communication systems	Physical access reform	Referral: for complications, 43% above control	877
Eades [39], 1993 Nicholas [69], 1976	Training and supervision	Physical access reform Health system development	Referral: for complications, increased by 35%	35
Kelly [40], 2010	Training and supervision	Community participation Physical access reform Healthy system development Affordability changes	Referral: 32% above baseline of 0. New	24 148
Ir [59], 2010	Role definition	Community participation Affordability changes	SBA: facility births increased by 29%	5611
Chen [58], 1976	Role definition	Health system development Affordability changes	SBA: increased by 28%	6900
Chaudhury [42], 2008	Training and supervision	Community participation Affordability changes	SBA: increased by 27%	46 320
Goldman [41], 2003	Training and supervision	None	Referral: increased by 26%	2872
Yadav [37], 1987	Training and supervision	None	SBA: increased by 23%, (facility 6.4%; home 17%)	4524
Shah [57], 1993 (Senegal)	Communication systems	Physical access reform	Referral: for complications, 23% above control	732
Ronsmans [50], 2001	Collaboration skills	Community participation Health system development Affordability changes	SBA: increased by 22%	1348
Alisjahbana [55], 1995	Communication systems	Community participation Physical access reform Health system development	SBA: for complications,19% above control	3275
Mushi [60], 2010	Role definition	Selection of TBAs Community participation Affordability changes	SBA: increased by 17%	512
Bhutta [44], 2008	Training and supervision	Community participation Physical access reform Healthy system development Affordability changes	SBA: facility births 17% above control	4815
Araujo [53], 1983 Janowitz [70], 1985	Inclusion at facilities	Community participation Physical access reform Healthy system development Affordability changes	SBA: increased by 17% Referral: increased by 20%	1646
Bailey [52], 2002	Collaboration skills	None	SBA: increased by 15%	3518
Hossain [62], 2005	Role definition	Community participation Physical access reform Healthy system development Affordability changes	SBA: facility increased 18% 15% above control	500 000
Skinner [51], 2009	Collaboration skills	Community participation	SBA: increased by 14%	645
Fauveau [56], 1991	Communication systems	Physical access reform Healthy system development	SBA: increased by 13%	3315
Swaminathan [61], 1986	Role definition	Selection of TBAs Community participation	SBA: 10.5% above control Referral: 26% above control	637
Mbonye [14], 2007	Role definition	Selection of TBAs Physical access reform	SBA: increased by 7%	1321
Shah [57], 1993 (Zambia)	Communication systems	Physical access reform	Referral: for complications, 2% above control	965
Schooley [64], 2009	Role definition	Physical access reform	SBA: MWH increased by 1.5%	30 852
Kumar [63], 1984	Role definition	None	Referral: 1.2% above control	672
Jokhio [12], 2005	Inclusion at facilities	Selection of TBAs Health system development	SBA: below control by 1%	19 557
Shah [57], 1993 (Pakistan)	Communication systems	None	Referral: for complications, 8% below control	1085
Gloyd [47], 2001	Training and supervision	None	SBA: facility births 15% below control	5040

Abbreviations: MWH: maternity waiting home; SBA, skilled birth attendant; TBA, traditional birth attendant.

54% of women and were pleased that SBAs gave their clients "special and urgent attention" [65]; however, their promotional activities virtually ceased after 6 months.

Traditional birth attendant integration mechanisms were rarely applied in isolation. Four complementary activities positively influenced TBA integration and skilled birth attendance: careful selection of TBAs; community participation; health system development; and affordability changes. The influence of physical access reforms was mixed and dependent on the context and implementation. Table 2 summarizes the integration mechanisms and complementary activities implemented by studies, listed by greatest to least change from baseline coverage or control population. This list excludes 6 studies [21,43,45,49,54,66] because their outcomes were not reported in a comparable format.

Increased skilled birth attendance is associated with precise, clearly defined TBA selection criteria. Nwakoby et al. [65] reported an increase in referrals, from 0% to 54%, and Mullany et al. [38] reported increased skilled birth attendance, from 5% to 48.7%, with careful selection of TBAs based on combinations of literacy, activity level, gender, self-nomination, and reputation. Notably, studies selecting TBAs exclusively by activity level or popularity changed skilled birth attendance little [14,45,61].

Community participation is strongly associated with greater increases in skilled birth attendance. Gabrysch et al. [48], and Skinner and Rathavy [51] reported community participation as priority for increasing compliance with TBA referrals. The integration of TBAs has been bolstered with education groups [55] and information sessions by midwife–TBA teams [50]; community committees promoting maternity care [38,42], monitoring projects [42,59], community-managed funds [44,62], and blood donation [65]; monthly meetings [60]; and women's group consultations [40].

Improving the affordability of maternity services can increase TBA referrals and enable compliance. Paying TBAs for referrals has aided integration by averting their unemployment [38,59]. Fee abolition was crucial to increasing SBA-attended deliveries for internally displaced women in Burma [38] and contributed to increases in rural Tanzania [60] and Cambodia [59]. However, affordability alone does not guarantee utilization of SBAs. In Indonesia, midwives offered free services in villages for many years but attended few births until they teamed with TBAs [58]. In Cambodia, 60% of vouchers distributed for free maternity care remained unused owing to lack of transport, night deliveries, unwilling households, and dissatisfaction with health facility staff [59].

Health system capacity and quality of care are interdependent with TBA integration. In a large rural population of Bangladesh, improved quality of care at facilities increased skilled birth attendance from 7.2% to 12.5%, but when combined with TBA integration this rose from 2.4% to 20.5% [62]. In Indonesia, upgrading health facilities increased compliance with TBA referrals [55], and training of village-based midwife–TBA teams increased domiciliary skilled birth attendance [50]. Dehne et al. [45] illustrated the impact of ignoring this component; women were non-compliant with TBA referrals to a hospital known for its 9% maternal mortality rate.

Overcoming accessibility barriers assists TBA integration. Communication between TBAs and SBAs, and deployment of vehicles in obstetric emergencies have enabled skilled birth attendance in both rural and urban settings [39,53–55]. In very isolated or conflict settings, service decentralization [38] and bicycle transport [14,54] have assisted TBAs and SBAs in providing services.

The multifaceted nature of most interventions precludes assertion of impact through TBA integration alone.

Table 3
TBA integration within the 3-delays model.

Situation	Integration strategy	Examples of TBA integration addressing delays to skilled birth attendance
Pre-delivery	Create an enabling environment for TBAs to be integrated and to link women with SBAs effectively	Legislation and policy in support of TBAs. Goldman and Glei [41] initiated integration with registration of TBAs and followed up with inclusion at monthly health facility meetings
First: delay in deciding to seek care	TBA training and supervision for referral of all pregnant women, or early recognition and referral of complications	SBAs have been increasingly favored with training and supervision, focusing on facility-delivery promotion [44], risk assessments [37], and referral of complications [42], with SBAs overseeing TBA-attended complicated deliveries
	Collaboration skills for health workers to encourage TBAs to integrate, give a sense of inclusion, and encourage women to choose SBAs	Culturally appropriate SBAs and services—including manner, care, language—became respected by TBAs and well utilized [48]. Improved relationships with SBAs led TBAs to escort women and support them through birth at facilities [52]
	Communication systems enabling TBAs to call SBA, assess risk, and detect and manage complications	Referral cards create communication between TBAs and SBAs for case management throughout pregnancy [57], ensuring women see SBAs as required
	Role definition for TBAs for referrals, community health activities, and promotion of services	TBA roles include distributing vouchers, referring women (for which they may be paid) [59], providing maternal health, and nutrition education and services [46,60,66]
Second: delay in accessing the required level of care	Training of supervision of TBAs for referral to centers prior to delivery	TBA training has incorporated referral of women to maternity waiting areas to avert travel at delivery [40]
	Inclusion of TBAs at facilities to increase facility-based deliveries	TBAs practicing in clinics have access to supervisors for complicated deliveries and an ambulance for transfers to higher levels of care [53]
	Communication systems for TBAs to activate an efficient referral chain and for dispatch of transport	Ambulances are dispatched for complicated home births when called by TBAs, and staffed by SBAs for immediate care on arrival [43]. TBAs have been able to call for the ambulances in emergencies [54]
	Role definition with TBAs tasked with organizing transport, escorting women to SBAs, assisting SBAs	In a conflict zone, TBAs assist SBAs to provide domiciliary care to improve access [38]. TBAs' roles have included distribution of subsidies for travel to facilities [59]. Giving TBAs duties in upgraded facilities improves utilization [62]
Third: delay in receiving appropriate care	Collaboration skills for SBAs for improved responsiveness	Interpersonal skills and quality-of-care training for SBAs increased their home birth attendance [50]. Trained SBAs afforded special and urgent attention to clients of TBAs [65]
	Communication systems for appropriate triage of obstetric emergencies and improved responsiveness	Phone instructions can aid TBAs to manage complications successfully, enable reports of incoming referrals, and ensure rapid triage on arrival [55]. Care is efficient though facility upgrading, increasing of staff, equipping TBAs with walkie-talkies, and dispatching ambulances [54]
	Inclusion of TBAs at facilities to share the work load and prioritize in settings of SBA shortages	TBAs practice at facilities where SBAs are accessible when required [43,53]. Village-based SBA–TBA teams provide prompt, in-home care when required [38]
	Role definition with TBAs as assistants to SBAs	Clarification of roles for village-based SBAs and TBAs increased SBA attendance at home births [58]

Abbreviations: SBA, skilled birth attendant; TBA, traditional birth attendant.

The review included proxy measures (referrals and facility births) and different reference groups (baseline measures and control populations). Referrals and facility births risk overstating the impact because compliance is not necessarily 100% and facility birth does not guarantee skilled birth attendance. However, such evidence was afforded less weight through GRADE.

Conclusions on the impact of TBA integration are moderated by baseline coverage. Increasing skilled birth attendance in settings of moderate–high baseline coverage may be more challenging and, therefore, more profound than the same increases where baseline is low.

4. Discussion

Several components of TBA integration were clearly associated with increased skilled birth attendance and are recommended for incorporation into safe motherhood programs.

Traditional birth attendant training—annually refreshed—with regular supervision is associated with increased skilled birth attendance. The value of supervision is highlighted by the limited impact of TBA training in isolation [23,27,28]. Traditional birth attendants are often carefully chosen by communities [24,67,68]; thus, it is unsurprising that the interpersonal skills of SBAs influence their utilization. Improving the collaboration skills of health workers builds relationships among SBAs, TBAs, and community members. The integration of TBAs may be more challenging in isolated, severely under-resourced areas, although communication systems have effectively linked TBAs, SBAs, and women for skilled delivery care. The inclusion of TBAs at health facilities increases skilled birth attendance, with greater impact linked with greater contact. Definition of a TBA's role, with a breadth of duties rather than promotional tasks, increases skilled birth attendance. A most effective strategy has been the concurrent application of integration mechanisms and complementary activities that both encourage and enable women and TBAs to access SBAs.

For health programmers, the findings can be applied to the 3-delays model of care seeking. Table 3 illustrates how TBA integration can address each of the 3 delays.

The present review reveals a symbiotic relationship between TBA integration and certain supportive activities. Combining TBA integration with community participation; specific TBA selection; and improved affordability, accessibility, and quality of maternal health care amplifies the success of individual interventions. Community involvement can reportedly double skilled birth attendance [16], although the present review found that combining community mobilization with TBA integration achieved even better results. Specific selection of TBAs may improve the feasibility of integration; focusing on those most capable and active may achieve greater outcomes for limited inputs. Service utilization is enhanced through changes to accessibility, affordability, and quality of SBA care. In some instances, skilled birth attendance changed little, despite effective TBA integration, owing to insufficient attention to barriers.

The present review supports conclusions from previous research that major barriers to skilled birth attendance are transport, cost, distance [16,18], and health worker shortages [17]—but additionally highlights the lack of female health workers [21,47], poor quality of care and communication by health workers [38,39,48,49,59], and an unwillingness or inability for women to leave the home [57,59]. An initial assessment of the setting, health system capacity, and barriers—coupled with an understanding of the community and TBAs—will lead to appropriate application of TBA integration and increased skilled birth attendance. The algorithm in Fig. 3 was devised to assist health planners by

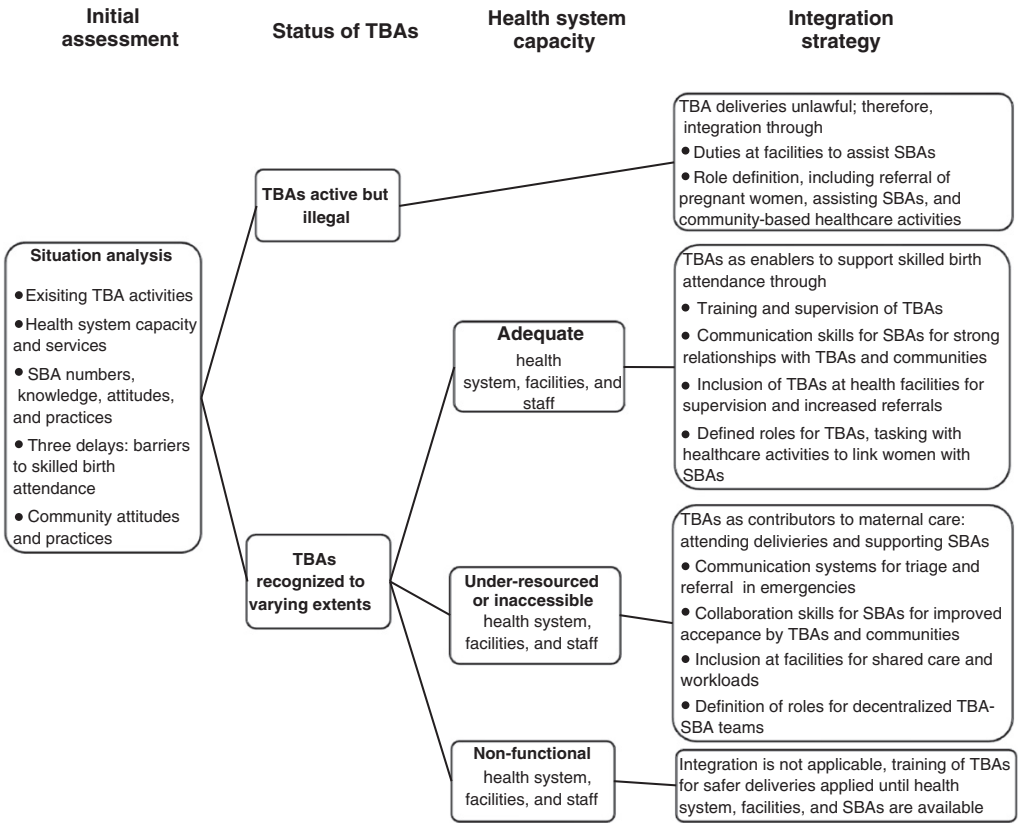

Fig. 3. Context-appropriate application of traditional birth attendant integration strategies.

outlining key considerations and appropriate TBA integration mechanisms for various contexts.

In settings with well-functioning health systems, fewer resources may be required to increase skilled birth attendance and it may be plausible to aim for universal skilled birth attendance, with integrated TBAs assuming interim roles. In operational health systems with sufficient SBA numbers, all integration mechanisms are likely to increase skilled birth attendance if specific barriers are concurrently addressed.

In settings with poorly functioning health systems and limited infrastructure, a comprehensive approach is essential. Integration mechanisms may be the same as for strong health systems; however, their application will differ. In weak health systems, universal access is an unreasonable expectation: priority must be given to women at high risk of complications and obstetric emergencies, with integrated TBAs occupying more pronounced, long-term roles.

The evidence is overwhelmingly context-related; thus, TBA integration must be based on situation analysis to ensure selection of the most appropriate integration mechanisms and complementary activities. Applied in this way, TBA integration has the capacity to increase skilled birth attendance and, thereby, contribute to safer motherhood.

The present review highlights the relevance of revisiting the role of TBAs in the current discussion on strengthening health systems for improved maternal health.

The level of impact reported by the studies depends on the combinations of integration mechanisms and complementary activities. The literature described multiple mechanisms for TBA integration: training and supervision of TBAs; collaboration skills for health workers; facility-based integration; communication systems; and role definition.

Success is dependent on the ability to create an enabling environment: first, to support TBAs to link women with formal health workers, and second to remove barriers to women's access to SBAs—enabling compliance with TBA recommendations. For TBAs, direct support from community members and health workers is crucial; however, their inclusion in the formal health system is also likely to require policy, strategy, and legislation changes. The involvement of TBAs increases the impact of other interventions to improve skilled birth attendance coverage, and highlights the potentiating role of meaningful connections between TBAs and the health system. In this way, TBAs can make a profound contribution to safer motherhood.

Conflict of interest

The authors have no conflicts of interest.

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