Quantitative Research Proposal

A Survey of Women's Experiences with Waterbirth

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Abstract

Waterbirth is the birth of an infant underwater. Water immersion refers to a woman's entrance into the water at any point during labor. Approximately 92% of hospitals in the United States do not offer waterbirth to their laboring patients (Harper, 2000). The benefits of waterbirth are relaxation, analgesic effects, labor progression, improved perineal integrity, diminished use of pharmaceuticals, and a gentler transition of the newborn from intrauterine life to extrauterine life. Theoretical maternal risks include infection, hemorrhage, and water embolism. Theoretical neonatal risks include infection, meconium aspiration syndrome, neonatal water asphyxia, shoulder dystocia, cord injuries, and delayed cord clamping effects. Neonatologists and pediatricians tend to acknowledge maternal benefits, but state it is at the expense of the newborn (Grunebaum & Chervenak, 2004; Kassim, Sellers & Greenough, 2004). Outcomes data to date suggests that for selected low risk women, waterbirth is a safe option. Making waterbirth an accessible option to more women promotes maternal choice of alternative birthing methods that best suit individual needs (Eberhard & Geissbuhler, 2000). Midwives, as patient advocates, have an obligation to protect and promote their clients' interests, including women's desires for safe birth alternatives, such as water immersion and water birth.
The conceptual framework guiding this inquiry is based on the psychological and physiological principles of water immersion and birth. This descriptive quantitative study will describe and compare the childbirth satisfaction and birth outcomes of 350 women who have undergone either waterbirth or land birth. Women will be recruited for a retrospective analysis from several different birth-related websites. Data will be collected using a questionnaire that addresses women's birthing experiences and outcomes. To broaden the population, a prospective sample from several midwifery practices will be given the option of a waterbirth or land birth. They will be given a similar questionnaire that additionally addresses the factors associated with the final choice of birth option.

Text

Chapter 1: Statement and Significance of the Problem

Introduction to the Problem

Waterbirth refers to the delivery of an infant underwater. Water immersion however, refers to maternal entrance into the water at any point during their labor but not necessarily during delivery. Approximately 92% of the hospitals in the United States do not offer waterbirth (Harper, 2000). However, when women are given the choice to birth in the water, some will chose, but many will consider the option (Geissbuhler, 2000). The problem becomes clear, waterbirth is not a readily accessible or available choice for American women. The American Academy of Pediatrics (AAP) and the American College of Obstetricians and Gynecologists (ACOG) do not recommend waterbirth as an option (Baton, 2005; "Water birth effect", 2004). The organizations site a lack of evidence and negative reports as reasons for recommending against waterbirth. Meanwhile, the American College of Nurse-Midwifery (ACNM) is developing a practice statement regarding waterbirth (ACNM, 2003). Their website, www.midwife.org, lists several articles in support of waterbirth from the Journal of Midwifery and Women's Health.

Areas of debate include rates of maternal and neonatal infection in comparison to land birth, timing of cord clamping and infant submersion, duration of hydrotherapy, and management of complications in the water, such as shoulder dystocia, maternal hemorrhage. The two areas of agreement are improved perineal integrity and analgesic effects of the water (Baton, 2005; Geissbuhler, 2000; Harper 2000). Neonatologists and pediatricians acknowledge maternal benefits, but state it is at the expense of the newborn (Grunebaum & Chervenak, 2004; Kassim, Sellers &

Greenough, 2004). They claim mothers are choosing waterbirth for their own benefit and placing their infants at risk. However, most mothers' rationale for choosing waterbirth is to provide a gentle entry into the world for their newborns (Geissbuhler, 2000; Harper, 2000). There is enough data to say that for selected low risk women, water birth is a safe option. What the opponents are actually saying, is that to avoid the rare complication, waterbirth should not be an option for anyone.

Scope of the Problem

Waterbirth is still relatively uncommon in the United States. A total of 2.9 million vaginal deliveries were recorded in the United States in 2002, according to data from the National Center for Health Statistics (NCHS, 2005). But neither the federal government nor state health departments keep track of the number of deliveries occurring in birthing pools. What is known is that approximately 92% of the hospitals in the United States do not offer waterbirth as an available option. There have been approximately 10,000 waterbirths in the U.S. from 1999 to the present (B. Harper, personal communication, January 6, 2006). Waterbirth in the United States hospital setting has expanded from one in 1991 to 280 in 2004, with the greatest growth accruing from 1995 to 1996 (B. Harper, personal communication, October 10, 2005). Midwives being the guardians of normal low risk birth, should encourage their clients to be active participants when making their birth choices. Therefore, water immersion during labor or waterbirth should be an available option.

Significance to Women's Health

The stated goals of Healthy People 2010 are "to improve the health and well-being of women, infants, children and their families" (Healthy People, 2010, 2000). Promoting maternal choice of alternative birthing methods opens the door for a better birth experience (Eberhard & Geissbuhler, 2000). Empowerment through the birth process can enhance the mother's level of confidence in herself. This concept does not end at birth but develops into feelings of competence in relationship to perceived mothering abilities (Rooks, 1997). This, in turn, promotes the early parenting experience and enhances the mother-child relationship (Kroeger, 2004).

The woman is "a unique individual shaped by the context of her family and life" (Rooks, 1997, p. 126). Family support and involvement are critical factors in the birth plan. Caregivers can provide support to families during the antenatal period, through education, to help develop that context. Topics can include the woman's and her family's expectations related to labor, birth and mothering. Choices are discussed and birth plans developed. Alternative birth methods, such as waterbirth, support these values. Left undisturbed, skin-to-skin in warm water, the mother and baby have time to "adjust to each other, guided by ancient instincts and responding to rushes of hormonal influences" (Kroeger, 2004, p. 239). Optimally with attentive, non-interventive support, the mother-baby dyad will begin on a positive note.

Within the context of choice, clients trust their provider to guide them as they monitor their health during pregnancy and labor. Through education and collaboration, waterbirth remains a safe option. The safety of waterbirth needs to be judged in looking back at the number of cases that have been reported world wide and the number of problems that have occurred as a result of birth in water. To date, there has been over 100,000 documented international cases of waterbirth (Harper, 2000). Only a rare number have demonstrated sentinel events, as evidenced in the literature review. Most women in the U.S. believe that the best, safest, and most evidence-based maternity care available is found in large hospitals under the care of an obstetrician. Research suggests, however, that a more intimate space and fewer interventions are safer and more comfortable for giving birth for the majority of women. When a laboring woman is subjected to limited childbirth options, her own innate wisdom of birth may be inhibited. Her body in turn produces less of its normal birthing hormones causing more pain and often slowing labor leading to an increased perceived need for medical interventions. These cascade of interventions often create a "domino effect" and a medically managed birth. These interventions often lead to less optimal outcomes, such as fetal distress, failure to progress, or even a Cesarian section.

Significance to Midwifery

Many women seek out alternative birth choices, such as waterbirth, but are denied the option due to theoretical and misunderstood risks. Television shows such as TLC, The Baby Story, ABC, and 20/20 make it seem that waterbirth is an available option to American women. Unfortunately, there are only a limited number of facilities that engage in this practice. According to the ACNM (ACNM, 1989), midwives support the right of each woman

to self-determine the type of care she receives as well as to fully participate in all aspects of her care in an environment of respect for human dignity and cultural variation. To the practicing midwife, this calls for an open mind concerning alternative childbirth options. Trust needs to be incorporated into a reciprocal relationship. Each birthing woman has individual needs. Practitioners, through sound judgement should recognize these individual needs. The midwifery model of care promotes the right for the childbearing woman to plan the type of care they desire through education, council, and informed consent.

The Global Maternal Child Health Association and Waterbirth International strongly support the use of water immersion during the intrapartum period. The chartered purpose of Waterbirth International "is to ensure that waterbirth becomes an available option for all women in all birth settings by 2015" (Waterbirth International, 2005, about us, para 3). Sponsoring organizations that are proponents of waterbirth options include Doulas of North America (DONA), Citizens for Midwifery (CFM), and the Royal College of Midwives (RCM) of the United Kingdom. The Midwives Alliance of North America (MANA), The North American Registry of Midwives (NARM), and the ACNM advocate the birthing mother's right to self select her birth options, but do not hold a current position on waterbirth. Barbara Harper (2006) states that there are many avenues to support Waterbirth International's mission. The mission statement,developed by a group of concerned midwives, parents and childbirth educators, is "to ensure that waterbirth is an available option for all women in all birth settings" (Harper, 2000). The key element in achieving this goal is careful review of the evidence reflecting the benefit/risk ratio in relationship to waterbirth. Therefore, this study will describe women's experiences with waterbirth in relationship to birth outcomes and childbirth satisfaction.

Chapter 2: Review of Literature & Conceptual Framework

Conceptual Framework

The conceptual framework is the foundation in which the study's investigational concepts are defined. "It broadly presents an understanding of the phenomenon of interest and reflects the assumptions and philosophic views of the model's designer" (Polit & Beck, 2004, p. 116). It presents clear explanations, so that the reader can understand the concepts supporting the study. Its main intent is to link the current research to the study's hypothesis. These background strands of prior research are interwoven, in order to persuade readers that in fact the new study holds promise for adding evidence in the field of midwifery (Polit & Beck, 2004). The conceptual framework for this inquiry is based on the psychological and physiological principles of water immersion and birth.

Maternal psychological and physiological principles.

Hydrotherapy is the therapeutic use of water for healing and relaxation. It is a naturopathic form of complementary medicine that has been practiced by many different cultures throughout time. Primitive cultures used thermal pools and hot tubs as sacred healing centers promoting wellness of the mind, body, and spirit. (Johnson & Odent, 1995) Today, the use of hydrotherapy is practiced in a variety of settings such as homes, physical therapy centers, birthing centers, and hospitals. This is done through the use of wraps, baths, showers, whirlpools, or swimming pools.

There are many advantages in using hydrotherapy during the intrapartum period of labor. The bioengineering principles underlying these benefits revolve around buoyancy and hydrostatic pressure (Church, 1989). "The Greek mathematician, Archimedes (287-212 BC) discovered as a result of the buoyant force, a body immersed in liquid loses weight" (Church, 1989, p.165). This weight loss is equal to the weight of the water displaced, giving the woman a "hydrodynamic lift" or a feeling of weightlessness (Church, 1989). Not only does this facilitate positional changes, but it eliminates compression of the inferior vena cava resulting in an increased vascular supply to the uterus and fetus. The properties of buoyancy also decrease overall muscle tension, allowing the woman to move freely and relax. The hydrostatic property of water is that it exerts equal amounts of pressure in all directions (Church, 1989). Simply put, this means that all body surfaces beneath the water are equally supported. This low impact characteristic is forgiving to the tired joints and aching muscles which are often the areas of common labor discomforts.

In practice, an “ahh effect” has been observed when a client enters warm water (Johnson & Odent, 1995). Many women feel that the water creates a safe and nurturing environment. It also provides a sense of privacy, which releases inhibitions of fears and anxieties. Maternal sense of control increases, which in turn enhances emotional well-being.

Birth is governed by bodily processes outside the control of the conscious mind (Johnson & Odent, 1995). This means that when a woman is in labor the most active part of her body is her primitive brain. The primitive brain is responsible for the release of the endogenous hormones oxytocin and endorphins, complimenting labor. When anxiety dominates, negative results may occur. Stress causes the neocortex of the brain to dominate, taking the control away from the primitive brain. Catecholamines and noradrenaline are released, causing labor progression to slow down or even stall (Johnson & Odent, 1995). When anxiety is abated, the stress hormones are replaced by natural oxytocin and endorphins.

Endorphins are endogenous opiates that are produced by the brain. These hormones are equivalent to a pharmaceutical dose of a quarter grain of morphine sulfate (Church, 1989). It has been reported that endorphins produce effects similar to a shot of Demerol without the unwanted side effects. "Wet-epidural" or "aquadural" are casual terms often used to refer to hydrotherapy in labor in the clinical setting. The pain relieving and hemodynamic enhancing effects of the water reduce the need for pharmaceutical interventions, such as pain killers and oxytocin. Full immersion is the key to maintaining these positive physiological responses. The water level should be at least covering the abdomen, though it is optimal to be at the level of the breast (Harper, 2000). Full immersion has been shown to increase the levels of vasopressin and in turn, increase the levels of oxytocin and endorphins. Therefore, not only is this relaxing quality of water beneficial for pain relief, but it can promote effective cervical dilation and result in a shorter duration of labor (Church, 1989).

Hydrotherapy during the birth process has other advantages. Softening of the connective tissues and enhancing natural lubrication can improve perineal stretching and aid in reducing trauma. Water provides a gentle medium for touch and encourages gentle pushing with control over the emergence of the infant's head. Water buoyancy, positional changes, and a lower pressure gradient have shown a reduction in injuries to the birth canal and perineum. Episiotomy is often not considered necessary, since in water there is greater elasticity of the pelvic floor, allowing the perineal muscles to stretch spontaneously (Thoeni, & Moroder, 2004).

Thermodynamics of the water temperature can be a benefit or risk. Warm water aids in relaxation, but when the specific heat is too hot or cold, unwanted effects can occur. When the water is too hot, the laboring mother can become dehydrated and overheated. Overheating can result in the body utilizing its natural cooling mechanism to maintain homeostasis. This is done by two mechanisms. The first involves the body's attempt to cool the core temperature. The blood volume increases to the vessels beneath the skin. The end result is cooler blood returning to the body's core. The second mechanism involves overheating of the skin. When this occurs, sweating begins and cools the skin. Both mechanisms require an increase in the body's metabolism, resulting in less energy and blood flow to the laboring uterus. In the absence of this cooling mechanism, more blood flow may be available to the uterine muscle and increase the efficiency of uterine contractions. Physical manifestations are evidenced by maternal tachycardia and an increase in core body temperature (Church, 1989).

Cold water also may predispose the mother to certain risks. The body stores heat in warm water but will lose heat in cold water (Church, 1989), increasing oxygen and energy demands. Shivering and shunting of the blood flow to the vital organs results. When this occurs, uterine blood flow is compromised and may interfere with the effectiveness of contractions during labor. Physical manifestations are similar to overheating, but cause a decrease in core body temperature.

Therefore, maintaining a thermoneutral water environment is recommended for a waterbirth. The temperature range for thermoneutral water is between 95-100 degrees Fahrenheit (F), or 35-37.7 degrees Celsius (C) (Church, 1989). The laboring woman may gain an advantage from this environment allowing her body to focus on the working uterus (Bristow, 2005).

Warm water can lower maternal blood pressure. "It induces a redistribution of body fluids with a relative increase in intrathoracic volume, and increase in central plasma volume, caused from a shift of fluid from the extracellular and/or intracellular space" (Church, 1989, p.166). This, in turn, suppresses the renin-aldosterone system releasing the vasopressin hormones causing a decrease in maternal blood pressure (Church, 1989). Though this can be a positive outcome, caution should be used to prevent or anticipate orthostatic hypotension, if the mother needs to stand or leave the pool.

Theoretical maternal risks include infection, hemorrhage, and water embolism. Mother-to mother infections from

sharing the same tub with patients positive for HIV or hepatitis can be prevented by the use of proper cleaning protocols. The HIV virus is susceptible to warm water and does not live in this environment (Harper, 2000). It is still imperative that the staff and practitioners practice Universal Precautions during a waterbirth. Studies revealed that there was no significant difference in the level of pathogenic organisms in the water before and after birth (Thoni & Moroder, 2004). Concerns related to maternal infections surround the issue of chorioamnionitis and endometritis. There has not been significant evidence to validate either of these concerns.

Hemorrhage has been sited as a theoretical risk. The theory states that warm water keeps the muscles relaxed after delivery of the placenta and prevents blood clotting (Garland & Jones, 1997). It is difficult to determine blood loss in the water. The actual size of the tub and volume of water can vary, therefore experience with waterbirth is key. Assessment of the physical condition of the mother is important. Universal skin color, along with vital signs should be monitored.

In theory, water embolism is a sited risk factor (Royal College of Midwives, 2000). The hypothesis is that water could enter the placental site in the uterus. Placental delivery underwater with a combination of vasodilatation and an increase in hydrostatic pressure could possibly increase the risk. The vagina is a distensible tube that collapses on itself when empty. Water would have to be under pressure to get up into the uterine area. There has never been a case of a water embolism reported in relationship to water immersion or birth.

Fetal psychological and physiological principles.

Psychologists believe that each of us is deeply influenced, on many levels, by major life circumstances which shape our character and personality (Johnson & Odent, 1995). Could birth be one of the most significant occurrences in our lives? Odent (1995) believes it is and claims that there is a critical period surrounding birth. Waterbirth offers many advantages along this line of thinking, in that it is a gentler birth experience for the baby. The theory behind this is that the baby has been in the warm watery amniotic sac for nine months. Birthing from water-to-water is familiar and may allow for a gentler transition with less trauma. Waterbirth goes hand in hand with low lighting, sound, and tender touches, thus decreasing the amount of sensory overload the newborn is exposed to at birth. Parent-to-child interactions are facilitated by a positive birth experience. The shared miracle enhances the bond of love in a family. This positive memory may serve to sustain the family through difficult times (Johnson & Odent, 1995). Gentle alternatives that make birth easier on the mother will most likely make birth easier for the child. The mother-baby dyad is intricately linked (Johnson & Odent, 1995).

As stated previously, when the mother works with her primitive brain, hormones are released that increase uterine and placental perfusion. This is turn increases the placental blood flow to the newborn. Some studies have demonstrated an increase in Apgar scores in babies transitioning from the uterine to external environment through the medium of water (Geissbuhler & Eberhard, 2000).

The thermodynamics of the water temperature are just as important concerning the fetus as they are with the mother. The recommended range helps maintain a balance of heat being produced and lost. It is best to keep the water temperature within the normal physiologic range that is similar to amniotic fluid temperatures (Johnson & Odent, 1995). This helps the newborn maintain a constant body temperature that does not influence its inherent thermoregulatory control mechanisms. When the water is too cold**,** it increases fetal energy and oxygen demands. This can predispose the infant to hypoxia. High water temperatures can cause changes in feto-maternal hemodynamic regulation, as well as thermoregulation causing the fetus to be tachycardiac. Again, increasing its metabolic needs, which are normally reserved for the labor process (Church, 1989).

Theoretical fetal risks include neonatal water asphyxia, infection, meconium aspiration syndrome, shoulder dystocia, cord injuries, and delayed cord clamping outcomes. To understand the theoretical risk of neonatal water asphyxia, it is important to understand the mechanism that prevents the fetus from breathing amniotic fluid. The fetus receives its oxygen needs from the mother through the placenta. Breathing is inhibited through a natural physiological process from endogenous hormones released from the placenta. In term healthy newborns**,** inhalation of water is suppressed. Prostaglandin E2 levels from the placenta slow down the fetal breathing movements (FBM) 24-48 hours before the onset of spontaneous labor. With the work of the musculature of the diaphragm and intercostal muscles suspended, there is more blood flow to the vital organs including the brain (Harper, 2000). At birth**,** these prostaglandin levels remain high engaging in a inhibitory response. The newborn is also equipped with the Dive Reflex. This reflex involves the larynx which contains chemoreceptors or taste buds.

These receptors facilitate the baby's recognition of which fluids can be swallowed. When a solution passes the larynx, these taste buds interpret the substance and the glottis automatically closes and the solution is swallowed, not inhaled (Harper, 2000). When the newborn senses a change in its environment from water to air, a complex chain of chemical, hormonal, and physical responses occur initiating its first breath. The risk of water asphyxia occurs when severe intrapartum hypoxia is present. Fetal distress is evidenced by fetal heart tones exhibiting severe variable decelerations or bradycardia. In this case, the fetus may be compromised causing the Dive Reflex to be overridden. This would cause the newborn to gasp as soon as it was born and possibly inhale water into its lungs (Harper,2000). Monitoring fetal status helps prevent asphyxia. Indications of fetal compromise are contraindications to a waterbirth. Gilbert and Tookey (1999) also recommend that the practitioner avoids checking for a nuchal cord. Early stimulation of the cord can increase the risk for premature fetal breathing.

There is no physiological reason to leave a baby underwater for any length of time (Harper,2000). Since placenta provides the baby with oxygen, it cannot be predicted when the placenta will separate causing the flow of oxygen to cease. The safe approach is to gently bring the baby's head above the water's surface soon after it is born (Harper, 2000).

The research shows that neonatal infection is a rare occurrence. Dr Siegel (1960) conducted a study to see if bath water entered the vagina when a woman was in the tub. He placed sterile cotton tampons into 30 women and asked them to bath in iodinated water for a minimum of 15 minutes. In 100% of the cases, when the tampons were removed**,** there was no iodine present. The laboring uterus along with fetal descent moves matter down and out, not up and in. The real risks to the fetus are frequent sterile vaginal exams, amnihooks, and fetal scalp electrodes frequently used in bed births (Harper,2000).

When meconium is present, fetal distress must be ruled out. If the well-being of the fetus is in good standing and meconium is present, there is no indication that the mother must leave the water. Meconium washes off the face of the newborn and comes out of the nares and mouth while the baby is still underwater. Suctioning can still be accomplished as soon as the baby is up in the mother's arms (Harper, 2000).

Shoulder dystocia has been associated with early forced pushing, causing the baby to emerge before its body has a chance to fully rotate (Varney, 1997). The use of water during labor or birth, facilitates frequent positional changes with physiological pushing. Physiological pushing encourages the mother to push in response to the messages from her body. Maneuvers to facilitate delivery of difficult shoulders is to have the mother get on her hands and knees or to stand up with one foot on the edge of the tub (Harper, 2000). Some of the evidence suggests that shoulder dystocia can be managed easier in the water by using the "Barnum maneuver", or by delivery of the posterior arm (Thoeni, Zech, Moroder, & Ploner, 2005).

The greatest risk of water aspiration or exsanguination, is attributed to situations in which the umbilical cord has snapped while the baby is still submerged (Harper, 2000). Snapping of the cord is possibly related to the increase movement involved in bringing the newborn to the surface of the water after the birth. It can be prevented by recognizing the possibility of a short cord and using caution when lifting the newborn up to the mother's chest (Harper, 2000).

Expectant management during the third stage of labor is an appropriate intervention for waterbirth. Delayed cord clamping carries with it theoretical fetal risk factors of its own. Polycythemia and hyperbilirubinemia are two possible outcomes. Both can occur as a result of an excess placental transfer of blood from the mother to the baby. According to Mercer (2001), this is a rare occurrence. The umbilical cord will usually vasoconstrict when exposed to air, thus limiting excessive placental transfusion to the newborn. The difference between a land birth and waterbirth is that the warm water could prevent this from happening. Preventative measures include delivering the placenta out of the water, keeping it in a floating basin during the fourth stage of labor, and clamping the cord once it ceases to pulsate (Church, 1989). Delayed cord clamping has been shown to prevent anemia in the newborn (Mercer, 2001).

Utilizing research: Adoption of new practices and policies.

Past research clearly demonstrates that for selected low risk women, waterbirth is a safe option. The question is, why is it not a readily available and accessible alternative for childbearing women in the United States? Polit and Beck (2004) refer to this concept as an Research Utilization (RU) issue. RU involves innovations in practice, such

as water immersion and birth, and integrates the best available research with its evidence and attempts to utilize these findings for actual practice. The Iowa Model of Evidence-Based Practic to Promote Quality Care is an example of how new policies can be developed through RU. This model begins with "a knowledge-focused trigger that stems from an awareness of innovative research findings" (Polit & Beck, 2004, p.685). The model then outlines a series of activities with three critical decision points. These are: to decide whether the problem manifests a need for the organization (hospital or birthing center) to explore possible changes in policy, to decide whether there is a sufficient research base, and to decide whether the change is appropriate for adoption into practice (Polit & Beck, 2004). Consumer demands are one of the prevailing forces for quality service that a hospital or birthing center provides. As more women requests alternative birth options, such as a waterbirth, the organization recognizes a need to explore possible changes in policy. Review of the literature demonstrates a sufficient research base that presents water immersion and birth as safe options. A survey will be conducted with Barbara Harper of Waterbirth International so that a large-scale investigation on water immersion and birth can be documented. This will be a resource tool for policy change. Three main ingredients will be necessary to make these policy changes a reality. These are a motivated mother, an open and supportive practitioner, and a compassionate nurse manager or perinatal coordinator who is willing to educate and train their staff in the creation of a new policy (Harper, 2000).

Conceptual map.

A conceptual map is a representation of the study's concepts using symbols or diagrams. The conceptual map of this study is:
Survey: WWE and MFO ---(+)---PR---> KFT ---> WI and WB

WWE = Women's waterbirth experiences
MFO = Maternal-fetal outcomes
PR = Prior research
KFT = Knowledged-focused trigger
WI = Water immersion
WB = Waterbirth

Review of Literature

Initial attempts to access full-text articles through the Philadelphia University's On-line collection and Google search engines, yielded few studies. Subsequent attempts included a PubMed search using the keyword "waterbirth" and a review of the bibliography from Waterbirth International. Articles were chosen based on recency and applicability, and then obtained through Anne Arundel Medical Center's hospital library. Additional articles were still needed, so a review of previous students' bibliographies were conducted and selected articles obtained via interlibrary loan from Philadelphia University's Gutman Library. The total number of received studies was 25; articles were reviewed for data provision and special topics. Large studies that yielded several outcome measures were included as were studies of specific phenomena such as labor progress and dystocia, temperature regulation, labor pain, trial of scar after cesarean, and therapy for edema. Finally, three articles were chosen that discuss women's decision-making and experience with waterbirth.

Large studies offering waterbirth outcome measures.

In England and Wales, the House of Commons Health Committee recommended the provision of a birthing pool in all hospitals (Alderdice, et al., 1995). This recommendation called for additional research on labor and birth in the water, so the Department of Health funded the survey discussed by Alderdice, et al (1995). The survey was mailed to "219 identified heads of midwifery, or equivalent, in NHS provider units in England" (Alderdice, 1995, Methods and Results, para 2). All of the questionnaires were returned and followed up with telephone interviews. They collected two consecutive years of retrospective data including the frequency of use of water for labor, birth, or both. They also collected data that included any problems that occurred during the use of water immersion. The majority of the units (n = 179) delivered 20 babies in the water in one year; 17 units delivered 50 or more and only 4 delivered 100 or more. The immersion participants totaled over 14,000 and some of these numbers are "good" or "rough" estimates.

The reported problems during labor and birth were considered not related to the water itself, however, this is a retrospective consideration. The reports included 12 (~0.9%) fetal/neonatal deaths, 51 (~0.36%) reports of

neonatal morbidity including respiratory problems or infections, and 33 (~0.24%) maternal morbidities including postpartum hemorrhage and severe perineal trauma. All together these totaled approximately 0.69% of the 14,000 participants. The authors conclude that "there is no evidence from this survey to suggest that labor and birth in water should not continue to be offered as an option to women in England and Wales" (Alderdice, 1995, Comment, para 3). The authors recommended a randomized controlled trial and obtained interest from 168 of the participants. They comment that routine local audits should be carried out to gather more data.

This study has strength in numbers, however, the description of the study is lacking. The authors should elaborate on the actual questions of the survey and interview, data processing and analysis, and population description. The method of data collection was self-report which "frequently yields information that would be difficult, if not impossible, to gather by any other means" (Polit & Beck, p. 320). However, it must be interpreted with caution because the midwifery heads admittedly estimatied data rather than having exact numbers, in order to represent their practices in a positive light. The data should be compared to national averages to determine the extent of the reported problems. This simple comparison could provide the necessary support needed to qualify the use of water during labor and birth demonstrating low reported fetal, neonatal, and maternal complications. For the proposed inquiry, self-reported data will be collected and thus must be interpreted with the same caution. Additionally, the inquiry will be piloted for accuracy and validity and the participants will be encouraged to provide full and honest responses (Appendix C &D).

Two years after Alderdice et al.'s study, Gilbert and Tookey (1999) also described perinatal morbidity and mortality during waterbirth in England and Wales. They sent a postal survey to the same 219 NHS maternity units; 217 responded. They asked about the number of water births and immersion without birth during the 25 month period between April of 1994 and April 1996. Their methods also included a surveillance study of neonatal admissions to the special care nurseries. Every month they asked consultant pediatricians in the British Isles "whether or not they knew of any births that met the case definitions of 'perinatal death or admission for special care within 48 hours of birth, following labor or delivery in water'" (Gilbert & Tookey, 1999, p. 483-4).

Results of the postal survey estimated 4,032 births, or 0.6% of all deliveries occurred in the water, excluding immersion only participants. The majority, 82%, were calculated from written records while 12% and 6% were good and rough estimates, respectively. The surveillance study revealed five perinatal deaths of the 4030 live births giving a perinatal mortality of 1.2 per 1000 live births. The national average for low-risk women is 0.8/1000 to 4.6/1000 live births. Two of the perinatal deaths were stillborn. One was born to a woman who concealed her pregnancy, did not receive prenatal care, and delivered unassisted in water at home. The other stillbirth was identified prior to water immersion. The three neonatal deaths were secondary to 1) neonatal herpes infection, 2) an intracranial hemorrhage after precipitate delivery, and 3) hypoplastic lungs.

In addition to these three babies, 32 were admitted to the special care nursery giving a risk of 8.4 per 1000 live births. The national average for low-risk women is 9.2/1000 to 64/1000. The indications for admission included: respiratory support (n = 13); respiratory tract problems such as pneumonia, transient tachypnea of the newborn, meconium or water aspiration, and fresh water drowning (n = 15); hypoxic ischemic encephalopathy grade 2 or 3 or perinatal asphyxia including the baby diagnosed with fresh water drowning (n = 5); evidence of infection (n = 2); snapped umbilical cord (n = 5); chromosomal abnormality (n = 1); transposition of the great arteries and hypoxic ischemic encephalopathy (n = 1); stridor (n = 3); and shoulder dystocia (n = 1). Four babies had no clear reason for admission and some babies had more than one indication.

Of the women who used water immersion with a land birth, six babies died. Three were stillborn, with one dying from a nuchal cord wrapped five times, which resulted in intrapartum asphyxia. The other two stillbirths were unexplained. Two neonatal deaths were from hypoxic ischemic encephalopathy grade 3; one had evidence of antepartum hypoxia, and the other had severe shoulder dystocia. The remaining mortality was from sudden infant death syndrome. The authors commented that they could not determine whether water attributable causes of mortality such as water aspiration and snapped umbilical cords could be prevented by conventional births.

Under-reporting was possible for nursery admissions, but the researchers evaluated under-reporting of neonatal deaths by comparing the reports to the mandatory regional notification scheme. Additionally, the authors believe that the estimated number of births is probably lower than the actual number. This would increase the denominator, or total number of waterbirths, used for risk analysis (4032). A larger denominator would reveal a smaller risk. With this in mind, the researchers compared their data to national averages for low risk women and

concluded that "delivery in water does not substantially increase adverse perinatal outcomes" (Gilbert & Tookey, 1999, p. 486).

Overall, this study offers a detailed analysis and compelling conclusions that support the use of water for birth. The authors' description of the neonatal indications for nursery admission was not clear. The reader must deduce that there was more than one problem with some babies, because the total number of indications is greater than the number of admitted infants. The study was retrospective, leading to bias. The authors were able to double check the reporting of neonatal deaths but not nursery care admissions and they relied on the pediatricians' memory. The article focused on risks to the fetus. Risks to the mother as well as benefits for the mother and baby should be evaluated for a true risk/benefit analysis. The data in this study was gathered from the providers. This provides observational, self-reported data. Observational data is subject to bias. For example, pediatricians opposed to waterbirth may overestimate the number of special care nursery admissions. Additionally, the provider reported data does not provide information about women's experiences such as feelings, motives, and opinions. This inquiry proposal aims to describe safety issues and women's experiences.

An additional study out of the United Kingdom evaluated maternal and neonatal outcomes of waterbirth using a retrospective quantitative case control design (Otigbah, Dhanjal, Harmsworth, & Chard, 2000). From October 1989 to October 1994, 301 women participated in waterbirth. Criteria for participation included written request, at least 38 weeks gestation, cephalic presentations, normal sized fetus, reactive admission cardiotocography, and lack of meconium stained fluid. These cases were matched to land births based on parity, low-risk status, normal vaginal delivery not requiring oxytocin augmentation, maternal age within five years, and induction method (prostaglandin use only). The authors describe the waterbirth protocol used and highlights include freedom to enter and exit the water when desired, intermittent fetal heart monitoring, immediate surfacing of the newborn, use of disposable pool liners, pool cleansing and culturing protocols, and water temperature of the mother's choosing until delivery. At birth, the temperature was maintained at 37 - 37.5 degrees C. The *t* test and Chi-squared tests were used for statistical analysis.

Outcome measures included length of labor, analgesia use, timing of first breath, perineal integrity, maternal and neonatal infections, postpartum hemorrhage occurrence, and other complications such as shoulder dystocia and special care nursery admissions. Waterbirth primigravidas experienced shorter first stage labor (300 minutes verses 390 minutes, $p<0.05$) and second stage labors (32.7 minutes verses 42.6 minutes, $p < 0.005$). The trend was similar, although not significant, among multiparas. There was significantly ($p<0.0001$) less use of analgesia (entonox, pethidine, or combination), except for multiparas' use of entonox only. Waterbirth multiparas used more entonox (nitrous oxide and oxygen) only than the control group (92 versus 79), however this was not significant. Intact perineums were more common for waterbirth primiparas (54 verses 38, $p<0.05$). Multiparas experienced more lacerations in the water (93 verses 72, $p<0.0001$) and fewer episiotomies (2 verses 25, $p< 0.0001$) than their matched controls. There were no significant differences in other measured neonatal and maternal outcomes. The authors conclude: "this study has shown no evidence that waterbirths in low risk women, conducted by professionals, are less safe than normal vaginal deliveries and indeed may confer significant benefits to the laboring mother" (Otigbah, 2000, p. 19).

Two strengths of this study include the size and use of a control group. The authors included important matching criteria such as low-risk, age, and parity. However, the authors noted that the waterbirth group who self-selected their method of delivery could be better motivated and educated, therefore more likely to refuse analgesia and episiotomies. This self-selection to water is the way water babies are usually born. Women are not requested to enter the water, contrary to their personal desires. These self-selection results are acceptable. They also commented that the midwives who cared for waterbirth clients were specially trained, and may share a philosophy with the waterbirth mothers. The midwifery patients were also provided with continuous one-on-one support. The philosophical factors may contribute to the outcome differences. A prospective controlled study should include one-on-one support for both in and out of water participants. Also some form of randomization to the option of waterbirth, may eliminate some participant bias. This randomization may however be a risk to the ethicality of a study, given that women should be allowed the autonomy to choose or decline a waterbirth. Additionally, a qualitative study could assess the rationales for choosing or avoiding waterbirth. This study provides further support of waterbirth as an alternative birthing method.

During the time that England was producing substantial evidence supporting waterbirth, Thoni and Moroder (2004) offered results from their waterbirth studies at a hospital in Italy. Specifically, they compared the three most

common modes of delivery at their hospital: bed birth, delivery stool, and waterbirth. The study period was from March 1997 until December 2003, in which 1355 mothers underwent waterbirth. The vast majority of births at this hospital were low risk. High risk pregnancies were transferred to a perinatal center. Women self-selected their birthing position and were able to change positions at any time. Exclusion criteria included non-reasurring fetal monitor tracings, intrauterine dystrophy, twins, or footling breech. After an initial 20 minute fetal monitoring session, intermittent monitoring was used. They also used a waterproof wireless monitoring system.

Results were congruent with other outcome studies, however statistical analyses were not performed and full data was not provided. The authors stated episiotomies were reduced in the waterbirth group, without an increase in perineal lacerations. Numbers were not provided. Third degree lacerations occurred in 0.53% of waterbirths and 1.7% of stool births. Percentages were not given for bed births. Perineums remained intact for 57% of primipara verses 36% and 48% in the other two groups. The author did not specify which were bed verses stool births. The women birthing in the water who sustained lacerations did not have any functional deficits postpartum. Waterbirth primiparas experienced shorter first and second stage labors; actual differences were not provided. The waterbirth participants did not use analgesia nor oxytocin; no data were given for the other groups. Fifty-three women with a history of a previous Cesarean, successfully had vaginal waterbirths. This was not compared to the other two delivery modes.

Concerning neonatal outcomes, three cases of shoulder dystocia occurred in the water. One baby had its clavicle fractured during delivery, and one mother left the water for birth. Delivery of the posterior arm was required in all cases. Arterial cord pH and base excess were within the normal range and no functional deficits were noted in any of these babies. Data was not given regarding shoulder dystocia for the other modes of delivery. There were no statistical differences in arterial cord blood pH, base excess, and birth weight among the three groups. Significance was not calculated. Furthermore, infection risk of the water born infants was lower.

The authors provided a description of methods to reduce pool contamination. Initially, bacterial contamination of the hot water was attributed to insufficient cleaning protocols resulting in contamination of the pool water samples. The addition of a bacterial filter decreased the contamination of *Pseudomonas aeruginosa* and *Legionella pneumophilia.* Disinfecting agents further reduced coliforms, *Escherichia coli* and *Enterococcus spp.* Samples taken after births found high rates of coliforms and *Escherichia coli* and lesser amounts of *Pseudomonas aeruginosa, Staphylococcus aureus*, and yeasts. Refilling and re-sampling the pools after births revealed high levels of *Escherichia coli, Enterococcus spp., Pseudomonas aeruginosa,* and *Legionella pneumophilia.* The infants born in the water displayed fewer signs of infection than the other two groups combined (1.34% verses 3.4%, respectively). Additionally, those babies born in the water had decreased C-reactive protein (a chemical released during an inflammatory response) than bed born babies (1.5 ± 0.2 verses 2.82 ± 1.82).

The strength of this retrospective study is the large sample population. The comparison is poor. More data should be provided from the bed birth and stool birth groups. Additionally, statistical evaluation is needed to determine if the differences between the groups are significant. The author used the terminology "significantly different" without providing the necessary p values. This type of missing data subjects the research to turmoil and allows data questioning. It is supportive of waterbirth. A better use of statistical analyses would strengthen the authors" contribution to research. For the proposed inquiry, data will be compared and significance values calculated and reported.

In response to consumer demand, Geissbuhler and Eberhard (2000) began a new birth program at their hospital in Switzerland that offered mothers a choice of delivery positions. They designed a quantitative study for their clients "to compare the quality of alternative birth methods, especially that of waterbirths (when the quality of the monitoring and the birth management is unchanged), with traditional 'bed birth" (Geissbuhler & Eberhard, 2000, p. 292). As providers, the authors wanted to assess the safety of such deliveries and they proposed a question about the safety of alternative birth methods.

The study's design is a prospective, observational, and quantitative data collection over a five-and-a-half year time span (1991-1997), encompassing their entire birthing clientele - 7,508 births. The participants were self-selected into a group of birthing methods, which changed overtime based on the mother's choice. The primary birth methods included waterbirth, Maia-birthing stool, or bed birth. In order to study the participants' experiences, the authors distributed a prenatal questionnaire six to eight weeks before the birth. It asked "about her expectations and wishes concerning birth management, birth methods, and the expected pain. She may also express her fears"

(Geissbuhler & Eberhard, 2000, p. 294). After the birth, "the attending midwife and doctor record the objective information concerning labor, birth, and the postpartum phase" (Geissbuhler & Eberhard, 2000, p. 294). Finally, they offer the mothers a visual analogue scale to grade their birth experience. They analyzed the data using x^2 test and the Mann-Whitney U test.

Maternal outcomes in perineal integrity and blood loss were significantly different for the waterbirth group. Waterbirth was found to be the most protective birthing method with better perineal integrity, having less episiotomies than Maia-birthing stools ($p < 0.001$) and bed births ($p < 0.001$), fewer 3rd to 4th degree lacerations than bed births ($p < 0.05$), and more instances of intact perineums than Maia-birthing stools ($p < 0.05$) or bed births ($p < 0.05$). Waterbirth was found to have more 1st to 2nd degree lacerations than Maia-birthing stools ($p < 0.05$) and bed births ($p < 0.001$). Clitoral tears were similar among all groups but waterbirth had fewer vaginal tears and labial tears than Maia-birthing stools ($p < 0.05$ and $p < 0.0001$, respectively) and bed births ($p < 0.0001$). Waterbirthing mothers experienced lower blood loss - measured by change in hemoglobin levels before and two - four days after birth - than Maia-birthing stools ($p < 0.003$) and bed birth ($p < 0.0001$).

The waterbirth participants had less exposure to pain-killers, significant at $p < 0.05$ and $p < 0.0001$ for Maia-birthing stool and bed births respectively. The neonates experienced higher neonatal arterial pH, and improved Apgar scores. The mean values for umbilical cord arterial pH were 7.30, 7.29, and 7.26 for waterbirth, Maia-birthing stool and bed birth, respectively. Compared to waterbirth, significance values were $p < 0.005$ for Maia - birthing stool and $p < 0.0001$ for bed birth. Mean Apgar scores at 5 and 10 minutes for waterbirth and Maia-birthing stools were 9.8 and 9.9, which were significantly different ($p < 0.0001$) than mean bed birth Apgar scores of 9.6 and 9.9. Although these values were found significantly different, there is no clinical significance between an Apgar of 9.6 and a 9.9. This level of significance was found because the sample size was large enough to find a difference. Readers must be cautious when interpreting the values. There were no increases in infection or reports of maternal or neonatal water-related complications. The findings were extraordinary.

However, results are only as good as the study methods and these findings must be interpreted with caution. The lack of blinding offers opportunity for bias. In their article, the authors admit to being more cautious with their waterbirth clients. This was because they had them resort to bed birth positions so that they could monitor the fetal heart tracings during uncertainty of the fetal heart tones. This action reduces potential negative outcomes in the water. Self-selection is subject to bias. However, the decision for a waterbirth should continue to be an available option for healthy candidates and not necessarily a "treatment" option for labor and birth. The majority of foreign clients selected a bed birth and may represent a higher risk status or cultural differences. This is because the authors state that the majority of foreign clients "do not benefit from prenatal care as often or as regularly as the Swiss population because of the language barrier and lack of information about the local possibilities" (Geissbuhler & Eberhard, 2000, p. 299). Additionally, the foreign clients may also choose a bed birth because waterbirth does not appeal to them or for cultural preferences. The authors did not comment on alternative reasons for foreigner selection to the bed birth group.

Improving the study then seems easy, double-blind and randomize it. However, randomization would defeat the researcher's philosophy of allowing a woman to choose her own birthing position. In natural settings - at home, birth center, and hospital births - women decide on their birth plans. Research that evaluates such circumstances is naturalistic setting research and it emphasizes "the inherent complexity of humans, their ability to shape and create their own experiences, and the idea that truth is a composite of realities" (Polit & Beck, p. 16). With this research philosophy, a deeper understanding can be obtained that represents how outcomes can and will occur in the clinical setting. Therefore randomization is not ethically feasible as it strips women of their autonomous right to decide their birth plan. Geissbuhler and Eberhard state that the decision to exit the water was made by either the provider or the mother. When it is the mother's choice, the motive for leaving the water could be evaluated. Perhaps there is something innate in women - their bodies communicating to them when it is or is not safe to be submerged - that could be evaluated. Regarding blinding the study, it is impossible to blind a provider and the mother to the birthing position. Therefore, data collection is subject to bias of the collector. Alternatively, the researcher could hire an objective observer to witness and record the events as they occur.

The primary strength of this study is the sample size. In industrialized nations, maternal and neonatal morbidity and mortality is rare, thus a large population sample is required to detect such occurrences. With waterbirth as an emerging, utilized alternative birth method, this population size may be difficult to replicate. Another strength of

the study is the researchers' explanation of study results. For example, the low rate of episiotomy for waterbirth could be due to the provider's inability to visualize the stretching perineum. They comment on gravity's influence on blood loss in the Maia-birthing chair, which was found to be statistically greater than bed births or waterbirths. They independently hypothesized that the dilutant effects of the water reduce microorganism exposure to the mother and infant resulting in the low infection rates.

In comparison to the previous study, waterbirth outcomes were found to be better than land births, rather than similar. Perhaps this is an issue of protocols and the methods used by Geissbuhler and Eberhard to care for women in labor. The different standards they uphold, such as continuous support and surveillance of the labor as well as the prompt response to warning signs, could be evaluated in further studies.

In 2004, Geissbuhler published another study along with Stein and Eberhard. The sample included their original data plus the births from the more recent years. The methods were the same and the purpose was slightly more focused: to compare neonatal morbidity and mortality between waterbirths and land births. Maia-birthing stool and other birthing alternatives, besides waterbirth, were factored into the landbirth group. The data was expanded to include nine years worth of records. They used the same protocols to care for the women including liberal use of oxytocin for third stage blood loss. Exclusion criteria for waterbirth includes breech presentation, twins, gestation less than 36 weeks, and women with a BMI > 40. The population totaled 9,518 with 38% delivering in the water and the remaining 62% experienced land births. The landbirth group, as before, was at higher-risk for complications and included more preeclampsia ($p < 0.001$), signs of infection ($p< 0.007$), meconium-staining of amniotic fluid ($p< 0.000$), and suspicious/pathological fetal heart rate tracings ($p< 0.000$). This analysis was not provided in the previous study.

First and second stage labor was shorter in the waterbirth group ($p<0.000$) and the authors attribute this to the higher numbers of secundi- and multiparous mothers. Perineal integrity was improved in the waterbirth group, all at $p< 0.000$. As before, clitoral tears were similar in both groups and waterbirth had more 1st and 2nd degree lacerations ($p<0.000$). Reduction in blood loss based on hemoglobin levels among waterbirth participants was 5.26g/L verses 8.08g/L at $p < 0.00$. The only analgesic used more frequently in the waterbirth group was homeopathic remedies ($p<0.000$). In contrast to the previous study, there were no significant differences in use of suppositories, injections or acupuncture. However, waterbirth participants used less epidural anesthesia ($p<0.015$) and less "other remedies and methods" ($p<0.023$) such as aromatherapy. The incidence of maternal infection was similar in both groups, with more prophylactic ($p< 0.000$) and therapeutic ($p<0.003$) antibiotic use among landbirth participants who also had more signs of infection than the waterbirth group.

Neonates born into the water experience fewer occurrences of 5 and 10 minute Apgar scores less than 7 and 9 respectively. However, a significance calculation was not provided. Umbilical cord pH was significantly lower among water babies ($p< 0.00$) with a mean of 7.29 verses 7.27 and a minimum of 6.88 and 6.74. Waterbirth neonates also experienced fewer ($p< 0.000$) injury-associated complications and complications with transfer from the delivery room to the neonatal intensive care unit (NICU). Rates of complications, including severe shoulder dystocia and complications with transfer from the newborn ward to the NICU, were similar among both groups. The previous study did not provide this information. The only significant difference in neonatal infections was more ocular infections of land-born infants at $p< 0.022$ with the total number of infections favorable for the waterbirth group at $p<0.015$.

This study combines a secondary analysis of previously studied data and incorporates newer records data. Secondary analyses allow exploration of new hypotheses. In this case, the researchers more closely evaluated morbidity and mortality. If secondary analyses are done by researchers different from those who originally collected the data, the data is likely to be deficient in some area (Polit & Beck, 2004). This was not the case in this study as the researchers revaluated their own data sets. Records data is inexpensive and accessible (Polit & Beck, 2004). When data is collected repeatedly, as in this case, the data can be studied for trends in outcome and care plans. These authors could do this in yet another follow-up study.

The data supports the safety of waterbirth as an alternative to landbirth. As previously stated, caution must be used when interpreting the results, as the landbirth group demonstrated a higher risk. This is not necessarily a limitation because waterbirth should remain a safe option. Therefore, further research could evaluate the support and surveillance activities of the provider that should be included in a home or hospital waterbirth protocol. The research methods were no different than the researcher's standard of care and the data simply came from the

medical records of their entire population. The authors recommend thorough cleansing of birthing tubs, birth management that follows obstetric guidelines, careful evaluation of birth, never leaving the woman alone, and using their exclusion criteria. Further information from this extensive study database could include case evaluations of the complications. Information could be qualitatively evaluated to determine details regarding exiting the water. This would include events that lead to the change, who made the decision, and the women's satisfaction with their decisions. Additionally, the providers and mother's experiences could be discussed.

Specific parameters associated with water immersion.

A group of American researchers designed a prospective randomized controlled trial of water immersion (without water birth) on labor efficiency (Schorn, McAllister, & Bianco, 1993). Their population included 93 women between 36 and 41 weeks gestation, without major obstetric or medical complications, at 4 -7 cm dilation, with intact membranes, and a normal fetal heart rate pattern. At first attempt, obtaining consent was difficult. The original methods blinded the clinical midwife to the treatment group until after consent was obtained. The methods were changed to allow disclosure of the treatment group to the counseling midwife and consent was more readily obtained. The treatment group was allowed immersion and self-regulated temperature control of a jacuzzi tub with a molded seat for as long as they chose. Both groups were offered showers, ambulation, rest, and analgesics. Data was collected prior to and an hour after treatment (or no treatment) and then analyzed using the Student *t*-test, Fisher's exact and chi-square tests. Statistical significance was $p<0.05$.

Forty-five women were in the water immersion group and the remaining 48 were in the control group. The groups were similar in maternal age, gestational age, maternal weight, and newborn weight. However, there were more primigravidas in the water immersion group (29 verses 18). Most women immersed in the water for 30-45 minutes with ten at 30 minutes or less, 20 for 31-45 minutes, 14 for 46-60 minutes, and one for more than 60 minutes. Self regulated water temperature ranged from 32-41 degrees C and averaged 36 degrees C. There were no differences in change of cervical dilation, contraction frequency, and length of first stage labor between the two groups. This was even when parity was controlled. Second stage labor was shorter for the control group (1.8 hours verses 0.6 hours, $p < 0.02$), however, this difference was eliminated when accounting for higher parity in the control group. Rates of analgesia use and oxytocin for augmentation were also similar.

The authors evaluated additional maternal and neonatal outcomes after water immersion. Systolic and diastolic blood pressure remained similar in both groups. Maternal temperature was 0.4 degrees higher during water immersion group and 0.05 degrees cooler during labor in the control group ($p<0.04$). Maternal pulse was 6.8 beats per minute (bpm) higher after water immersion and only one beat per minute higher in the control group ($p<0.046$). Fetal heart rate was elevated 10-20 bpm during water immersion and 6.3 bpm higher one hour after the start of immersion. It was 0.1 bpm higher in the control group ($p< 0.01$). The mild changes in maternal and fetal heart rate were contributed to the increase in maternal body temperature during immersion. Neonatal Apgar scores were similar among the groups. There was no evidence of fetal distress during or after the water immersion, neonatal infection or chorioamnionitis in either group. Although there were two cesareans among the water immersion group and none in the control group, difference in method of delivery was not significant. This was also the case with three versus one case of postpartum endometritis in the control and water immersion group, respectively. Finally, there were no readmissions during the 30 days following childbirth.

The authors admitted to the potential bias due to the lack of blinding the clinical midwife during the consent progress. This bias was evident when the midwives were then able to obtain consent, once they knew the treatment group. Midwives who were fond of water immersion could counsel differently than those who are not, resulting in a different recruitment rate. The strength of this study is its randomized controlled design. This type of study is the only kind that can truly assess cause and effect; or test a hypothesis (Polit & Beck, 2004). The lack of a significant improvement in labor progress may simply mean that 30 - 45 minutes of water immersion may not have this effect. Also, the lack of effect on labor progress does not mean that water is a poor choice for the birthing woman. In the case control study by Otigbah, et al. (2000), there was a 90 minute reduction in first stage labor. A power analysis done by Shorn, et al. (1993) revealed that with their population size, there was statistical significance, in a difference of 2.3 hours. So, perhaps the population was not large enough to show effects on labor seen in other studies. An additional consideration is that the true experimental design has been criticized for demeaning the human experience (Polit & Beck, 2004). Perhaps, then it is the determined waterbirth participant and their supportive provider who maximize the waterbirth experience. Self-selection allows those people who are comfortable to enter it, and those who are not - to avoid it. If someone is not comfortable in the water, they are

likely not to achieve maximal relaxation which could result in inefficient labor progress.

To further study the effects of water on the labor progress and use of water immersion as a treatment protocol, Cluett, Pickering, Getliffe, & Saunders (2004) randomized 99 women with diagnosed dystocia to either water immersion or the standard augmentation protocol. Initially, the authors wanted to compare water, augmentation, and conservative management. However, conservative management was considered unacceptable by the administration at their southern England hospital. Their purpose was to compare labors in water with augmentation in nulliparous women with dystocia. To participate, nulliparous women with a diagnosis of dystocia - defined as cervical dilation of less than 1 cm per hour - who were in spontaneous active labor with a low risk of complications, gave their informed consent and were then randomized to their treatment group. The midwives who counseled and took informed consent, were unaware of which treatment group they would subsequently be assigned. All women received one-on-one care, vaginal examinations at least every four hours, and access to any available form of analgesia. The augmentation protocol was the hospital's standard of care for dystocia and included an amniotomy, followed by two hours of observation. If no progress was made, oxytocin was initiated starting at 4 mU/min and doubled every 30 minutes to a maximum of 64 mU/min or 3-4 contractions every 10 minutes. The water immersion participants promptly entered the tub, which measured 154cm by 184cm by 77cm (allowing immersion to the breasts when sitting). Water temperature was set at 36.0-37.0 degrees C.

The midwives originally recruited 176 women in which 99 (56%) agreed to participate. Forty-eight women participated in water immersion and forty-eight participated in augmentation. One woman randomized to water immersion requested augmentation and two women randomized to augmentation progressed prior to amniotomy. These changes resulted in a total population of 96. The groups were similar in age, neonatal birth weight, gestational age, marital status, and cervical dilation. Numbers of operative deliveries, duration of first stage labor, and overall satisfaction were similar among the groups. Of the 48 women undergoing water immersion, 35 (73%) required additional augmentation due to continued dystocia at the four hour assessment; 28 (58%) required an amniotomy, 7 (15%) needed oxytocin, and 14 (29%) received both. Of the 48 women in the augmentation group, 20 (42%) received amniotomies, 11 (23%) received oxytocin, and 17 (35%) received both. The rate of receiving both oxytocin and amniotomy was less among the water group than augmentation group ($p = 0.001$). Additionally, the augmentation protocol was described to start with amniotomy however, 11 women in the augmentation group received oxytocin only. Perhaps they had spontaneous rupture of membranes prior to trial initiation. More women in the augmentation group (33 or 66%) than the water group (23 or 47%) received epidurals ($p = 0.056$). During the postpartum interview assessment, water participants reported lower mean pain scores at 30 minutes after the start of the trial (49mm verses 64 mm out of 100mm on the visual analogue scale, $p = 0.003$) and a reduction in mean pain (-26mm verses 12mm, $p < 0.001$). Furthermore, water participants reported more satisfaction with freedom of movement (91% verses 63%; $p = 0.001$) and with the experience of privacy (96% verses 81%, $p = 0.029$).

Maternal and neonatal well being was also evaluated. Maternal and neonatal infection rates, neonatal Apgar scores, and umbilical cord pH were similar between the two groups. There were, however, higher rates of special care nursery admissions among the water participants. For the water group, there were six (13%) admissions with no admissions among the augmented group ($p = 0.013$). Reasons for admission include two with hypothermia, one with a fever, two with a suspected infection on day two, one with poor feeding on day three, and one with a cardiac defect. The authors proposed reasons for the increased nursery admission. These reasons include, "water immersion itself, the delay in intervention of up to four hours (even though this did not affect overall labor length), extra caution by practitioners when women were known to have labored in water, or chance factors with no direct relation to the trial" (Cluett, et al., 2004, p. 317). The babies were not born in the water and the mean delay from water exit to birth was six hours with a range from two to ten hours. It is interesting to note that three of the admissions were for temperature regulation with the water temperature controlled between 36.0-37.0 degrees C. However, with none of the births actually occurring in the water and the delay between tub exit and birth being at least two hours, it is difficult to consider the water immersion a cause of the nursery admissions.

The strength of this study is its design. A prospective randomized clinical trial is one that compares one intervention against a standard while maintaining everything else stable. Two excellent strategies were having the midwife unaware of which group the parturient would belong to during counseling and the provision of one-on-one care to both groups. One confounding factor that could not be controlled was the extra caution by practitioners described by the authors. Despite the differences found between the two groups, statistical significance was only

found related to the greater reduction in mean pain among water participants. This could be the lack of an ample sample size. However, the data shows that an initial trial of water immersion is as effective in treating dystocia as immediate augmentation. The authors concluded "for nulliparous women with dystocia (cervical dilation < 1 cm/hour), immersion in water for up to four hours seemed to reduce need for augmentation of labor, reduce pain, and increase satisfaction without increasing overall length of labor or operative delivery rate" (p. 318). In many of the aforementioned studies and in some waterbirth protocols, labor dystocia is an exclusion criteria for water immersion. However, in this study it is utilized as a treatment. As the research regarding waterbirth continues to grow, variables that waterbirth may treat can be explored. The proposed inquiry will be a stepping stone to this research. It will identify variables for consideration and encourage researchers to more closely evaluate them.

In a Belgium hospital, Cammu, Clasen, Van Wettere and Derde (1994) designed a prospective randomized study of 110 women to determine "whether a warm tub bath in labor has a pain relieving effect" (p. 468). The population consisted of nulliparous, low-risk women at 37 weeks gestation or greater, with a singleton fetus in cephalic presentation. Women were admitted to the study when they presented to the hospital in true spontaneous labor, at 3 - 5 cm dilation, had clear rupture of membranes, and no evidence of dystocia. Women were randomized into two groups. One group was selected for water immersion and the other group was not. Three mothers choose not to bathe. This resulted in 54 bathers and 56 controls. The groups did not differ in maternal age, gestational age, birth weight, cervical dilation or Bishop score on admission, or visual analogue pain scores. Pain and cervical status was assessed at admission (T_1), 25 minutes later (T_2), and again at 50 to 60 minutes (T_3) after randomization, unless second stage began sooner. The tub measurements were 160 cm long and 50 cm deep and the temperature was decided on by the mother. Caution was used not to exceed 37 degrees C. On the postpartum day, bathing mothers were anonymously given a questionnaire regarding their experiences. Questions were closed-ended with room to clarify or comment.

The pain and cervical assessments were similar between the groups at every interval, although trends were favorable for the water immersed group including less labor augmentation. Pain difference at T_3 verses T_1 was significantly lower for bathers ($p < 0.001$). This was also the case for Bishop score at T_3 verses T_1 among the bathers ($p<0.003$). First stage was 20 minutes shorter for bathers and the second stage was one minute shorter for bathers. Neither difference is significant. There were no significant differences in delivery method, endometritis, antibiotic use, or neonatal outcomes. Amnionitis and neonatal infections were never diagnosed. Bathing was found to have a soothing effect for 80% of the women. The main reason sited (65%) for leaving the tub was an increase in the pain with passing time. It was not stated if mothers delivered in the water or not. The majority (89%) of mothers choose to use water with their next labor, while three women (6%) did not, and three (6%) were unsure. The women who will not participate again include one who felt unwell and two who were "seized with fear because of the warmth and pain" (p. 470). The authors concluded that "bathing provinces a temporal pain stabilizing effect but no objective pain relief" (p. 471).

The strength of the study is the design (randomized controlled clinical trial), which allows for cause and effect analysis. Does bathing in labor decrease pain? According to this study, and within the sample size constraints, it does not. A power analysis of the study was not performed. The researchers, who were not the midwives caring for the women, asked the women several times to rate their pain on a visual analogue scale from "No pain at all" to "The most severe pain one can imagine." This intervention by itself could change the women's experience of pain and could be a confounding variable. Pain increased in both groups from approximately a six to an eight. The authors stated that the midwives varied in their views of waterbirth from favorable to fancy. This could also bias the results. The other articles reviewed in this discussion, quote analgesic use as a pain indicator rather than the objective measurement of pain using a visual analogue scale. The trends found in the article regarding less augmentation were a greater change in cervical status, pain stabilization, and equivalent neonatal and maternal outcomes among bathers. The study supports the premise to make waterbirth an available choice among women.

The changes in maternal temperature, maternal pulse, and fetal heart rate found in Shorn, et al.'s study were associated with water immersion. Geissbuhler and Eberhard along with Lebrecht (2002) designed a study to "examine the effect of the bath and the water temperature, as determined by the mother, on the body temperature of the mother and neonate, on the duration of bathing by the mother, as well as on maternal and neonatal birthing and perinatal parameters" (p. 371). The study included two dimensions, one of their entire birthing clientele (n=10,755; 3162 waterbirths and 5272 landbirths) to assess neonatal and maternal morbidity and another small group (n = 47; 30 waterbirths and 17 landbirths) that assessed the water, maternal, and neonatal temperatures.

The large portion of the study collected and provided data similar to that described in their 2000(b) and 2004 studies. The data they highlighted included a significantly ($p<0.05$) reduced frequency of respiratory distress syndrome, isolette monitoring, and transfer to the NICU among the waterborne infants. Umbilical arterial and venous pH values along with Apgar scores were significantly ($p < 0.05$) better in waterborne neonates. However, the differences were minimal, as was seen in their other studies. Neonatal weight averaged 32 grams heavier in waterborne infants. This was significant at $p<0.05$. Infection rates were similar in both groups. With regards to the mothers, there were no differences in febrile status, urinary tract infections, pyelonephritis, pneumonia, putrid lochia endometritis, or endomyometritis mastitis. There was significantly ($p < 0.05$) more prophylactic and therapeutic antibiotics given to mothers in the land birth group. Blood loss averaged -4.94 g/l for waterbirths and -7.83g/l for landbirths, which is significant at $p<0.05$. Again, these results must be interpreted with caution as the authors state a conservative transfer from water to land birth in any event of altered neonatal or maternal conditions.

In the temperature portion of the study, water temperature was recorded every two minutes via use of a probe placed 6cm deep along the side of the tub. Maternal axillary temperature was taken every 30 minutes from admission until one hour postpartum. Rectal neonatal temperature was measured at 15 minutes and 60 minutes postpartum. Water temperature at the bath beginning averaged 35.2 degrees C with a standard deviation of 2.9 degrees C and a range of 23.0 - 38.8 degrees C. Midbath water temperature increased to an average of 36 degrees C with a standard deviation of 1.2 degrees C and a range of 33.9 degrees C and 38.9 degrees C. Water temperature then decreased to an average of 35.7 degrees C, a standard deviation of 1.3 degrees C and a range of 33.0 to 38.2 degrees C. Finally, water temperatures ended at their coolest - averaging 32.9 degrees C, standard deviation of 2.8 and range of 26.0 degrees C to 36.6 degrees C. Mothers remained in the bath an average of 98 minutes and ranged from 28 minutes to 364 minutes.

Maternal temperatures were similar at admission, one hour postpartum and discharge for land and water birthing mothers. At birth, waterbirth mother's temperatures were 0.6 degrees C warmer than their landbirth counterparts ($p<0.05$). Bathing mothers maintained their temperatures at 36.7 degrees C upon water entrance, 36.9 degrees C at birth, and 36.9 degrees C upon exiting. It is noteworthy that despite the large ranges in water temperature, as chosen by the mother, their body temperatures remained within 0.2 degrees C of pool entrance temperature. Furthermore, standard deviation of maternal temperature in the water was only 0.6-0.7 degrees C. Neonatal temperatures at 15 and 60 minutes post-natal, and at discharge were similar both in and out of the water (only 0.1 degree C different at any measurement point). The providers maintain the parturient in the water for placental delivery (bath-end was the coolest water temperature recorded) and the baths have a heat lamp above them. The authors state that their "results show that waterbirths with maternal self-determination of bath temperature and bathing time present no thermal risk of hyperthermia or hypothermia to either the mother or neonate" (p. 376). They also reiterate the safety of waterbirth with their neonatal and maternal outcome results.

This study is a secondary analysis of some older data as well as inclusion of newer data. As stated before, secondary analyses can be used to focus research on a different variable. In this case, the researchers are interested in water temperature and resulting outcomes. This variable was not discussed in previous studies. However, the multiple articles commenting on the same outcome data appear that new supportive data is emerging, when it is not. Also, the growing study sample size has become so powerful that even small differences in water verses land birth groups can be statistically but not clinically significant. For example, the water babies were statistically 32 grams heavier and the researchers found this significantly different. This difference in weight is only a little over one ounce and not likely clinically significant. Readers must be cautious when interpreting and understanding the data.

This study does show that mothers have the ability to make safe individual choices regarding the temperature of the water. Neonates were also able to maintain their temperatures similar to their land born counterparts. at the measured times. The study could have evaluated the differences in provider verses maternal controlled water temperature birth outcomes. However, Geissbuhler et al. (2002) warn that this may "even dangerously disrupt the physiological control circuit of temperature regulation" (p. 376). Additionally, such temperature control could also reduce the comforting effects of the water for the mother. The authors did not comment on the fetal heart rate during waterbirth. If it does elevate, as found by Shorn, et al., the question remains whether this confers any detrimental effects to the fetus. According to both Shorn et al, and Geissbuhler et al, outcomes are at least similar in land and waterbirth neonates when mothers self-regulate the water temperature.

Katz, Ryder, Cefalo, Carmichael, and Goolsby designed a study "to compare the effects of bed rest with immersion in relationship to the degree of diuresis on the mobilization of extravascular fluid and relief of edema" (1990, para 1). They recruited healthy study volunteers at 34-38 weeks gestation from the North Carolina Memorial Hospital Obstetrics and Gynecology clinics. They randomly assigned each woman to one of three treatments: left lateral bed rest, seated with legs placed horizontally in a standard bath tub of water filled two-three inches below the top of the tub, or immersion in shoulder-deep water with legs extended downward. The water temperature in both immersion groups was 32 degrees C. Each woman rotated through all three trials spaced two- four days apart. Prior to the first and in between each trial, the women were asked to eat and drink normally but to avoid diuretic beverages and exercise on the treatment day.

The study instruments included assessment of weight, heart rate, blood pressure, and blood samples. Data was collected prior to, during, and after the trial. Women were asked about their experience of uterine contractions during the trial. Data was assessed for normal distribution and a *t* test was run if normal, otherwise a Wilcoxon signed rank test was used. The authors state there were no difficulties completing any part of the study, with 11 women having full data sets. One woman did not complete the bed rest trial due to delivery. Among the three trials, shoulder deep immersion demonstrated the greatest effects on enhancing diuresis, urinary dilution, and free water clearance with reductions in mean arterial pressure. All comparisons had p values < 0.05. There were no significant differences between the groups in sodium, potassium or osmole clearance, mean weight loss, serum prolactin level, or maternal heart rate. Neither immersion trial experienced increases in plasma volume. The bed rest data revealed a statistically significant increase of 2.4%. None of the women experienced any changes in contraction frequency.

From this data, the authors conclude that deep water immersion provides excellent mobilization of extravascular fluid while maintaining safety with a stable plasma volume, serum sodium, potassium, total protein, osmolarity, and serum creatinine concentrations. This authors point out the controversy that some studies have found increases in the plasma volume which may result in hormonal and electrolyte imbalance. In this study, the blood samples were obtained 10 minutes after the trial, which the authors note, is plenty of time for body fluids to shift. A strength of this study is the randomization. How this was done was not specified, nor was the original number of volunteers. One might ponder on the effects of successive treatments, however the randomized nature should negate such results. A weakness of the study is the low sample size. However, "clinical studies that deal with biophysiologic processes in which variation is limited, a small sample may adequately represent the population" (Polit & Beck, p. 302) The authors did not comment on how they recruited these volunteers or their demographic variables. This information is needed to detect the homogeneity of the group. The more homogeneity, the lower the sampling error and the more representative of the population. Also, the information is needed to define the population for generalization of the findings.

This article induces thoughts about generalizing the results to a labor population, including those with stable preeclampsia undergoing vaginal birth. Studies must be done to assess the safety but these results are promising. Another factor related to the role of immersion in labor and birth, is that declines in prolactin levels were noted in all three treatment groups which may be due to the tocolytic effect of bed rest and hydration. They comment that some authors suggest that prolactin stimulates the myometrium. This information could help explain effects of water on prodromal or latent labor progress. This article provides information about the physiologic changes in pregnancy and water immersion. A simple bath or immersion in a local pool may be a very effective and safe alternative to relieving the discomfort of pregnancy edema. It indirectly supports the use of water during labor and its safety.

Garland (2004) audited her Kent hospital population to evaluate the use of water during a "trial of scar" (TOS) after one or more cesarean sections. Initially, data was collected for the seven year period from 1996 - 2002 regarding TOS participation, success, and scar dehiscence. Then, the study evaluated the use of a risk assessment tool in order to determine the plan of care during labor of women choosing water immersion for their TOS experience. The initial data collection revealed the following: Of the hospital's 2400 births, 100 were born in the water. The study included seven years of data with annual deliveries of previous cesarean clients increasing from 225 to 315 by the end of the study period. The percentage of these deliveries attempting a TOS decreased from 52.4% to 42.5 % over the seven year period. Success rates ranged from 68.4% to 75.4% with no trend over the study period. Scar dehiscence for 1996 was 2 of 118 (0.02%) and in 1998 and 1999 was 1 of 137 (0.01%) and 114 (0.01%) respectively. The remaining four years had no occurrences of wound dehiscence.

The risk assessment tool included discussion of hydrotherapy guidelines. These were observations for normalcy and vaginal exam with water entrance for four hour intervals at 3-4cm or established labor. If labor is slow or suspicious, the mother exited the water. If assessments remain normal, the mother remains in the water for four hour intervals and exits the water prior to delivery, unless delivery is imminent. The decision to undergo the risk assessment protocol begins with explanations about vaginal births after cesareans (VBACs) including the risk of scar dehiscence and probability of a repeat cesarean. If the mother chooses a TOS, the consultant obstetrician and practice development midwife review her maternity records. If accepted for a TOS, the risk assessment protocol is reviewed. The protocol guidelines in 2001 stated that women undergoing a TOS "should be monitored continuously in labor. However they also highlighted that consideration should be given to maternal preference and priorities" (Garland, 2004, p. 64).

In 2002, 27 (8.6%) of 314 women with a previous Cesarean chose to participate in the risk assessment protocol. None of the women were excluded by the providers from participation in the risk assessment. Of these, 20 experienced spontaneous labor, 4 were induced, and 3 did not labor. Eight women (33.3%) used the water and three (12.5%) left for analgesia (two had pethidine, one had an epidural). Of the 16 women who did not used the water, 4 used entonox, 6 had pethidine, and 6 obtained an epidural. It is not clear if some of the women who used entonox and pethidine went on to obtain an epidural or if all 16 women obtained some form of analgesia. The VBAC rate for the 27 women was 81%. Seven had instrumental deliveries. The success rates for those previously experiencing an elective verses emergency cesarean were 83.3% and 80%, respectively. The original population of 315 experienced a spontaneous labor rate of 36.2%, an induction rate of 6.3% and 57.5% did not labor. Of these who labored, 60% had spontaneous VBACs and 24% had an emergency cesarean. There were no cases of wound dehiscence in 2002. Statistical power of these findings was not calculated.

The author then compared this data to a second audit using matching criteria for a comparative (control) group of 27 women. How the women were chosen was not described. The authors' comment was that the matching criteria was subject to bias and included the number of previous low-transverse cesarean sections (ltcs), the average age, the onset of labor, and the parity compared to number of ltcs. The risk assessed group included more previous elective cesareans (n = 12 verses n = 4), less previous emergency cesareans (n = 15 verses n = 21), more breech indications for the previous ltcs (n = 13 verses n = 6), slightly higher rate of spontaneous vaginal birth (n = 15 verses n = 11), more instrumental deliveries (n = 7 verses n = 4), fewer emergency cesareans (n = 9 verses n = 2), longer first stage labors (n = 4 verses n = 2 of first stage > 12 hours), fewer women with BMIs of 30-34 (n = 1 verses n = 7), and lighter weight babies. Again, statistical power of the differences was not calculated. The difference in history of breech ltcs resulted in improved VBAC success (84.6% verses 61.5%) in the risk assessed group. The groups did not differ in gestational age, elective cesareans, other BMI categories, or Apgar scores. There were no admissions to the special care nursery in either group.

The author did not comment on how the differences between the groups such as previous emergency, elective cesarean, or BMI may have impacted the delivery outcomes. The conclusion about water used during labor was that it appeared to be a 'safe and realistic' alternative. However, few eligible women experiencing a previous low-transverse cesarean delivery chose water for their labor experience. One weakness of this study is the lack of statistical analysis. This information could allow the reader to understand the significance of the results. Furthermore, the design of the study was not well thought out. After collecting the data in 2002, the researcher decided to identify a control group. To reduce possible bias, the groups should be audited simultaneously. The author did not delineate how many babies were actually born into the water and how many mothers were able to exit prior to delivery, which was the protocol. The author did not state a reason for exiting the water prior to birth. Since the focus of this literature review is on risks to the mother and infant undergoing waterbirth, this study provides limited - although supportive - data.

Studies related to choosing waterbirth as a delivery method.

Geissbuhler and Eberhard (2000a) wanted to demonstrate that women were dissatisfied with their birth experiences related to the high tech birth environment, and that they felt helpless in the hands of the decision making process (Eberhard & Geissbuhler, 2000). With a lack of available childbirth options, these women had to succumb to active management models of labor in which the decision making process was out of their control. In response to maternal dissatisfaction, Geissbuhler and Eberhard created their "New Birth Concept" (NBC). The NBC provided birth alternatives such as waterbirths, improved delivery beds, birthing stools, mats, ropes, and the

Roma wheel in refurbished homelike birthing rooms. This study's purpose was to determine whether changing the pattern of birth methods and management in their clinic would increase patient satisfaction rates in relationship to the birthing process.

> This included three themes: 1. Careful monitoring and birth management. 2. Restrictive use of invasive methods and promotion of the natural birth process. 3. Participation of the parents in the decision making process during labor and birth, including the free choice of the birth method. (Eberhard & Geissbuhler, 2000, p.284)

The study examined which birth method women preferred, as well as how the NBC influenced various aspects of birth management. These management variables included Cesarian section, episiotomies, birth inductions, and the use of regional analgesics for pain control. The population involved subjects of the town of Frauenfeld, consisting of 25,000 inhabitants. The Frauenfeld birthing hospital, "meets the needs of a clearly defined, mostly rural region of 150,000 inhabitants" (Eberhard & Geissbuhler, 2000, p. 285). Home births in the region are rare and less than 1%. Patients referred to the larger clinic because of their high risk obstetrical classification constitute 2% of the population. The study was done over a span of seven years from 1991-1997. The number of subjects involved in the study was 9,418.

The group of subjects who gave birth between 1991-1997, totaling 9,418, were compared with two similar and well defined groups: a historical group and a contemporary group. The historical group consisted of data collected from previous deliveries of the Frauenfeld hospital from 1986-1990. The total number of subjects was 5,602. The contemporary group consisted of data from the Arbeitsgemeinschaft Schweizerischer Frauenkliniken (ASF) statistics. The ASF statistical database included "data from most of the teaching obstetrical and gynecological clinics of Switzerland and represented a Swiss average as a valid comparison group" (Eberhard & Geissbuhler, 2000, p. 285). This data included subjects from 1986-1997 with a total of 344,328.

The study instruments included observational research. The data was collected by observing and recording behaviors and activities after the NBC was introduced. The article did not identify how they measured the satisfaction rates of their mothers. Dr Heinz Sulger Buel of the Statistical Department of the Canton of Thurgau, Switzerland, as well as Professor T. Gasser, Department for Biostatistics of the Institute of Social and Preventive Medicine of the University of Zurich/Switzerland, supervised the descriptive statistical review (Eberhard & Geissbuhler, 2000, p. 285).

In review of the data related to alternative birth methods, waterbirth rates rose steadily and stabilized around 40-50% (Eberhard & Geissbuhler, 2000). The birthing stools reached a peak of popularity in 1993, around 23%. then dropped off and stabilized at 10% (Eberhard & Geissbuhler, 2000). Bed birth rates stabilized around 40%. The other birth methods were not chosen very often and stabilized around 5% (Eberhard & Geissbuhler, 2000). The data related to aspects of birth management varied from one another. Episiotomy rates dropped from a previous rate of 80% to 15% (Eberhard & Geissbuhler, 2000). The Cesarian section rate remained the same at 10%, which was substantially below the Swiss average at 15% (Eberhard & Geissbuhler, 2000). The analgesia rate remained constant around 13%, while the Swiss average rates doubled at 23% (Eberhard & Geissbuhler, 2000). The induction rates were not significantly influenced by the NBC and were comparable to the Swiss average (Eberhard & Geissbuhler, 2000).

The results of this study suggest that new mothers chose to use alternative birth methods, especially waterbirth. The authors claim (2000) that their mothers say "in no uncertain terms that they experienced a more satisfying birth" (p.290). This study indicates the need for other obstetrical centers to consider implementing alternative birth choices that are less invasive and more natural in order to increase maternal satisfaction with their birth experiences. One strength of the study involves its statistical reliability of the data obtained. The results were compared to the Swiss average portraying an accurate reflection of a wider and separate population then the actual study group. Another strength was the study's confirmability. The study seems without bias. Results appeared to be derived from participant characteristics within the study context.

One weakness of the study was that the authors did not indicate their methods for measuring patient satisfaction. Since this was a significant finding, it should have been addressed in detail. Another weakness was the issue surrounding extraneous variables that could influence the results. An example would be one in which the authors claimed that there was a drop in the rate of artificial rupture of membranes in 1990 before the introduction of the

NBC. They concluded that this drop was related to changes in the technical equipment and the introduction of the external ultrasound that replaced the frequently used internal scalp electrode. The authors stated that limitations to their study could exist. Eberhard and Geissbuhler's (2000) study demonstrates that when waterbirth is an accessible option, women participate in its use.

Richmond (2003) evaluated the experiences of women who underwent waterbirth. The goal of the study was to determine whether they experienced it as therapeutic. The study was retrospective and excluded babies with Apgar scores less than 7 at one minute of age. This exclusion criteria was required for ethical approval related to fears of litigation. The author piloted the survey in nine women. Previously tried and tested questionnaires were used to design the study. Mothers were found to interpret the questions correctly. Different styles (open- verses closed-ended) of questions were used. The population of 240 women was randomly selected from 482 who experienced waterbirth in South East England over a two year period from five individual birth centers. The response rate was 78.5% (n = 189), making up a total of 208 births (19 mothers had two waterbirths).

Results revealed primiparas totalled 58 (31%) and multiparas made up the remaining 131 (69%) women. The mothers were predominantly middle class and referred to waterbirth by television (64.5%), magazines and books (39.5%), and midwives (17.5%). The majority of mothers stayed in the water for birth (95.8%), with 12.8% delivering their placentas in the water. Additional methods of pain relief were sought by 103 (54.5%) women; 21 used Trans Electrical Nerve Stimulation (TENS), 91 used Entonox gas, 1 used pethidine, and 1 used Meptid. Reasons for choosing waterbirth included that they: thought it seemed natural (78%), thought it would be less painful in water (78%), thought it would be a gentle delivery for baby (72.6%), wanted a drug free labor (50.3%), love warm water (48.9%), thought it would prevent me tearing (37.6%), had it recommended (27.4%), thought it would prevent interference from others (24.2%), and other reasons (17.7%). Other reasons included: a bad back, thought it would be more relaxing and easier than being out of water, curious after watching this experience on television, wanted to be different, thought she would be less vulnerable to health care professionals, asthmatic who could not use gas or air and did not want to use other drugs, and because the room looked "nice and cozy."

In order to look at mothers' experiences, the authors evaluated their expected perception of waterbirth which divided the women into three groups: 1) not particularly pleasurable; 2) quite pleasurable; or 3) very pleasurable and fulfilling. Of those women who expected waterbirth to not be particularly pleasurable (n = 28), 11 (39%) confirmed their expectations, 4 (14%) found the experience quite pleasurable, and 13 (46%) found waterbirth very pleasurable and fulfilling. Words used to describe their feelings upon pool entrance included relaxation (99 times), relief (51 times), pain relief (50 times), and warmth (48 times). Women also used the words buoyancy, control, and calming. Contractions were perceived as less painful. They enjoyed the warmth, and felt secure. Compared to previous birth experiences, mothers felt in more control (39), more relaxed (28), and in less pain (24) during waterbirth. Additional repetitious words included: less interference/monitoring, quicker labors, more personal, satisfying, calmer, more natural, less restricted, and easier movement.

Other descriptions of what mothers particularly liked about this method included its soothing effect (117), felt supported by the water (116), able to hold baby immediately - no one took the baby (116), less formal (84), more personal (80), easier to push the baby out (83), less fearful and felt safe (70 for each), sense of privacy (68), more confident/less worried (60), and felt protected by the water (47). General comments included general praise of staff.

Critical statements regarding what mother's disliked about this method were a lack of staff training, standing for monitoring, worries about the process, lack of research and reassurance from providers, facility criticism, and slipping in the bath while pushing.. One mother "felt like a whale, and delivered like a whale" (p. 28). Other dislikes about the water, included themselves (11 or 5.9%) or their babies getting cold (4 or 2.1 %), the inability to stand up to deliver (3 or 1.6%), contractions going away (9 or 4.8%), and unsupportive staff (10 or 5.3%). Other reasons (47 or 25%) include sterile vaginal examinations while in the bath, lack of gripping handles, water being too hot (n=1), and dislike of physiological third stage (n=1).

With regards to the neonate behavior, 48% of multiparous women noticed no differences in their water born infants. Mothers that noticed a difference stated their waterbabies were more alert, peaceful, calmer, content, and placid. They stated their waterborne infants seemed less stressed, slept well afterwards, and sucked better at the breast. The authors noted that statistical tests showed no significant difference in newborn behavior. This was not expounded upon. Neonatal problems occurred in three babies and included nasal congestion, low blood sugar, and

lung infections requiring special nursery admission and ventilation. Mothers faulted waterbirth first, then their midwives. The authors state that the pediatricians are critical of waterbirth and may have influenced the mothers.

A strength of this study is that it provides a descriptive picture of the mother's experience of waterbirth. The sample size is reasonable with a good response rate to the survey. The authors piloted the study to determine if responses were appropriate and if the survey was appropriate. Responders who had a positive experience may be more likely to respond and therefore sway the results conveying vast positive experiences. More details of the experience could be followed up with the mothers who had negative experiences. This is a phenomenologic descriptive quantitative survey study. This style may require two separate interviews or conversations (Polit & Beck, 2004, Chapter 11 p. 253). Surveys are also known for their inability to focus deeply on human behavior and feelings (Polit & Beck, 2004, Chapter 10 p. 234). A secondary analysis may be useful. With regards to the pediatricians' views of waterbirth, this could also be analyzed to determine genuine concerns, educational needs, or outright biases. This study supports the use of waterbirth as a alternative birthing method and provides information on what women like and dislike for their birth experiences.

A final study evaluated the decision-making experience of mothers who experienced waterbirth (Wu & Chung, 2003). This qualitative phenomenological study of nine women was "aimed at examining the subjective experience of the decision-making process of mothers choosing waterbirth" (Wu & Chung, 2003, p. 263). The participants were selected from a single midwifery clinic and were chosen if they were "citizens of Taiwan, speaking Mandarin or Taiwanese, having had a successful waterbirth experience within the past year, and being willing to participate" (Wu & Chung, 2003, p. 263). To establish credibility, the researchers began contacting the postpartum mothers at least ten months before the interviews began. Interviews were conducted between December 2001 and April 2002. After the 6th participant, no new data was obtained. The investigator was also the interviewer and used a semi-structured format to collect audio, emotional, and body language data. The investigator and a graduate student analyzed the data for "meaning units" and discussed any differences.

The women were 28 - 41 years old; 4 were primiparas and 5 were multiparas. Educational status included one with a high school diploma, five earned college degrees, and three earned post-graduate degrees. Job status included five housewives, three teachers, and one in the service industry. All mothers breastfeed and all newborns were healthy. The interview analysis revealed four key concepts; they will be discussed here, however, the reader is referred to the original article for the enlightening and rich descriptions made by the women.

The first theme, which the authors termed a concept, is feeling dissatisfied with existing obstetrical practices. This was the primary reason for seeking waterbirth experiences. The women described hospital delivery rooms and physicians as being geared for a procedure and performed interventions such as intravenous fluids and fasting that were considered preparatory for a cesarean. The women feared their previous experiences including negligent staff, painful experiences, and complications. The women wanted to be supported by family, breastfeed immediately after birth, undergo a trial of labor after a cesarean, and avoid an episiotomy. Their wishes were met with resistance by staff of the obstetrical environment. The second concept was the demonstration of autonomy. The women believed they had a right to decide their childbirth methods and explored them antenatally with understanding and scrutiny. They trusted their midwives, despite their declining prevalence and lower tech clinics, as compared to the hospitals. The women faced judgement from family and friends in order to achieve individual dignity of life. Consideration of their relatives' attitudes was a third concept which surfaced from the interviews. Objections by relatives were regarding the competency of the midwives and their acclaimed safety. The relatives did not share the same degree of trust that the women had found in their midwives. Finally, the women employed strategies to achieve their goals and to overcome these battles. Strategies included attempts at persuasion to reach a consensus. From this data, the authors concluded that their study "found that mothers chose waterbirth because they were dissatisfied with the current medicalized environment of deliveries" (Wu & Chung, 2003, p. 267).

A strength of this study is the depth of understanding obtained from these women. The study is small but well organized and it is difficult to obtain this quality of information from a large sample size. It would have been interesting to follow up with these women for more descriptions of their actual experiences. The authors stated that a limitation of their study was the relative homogeneity of the population. These findings can only be generalized to women of similar, culture, education, and employment status. Also, the inclusion criteria were successful waterbirth experiences. Therefore, additional research involving a more heterogeneous population, including women with unsuccessful waterbirth experiences, would provide further understanding regarding women's choices

and their subsequent experiences of waterbirth. Additionally, women can be questioned about their relatives feelings regarding their choice of a waterbirth.

Summary.

It is evident that waterbirth is a desired alternative for some women and that many women undergoing waterbirth enjoy their experience. The evidence supports the maternal and neonatal safety of waterbirth minimizing fears of neonatal aspiration of water or meconium and infection risk. Safety must continue to be evaluated and compared to controls, especially regarding the risk of umbilical cord avulsion. Future research must control for confounding variables and recruit ample population sizes to document any inherent risks. Studies should compare protocols such as the regulation of water temperature and placental delivery in the water. This information should be available to all associated providers and interested consumers in order for unbiased birthing options to be provided.

There is a limited amount of available research in the United States. The studies received and reviewed, took place internationally, with only two from the United States. It is important to evaluate women in this country as their needs and wishes may be different. This research project aims to describe the waterbirth experiences of United States women and hopefully spark additional qualitative and quantitative research concerning waterbirth within this country.

Chapter Three: Quantitative Research Proposal

Research Design

Research design: Strengths and weaknesses.

The descriptive quantitative study attempts to describe the occurrence of a behavior, and considers several variables (Polit & Beck, 2004). In this case, the phenomenon of study is women's experiences of waterbirth. The method for data collection will be a questionnaire. Questionnaires describe and compare a large number of women's experiences and reveal variables that may be associated with birth outcomes. Surveys can be flexible and broad to evaluate many variables while maintaining economic feasibility. The variables in this study include questionnaire responses such as support during waterbirth, feelings about water submersion, positions utilized, handling of the birth, infant responses to birth, and birth outcomes. There are two arms of the study. One arm will retrospectively describe the experiences of women who have undergone waterbirth by evaluating their responses to an on-line questionnaire. The second arm of the study will offer a prospective description of women who were offered a waterbirth experience and either accepted or declined this option.

True experimental studies allow establishment of a causal relationship (Polit & Beck, 2004). However, a descriptive study describes a phenomenon and a cause and effect relationship is not sought. The intent of this research is to prevent manipulating the environment in which a woman intends to birth. A descriptive study allows research of an event the way it happens naturally in the clinical setting. Women are offered waterbirth and self-select to either land or water. Self selection, rather than randomization, promotes autonomy of the individual woman and upholds the philosophical beliefs of midwives and their clients. This naturalistic philosophy will highlight the actual experiences of women presented with the opportunity for a waterbirth.

Given the current state of waterbirth research in the United States, a descriptive study is appropriate in order to enlighten providers, researchers and families to the variables surrounding women's waterbirth experiences. "Descriptive research is typically the foundation from which other research efforts evolve" (Farley, 2005, p. 126). Researchers will be able to focus on variables and outline waterbirth guidelines for individual practices. Providers and families will understand the waterbirth experience and possibly undertake waterbirth as an alternative.

Threats to external validity and measures to control them.

Threats to external validity are those threats that reduce the ability to generalize the study to a larger population (Polit & Beck, 2004). The retrospective arm of the study will include registrants of Waterbirth International who have announced the birth of their water babies on the website. This reflects a large amount of bias as these women are likely pleased with their birthing experiences. In order to locate women who are possibly displeased with their waterbirth experience, the questionnaire will be made available to other women via other birth-related websites

such as Childbirth.com, Pregnancytoday.com, Epregnancy.com, Parenting.com, and Mothering.com. In addition, the prospective arm of this study will sample women who decline waterbirth so that their feelings and opinions can be explored. Finally, all the women who choose waterbirth in the prospective arm of the study will be evaluated and any women who have negative comments about their waterbirth will have an opportunity to express them. These methods should improve generalizability to the population of all women anticipating vaginal birth and eligible for water birth.

Any questionnaire is subject to poor survey return and/or inappropriate responses; these could skew the final data analysis and results, reducing reproducibility of the study. In order to improve survey return, the questionnaire will be able to be completed in approximately ten minutes on the Internet through Surveymonkey.com. There will be no lost mailings or issues of postage. Upon completion of the questionnaire, Waterbirth International will offer a 20% discount coupon at the Waterbirth International store for any books or videos. Alternatively, women can elect to have a $5 gift certificate to an on-line baby store, which is yet to be identified. The individual questions must be clear, simple and unambiguous (Polit & Beck, 2004). The questionnaire will be reviewed by an expert panel for face and content validity and for clarity of wording. Polit and Beck (2004) recommend using a readability formula to estimate the form's reading level. The survey will be scored through Microsoft Word Tools for a Flesch-Kincaid Grade no higher than an 8th grade level.

Threats to internal validity and measures to control them.

Threats to internal validity include those factors outside the primary variable (waterbirth) that could influence the outcome of the study (Polit & Beck, p. 213). The midwifery model of care, whether a mother has an air or waterbirth, may improve the experience of birthing women (Rooks, 1997). This study will be subject to that bias as only midwifery practices will be assessed through the prospective arm. However, midwives are the provider most likely to offer water birth (B. Harper, personal communication, December 27, 2005). Nevertheless, reports will be accepted from respondents from Waterbirth International or the other websites who may have undergone waterbirth with a different provider, such as a physician.

Additional confounding factors could include the current acceptance of waterbirth among the prospectively studied midwifery practices. For example, if a practice has recently instituted waterbirth, the individuals could have varying degrees of comfort with the new protocols and convey these feelings to their clients. The practices will be asked about their waterbirth protocols, its frequency of use, and number of years since its initiation. Inclusion of multiple midwifery practices will reduce any effects seen within an individual practice. Finally, complications may be hard to identify in healthy women who qualify for waterbirths. This is because most waterbirth protocols exclude those women who are more likely to have complications such as women with multiple gestation or fetuses in breech presentations. The birth outcomes, according to the mothers in the prospective study, will be compared to identify differences in the waterbirth verses air births. The mother's view of a "complication" may be different than the providers, however we are interested in the mother's birth experience, not the providers. Inclusion criteria will limit study participants to those women without prenatal complications that might affect the outcomes of the delivery.

Self-selection to water birth will be studied in the prospective arm, as this is what happens in clinical settings. Every woman has the right to autonomy and to choose her birthing position. Childbirth is an event that women cherish throughout their lifetime. A woman who dislikes being submerged in water should not be requested to do so simply for the sake of research. Likewise, a women who would like to experience a waterbirth should not be prohibited from doing so. Demographic data will be collected. In order to protect anonymity, the data for the retrospective arm will only include women's parity. For the prospective group, age, race, and parity will be compared. In order to collect this data, the researchers and providers will be aware of the clients identity. The information will be kept in confidence and only reported as statistical frequencies. The responses will be evaluated and groups that are similar in age, race, and parity will be compared where feasible.

Sampling Methods

Site.

Respondents will be sampled from several different avenues including Waterbirth International and websites such as Childbirth.com, Pregnancytoday.com, Epregnancy.com, Parenting.com, and Mothering.com. B. Harper will

identify and provide names of midwifery practices that participate in waterbirth, to carry out the prospective study.

Population of interest.

The population of interest is all childbearing women who are anticipating a vaginal birth and who are eligible to choose water birth as a birth option.

Sample size and method used to determine adequate sample size.

Regarding the retrospective arm, the sample size from Waterbirth International will be 75. Respondents from the other websites will be accepted on a rolling basis. Their numbers will be monitored on Surveymonkey.com. for a period not to exceed six months, or a sample size of 75. This will create a sample total of 150 for the retrospective arm. In the prospective arm, study participants through the individual midwifery practices will also be accepted on a rolling basis for a period not to exceed six months or a total study population not to exceed 40 (20 in each group) for each of the five practices and a total sample size of 200. Total study population will therefore be 350.

This sample size was chosen to represent the population and for feasibility. In a quantitative study, responses are calculated and compared by the average response. Sampling error is "the fluctuation of the value of a statistic from one sample to another drawn from the same population" (Polit & Beck, p. 731). With a larger sample size, there will be a smaller sampling error and vice versa for a small sample. It is not possible at this stage of proposal development to perform a power analysis in order to determine the adequate sample size for statistical power. However, there are a couple considerations for data analysis. Homogeneity affects the sampling error (Polit & Beck, 2004). The more similar a sample, the lower the sampling error. This is why some demographic data will be collected and cross analyzed. For example, the entire sample will be analyzed first and then broken down by factors such as race, parity, and age. This secondary analysis will allow calculation of response rates among a more homogeneous sample.

A primary concern with population size, for a descriptive study, is the response rate. If the response rate is low, the study will have more nonresponse bias and will thus be less generalizable to the sampled population (Polit & Beck, 2004). The greater response rate of the sampled population, the more likely the respondents will represent the population. However, even with a large sample, a poor response rate may not adequately represent the population. Thus, this sample size is selected based on feasibility and measures - such as the discount for the Waterbirth International store - are included to enhance the response rate. Upon study completion, the response rate of the Waterbirth International participants and prospective arm will be calculated and discussed. The response rate of the external websites is not feasible to calculate but may be estimated based on the number of "hits" to the survey link.

In addition to the aforementioned considerations regarding population size, the rates of waterbirth per midwifery practice must be considered. For this population size, each practice must average 3-4 waterbirths per month. Upon interviewing the prospective practices, their waterbirth rates will be determined and the population size will be adjusted if necessary.

A final note regarding the sample size is that this study is descriptive or exploratory. It is the first of its kind and one of few United States research studies regarding waterbirth. The researchers do not intend to identify cause and effect relationships, but rather describe women's experiences. Generalization to the larger population must consider the women's responses and the inclusion criteria for the study.

Entry to site/access to population.

B. Harper - midwife, nurse and founder of Waterbirth International - has consent to contact all the registrants at Waterbirth International for a survey. Those women sampled, with working email addresses, will be emailed a brief letter and a link to the actual consent and questionnaire on Surveymonkey.com. The additional identified website companies will be sought for approval of a link to the same survey from their websites. If some companies do not approve the link, additional sites will be selected with a goal of at least three sites. These selected websites were easily found through website engine searches (e.g., Google.com) using keywords such as birth, pregnancy, parenting, and mothering. These websites are thus accessible by any mother who is utilizing the Internet as her pregnancy and parenting resource.

For the prospective arm of the study, names of midwifery practices will be supplied by B. Harper and these practices will be approached for site approval. Ideally, five sites will be utilized in different locations throughout the United States. The midwives at the individual practices will be responsible for obtaining consent to participate in the study, collection of standard outcome data, and obtaining email addresses of those consenting women. This information will then be shared with the researchers.

Inclusion/exclusion criteria.

All participants must be able to read and write in the English language. In the retrospective arm, women will be asked to comment only on those births that occurred in the last 10 years. The inclusion criteria for the Waterbirth International registrants in the retrospective arm of the study will be a working email address. These women registered their babies on the Waterbirth International website as waterbabies, so they probably had waterbirths. The participants from the external websites must have access to the Internet and are recruited only if they were offered a waterbirth experience but not necessarily utilized the option. Inclusion in the prospective arm of the study requires that the woman be 37 weeks gestation or greater with a singleton fetus in a vertex presentation and an uncomplicated pregnancy. The midwives will offer study participation to eligible women at their 36 week prenatal visit. The women must then present with spontaneous or ongoing labor after pitocin or prostaglandin treatment, and clear amniotic fluid if rupture of membranes occur prior to delivery. The practice's protocols for waterbirth are to be carried out as usual.

Sampling methods and strengths/weaknesses.

Convenience sampling, or using the most readily available participants, will be used (Polit & Beck, 2004). Convenience sampling, in this case, sampling the women already accessible through Waterbirth International or other websites, results in a sample that may not be representative of the entire population. However, demographic data will be obtained and this will be compared to existing national and published data on childbearing women to determine the representativeness of the obtained sample. As previously discussed, the women registered at Waterbirth International have happily announced the birth of their child on a waterbirth website and admittedly have enjoyed the experience. B. Harper has a list of over 5,000 of these women and we will generate a computerized simple random sample of 75 women. This type of sampling reduces researcher bias but does not guarantee that the sample is representative of the population. To reduce the bias of the registrants at Waterbirth International, additional samples will be taken from general birthing websites to attempt to gather data from the general population. Again, this is a convenience sample which is only sampling those members of the population who have Internet access. Caution must be used when generalizing these results to families with reading disabilities, without Internet access, or who do not communicate using the English language.

The prospective arm of this study will include a convenience sample of women, divided equally between waterbirth verses air birth. As waterbirth is not as common an option, the air birth clients will be obtained more quickly than the waterbirth clients. Each practice's sample will have their own unique biases. However, the use of several different practices will enhance the representativeness of the obtained sample. Demographic data will be available for comparison among the groups.

Ethical Considerations

Philadelphia University Institutional Review Board.

This entire research project will be reviewed by the Philadelphia University Institutional Review Board (IRB) for final approval. The IRB will evaluate this proposal for objectivity, ethicality, risks verses benefits, and protection of participant's rights (Polit & Beck, 2004).

Site review and authorization.

Waterbirth International will submit official site authorization and each selected website company will be requested to do the same. Further, the individual practices participating in the study will review the research materials and provide authorization for the study to be carried out. The researchers will have opportunity to review the waterbirth protocols at each individual institution; this information will be available to study participants, should they request it.

Consenting process.

Each participant will be given an informed consent form (Appendix C) which they are required to electronically sign through Surveymonkey.com. Researcher contact information is provided, should the woman have any questions or concerns. Additionally, those women participating in the prospective arm of the study will receive verbal and written consent (Appendix D) from the midwives of their respective practices. Anonymity is guaranteed through Surveymonkey.com. Researchers will keep confidential the information collected from the medical records of the participants in the prospective arm.

Data Collection Procedures

Procedures.

"Data collection plans for quantitative studies should yield accurate, valid, and meaningful data" (Polit, & Beck, 2004, p.323). In turn**,** this data should be effective in answering research question concerning the phenomenon under study. The goal of this study is to describe women's experiences with waterbirth, and to explore factors related to choice of water birth. It is the intent of the researchers to obtain self-reported data that will demonstrate childbirth satisfaction and birth outcomes for women choosing water birth. Following the approval of Barbara Harper of Waterbirth International and Philadelphia IRB, the two surveys will be distributed to the appropriate sources for data collection purposes.

In regards to the prospective arm of the study, an on-site inservice will be held for the midwives participating in the study. It will be the responsibility of the midwife to review the study's purpose and consent form with their clients that agree to participate in the study. Demographic data such as age, race, and parity will be collected from the client's medical record. Birth outcomes related to length of labor, delivery mode, Apgar scores, and complications will also be collected from the medical record. This data will be recorded by the midwife on a standardized electronic form (Appendix G) and sent to the researchers by an email attachment file.

Prior to the distribution of the surveys, three tasks will need to be completed. The first will be further development of the study's instruments/surveys (Appendix E & F)**.** The questionnaire, originally developed by B. Harper, will be reviewed for face and content validity and for clarity of wording by a panel of experts. The panel of experts will consist of the Midwifery Institute of Philadelphia University's Critical Inquiry Class 8 students and its professor. The surveys will then be piloted with the same panel of experts. These experts include consumers of waterbirth and women who have had a waterbirth. Ten to twenty pretests will be conducted for appropriate responses and returned.

The second task includes invitations to various childbirth websites that could place a link to the study for their readers/consumers. Childbirth.org, Epregnancy.com. Parenting.com, Pregnancytoday.com, and Mothering.com are some of the sites the researcher hope to receive approval. Referrals linking back to their homepage will be an incentive for consent.

The third task will be to recruit multiple midwifery practices to participate in the study for additional data collection purposes. The midwives and staff will be introduced to the purpose of the study. They will also be guided in the operation of the on-line survey.

Timeframe.

Upon approval, the surveys will be available for interested candidates to fill out and submit on-line. Included with the surveys will be an explanation of the study's purpose, as well as contact information to encourage and answer any questions (Appendix B). The survey will be available for public use during a six month time frame. This time frame was based on a recommendation from B. Harper, who is a co-researcher in the project and has generously donated her time, funding, and website.

Description of each instrument/measure used in the study.

The pilot survey for the retrospective arm of the study consists of 51 questions (Appendix E). The prospective survey totals 52 questions (Appendix F). The pilot study will be utilized to validate that these instrument documents are brief, user friendly, and easy to fill out. The questions should be straightforward, unambiguous, and

unbiased. It is estimated that it will take approximately ten minutes to complete the questions. The surveys were developed by B. Harper through Surveymonkey.com. This website is a tool that aids in the development, collection, and analysis of data obtained from on-line surveys. "The internet is increasingly being used to collect structured self-reported data" (Polit, & Beck, 2004, p. 367). "Web-based surveys appear to be an especially promising approach for assessing groups of people interested in very specific domains" (Polit, & Beck, 2004, p. 367). Surveymonkey.com describes its technical skills that are required to assemble a high-quality structured self-report instrument.

Reliability and validity data of the instrument used.

Reliability is "the degree of consistency or dependability with which an instrument measures the attribute it is designed to measure" (Polit, & Beck, 2004, p. 730). This study is designed to describe waterbirth experiences and waterbirth outcomes. Since the surveys will be used to directly collect the data, the reliability and validity of the instrument will depend upon the study participants reporting honest and complete answers. It will also depend on how well the questions in the survey are asked. The subjects will be encouraged to provide both positive and negative experiences. Most of the survey's content consists of simple yes/no, checklist, and numeric value questions. This design should enhance the reliability of the data gathered.Validity is "the degree to which an instrument measures what it is intended to measure" (Polit, & Beck, 2004, p. 735). Validity will be assessed by the degree of data obtained that actually measures childbirth satisfaction and birth outcomes. Assessment approaches for the validity of the instrument/survey will include face and content validity. Face validity "refers to whether the instrument looks as though it is measuring the appropriate construct" (Polit, & Beck, 2004, p. 423). Content validity "concerns the degree to which an instrument has an appropriate sample on items for the construct being measured" (Polit, & Beck, 2004, p. 423). The pilot surveys will be reviewed for face and content validity by a panel of experts. Feedback from the expert panel will be incorporated into the tool.

A well developed instrument is carefully analyzed. Polit and Beck (2004) advise pilot testing of any questionnaire to allow for improvement and revision. They recommend ten to twenty pretests before a survey is introduced. The pilot study for the questionnaires will be distributed to nine health care professionals of the Critical Inquiry class that will pretest and critique the surveys. Feedback will be utilized to improve the questionnaire's reliability and validity.

Data Analysis Plan for the Research Question

Data management and analysis software.

The research question is: What are the experiences of women who are offered a waterbirth? The focus is childbirth choices, satisfaction, and birth outcomes of childbearing women offered a water birth option.

The management of the data collected for this study will be conducted on-line through Surveymonkey.com. The collection process will be done in an ongoing manner as the surveys are received. Surveymonkey.com automatically stores the data generated, to later be organized into comprehensible graphs, reports, and charts. This will help in demonstrating relationships between the study's phenomenon of interest.

Follow-up to ensure that the desired sample size (n=75) is met, will be managed by review of hits provided by Surveymonkey.com. The website provides a means for tracking interested respondents. Incentives, such as Mrs. Harper's 20% discount offer, will be provided to those who complete and submit the on-line survey.

Statistical information will be retrieved from the raw data gathered through Surveymonkey.com. Further exploration of the data will be done through Statistical Packages for the Social Scientist (SPSS). Narrative responses will be reviewed, categorized, and evaluated by the researchers.

Identify and describe one statistic for each question/hypothesis of your study.

To explore the phenomenon under investigation and the study's variables (childbirth satisfaction and birth outcomes), the data will be examined by the use of descriptive statistics. Descriptive statistics are used to describe and synthesize the quantitative data and place it into a manageable form. Its purpose is to summarize sample characteristics, describe the key research variables, and then document methodological features (Polit, & Beck,

2004). This organizes the data obtained from the surveys into a format that can be interpreted in a sensible way, written in terms of percentages and averages. This allows the researcher to analyze the data in terms of means, modes, medians, standard deviations, and variance. Descriptive statistics provides a powerful summary of the data in which comparisons between the study's variables can be made.

Plan for Disseminating Findings

Journal and conference to present research findings.

Waterbirth as a childbirth option is a controversial issue within the United States medical and midwifery community as a whole. Therefore, it is not an easily available and accessible option to many American women. The investigators of this study suggest that the results of this research could have an impact on childbirth options available for women in the future. This study, when completed, will be submitted in manuscript form to the Journal of Midwifery and Women's Health. The authors of this paper will submit an application to the ACNM, in order to present their findings at an annual meeting to raise awareness of issues regarding waterbirth within the midwifery community. Fianlly, brief study results and description will be posted on the web sites used for gathering data.

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Appendix A
Feasibility: Budget & Timetable

Feasibility

The study, though costly, appears feasible. To get an adequate population size, it will be important to recruit multiple websites and midwifery practice sites. Incentive fees for advertising and reimbursement to the midwifery practices are included in the budget for this purpose. Through Surveymonkey.com, a research assistant will not be needed to collect and organize data, thus providing some savings. Data collection retrieval will be the responsibility of the three researchers and occur on a continuous basis. Since the researchers will be working with on-line surveys it is important that they are properly equipped. Therefore there will be an allowance for computers if their personal ones should break down or need repair. Internet access is also important, so the researchers will be reimbursed for internet service provider fees. It is anticipated that the entire study will be conducted within a 18 month timeframe.

Budget

CNM Researchers(3) - $30/hr X 8hrs/wk X 52 weeks	$37,440
Travel expenses for site visits and in-service training	4,500
Computers (3)	2,100
Office supplies - Printing/copying, paper, pens, & binders	400
Internet Access	600
Surveymonkey.com fee	200
Software – SPSS or Excel	300
Total	**$45,540**

Timetable

Philadelphia University IRB	1 month
Pilot surveys:	1 month
Website recruitment:	1 month
Site Recruitment	2 months
Ongoing subject recruitment - Data Collection time period:	6 months
Data analysis & writing up findings:	4 months
Dissemination of findings:	1 months

Total time:	**16 months**

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Appendix B

Purpose of the study & Contact information

Dear Future Participant,
We are conducting a study to examine waterbirth experiences. This study, which is sponsored by Waterbirth International, will help health-care providers to explore issues related to childbirth satisfaction and birth outcomes of the water birth experience. It will enable providers to better meet the need of women wishing to participate in waterbirth. Would you please assist us in this study by completing the on-line questionnaire? Your opinions and experiences are very important to us and are needed to give an accurate picture concerning issues surrounding waterbirth.

If you prefer not to answer any particular question, please feel free to leave it blank. Please do answer the questions if you can, though, and if you have any comments or concerns about any question, just write your comments in the margin.

Thank you very much for your time and assistance in this endeavor. If you would like a copy of the summary of the results of this study, please check the box at the bottom of this page.

Researcher's Contact Information

Barbara Harper
Director
Waterbirth International
www.waterbirth.org
503-673-0026 - office
503-710-7975 - cell phone

Lee Ann Walker
Researcher
Midwifery Institute at Philadelphia University
email: leeann_bc@hotmail.com
410-695-2976 - Home
410-991-8884 - Cell

Tamar Windsor
Researcher
Midwifery Institute at Philadelphia University
email: babynur@peoplepc.com
405-373-4944 - Home
405-990-5093 - Cell

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Appendix C

Consent for the Retrospective Study

I, _____, consent to participate in research entitled "A survey of women's experiences with waterbirth."

I understand that the goals of this research are to describe the experiences of mothers who were offered water immersion for the birth of one or more of their children, up to 10 years ago. The information collected will include data about my pregnancy, birth and postpartum time. Additionally, my feelings about the events will be requested. This information will be collected by an on-line questionnaire with space provided for elaboration. Time to complete the questionnaire will average 10 minutes.

I will be asked to revisit my birthing experiences. Although this is a joyous reflection for many mothers, it may represent a difficult time. My participation may help other mothers in deciding about water immersion for their labor experiences. The researchers have provided their contact information in the event I need to discuss my feelings directly, or for general questions, comments or complaints.

The data collected will be compared to other women's experiences; conclusions will be drawn by the researchers based on the obtained information. I understand that the information will be written in a final paper and possibly disseminated through one or more professional journals or conferences.

My participation in this study is voluntary and I have the right to withdraw and withhold information at any time. I understand that my honest and complete answers will be most helpful to the research. I also understand that my privacy will be protected and only the project researchers will have access to my identified information.

In the event that further information is needed from me I do ____ / do not ____ consent to further contact by the researchers. Finally, I would ____ / would not ____ like to be contacted for future research about waterbirth.

This research is funded by Waterbirth International and was approved by the Philadelphia Institutional Review Board on _____

Participant Signature _____ Date_____

Researcher's Signature _____ Date_____

Researcher's Contact Information:

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Appendix D

Consent of the Prospective Study

I, _____, consent to participate in research entitled "A survey of women's experiences with waterbirth."

I understand that the goals of this research are to describe the experiences of mothers who were offered water immersion for the birth of one or more of their children. The information collected will include data about my pregnancy, birth and postpartum time. Additionally, my feelings about the events will be requested. This information will be collected by an on-line questionnaire with space provided for elaboration. Time to complete the questionnaire will average 10 minutes. Demographic data such as my age and race will be collected from my medical record, as will outcomes of my birth such as length of labor, delivery mode, Apgar scores, and any complications.

I will be asked to revisit my birthing experiences. Although this is a joyous reflection for many mothers, it may represent a difficult time. My participation may help other mothers in deciding about water immersion for their labor experiences. The researchers have provided their contact information in the event I need to discuss my feelings directly or for general questions, comments, or complaints.

I understand that the option for waterbirth is a routine offering at my birthing site and that protocols are established and available for review and/or discussion. Potential benefits for my baby and I include comfort, relaxation, buoyancy allowing freedom of movement, emotional well-being, greater sense of control, shorter labor, less perineal stress, and a reduced need for operative assistance of my delivery. Potential risks have not been validated in the literature; however, birth is not without risk. One possible risk my baby or I could experience might be an increase in body temperature and/or infection. During a waterbirth, there could be a delay in handling any birth complications that might arise. Also, if the baby's umbilical cord is unusually short, it could be injured. The baby possibly could inhale water at delivery which could cause lung injury and/or a low blood sodium level. Finally, an undetected problem could occur for my baby or me.

The data collected will be compared to other women's experiences and conclusions will be drawn by the researchers based on the obtained information. I understand that the information will be written in a final paper and possibly disseminated

through one or more professional journals or conferences.

My participation in this study is voluntary and I have the right to withdraw and withhold information at any time. I understand that my honest and complete answers will be most helpful to the research. I also understand that my privacy will be protected and only the project researchers will have access to my identified information.

In the event that further information is needed from me I do ____ / do not ____ consent to further contact by the researchers. Finally, I would ____ / would not ____ like to be contacted for future research about waterbirth.

This research is funded by Waterbirth International and was approved by the Philadelphia Institutional Review Board on ____________

Participant Signature _________________________________ Date__________

Researcher's Signature _______________________________ Date__________

Researcher's Contact Information:

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Appendix E
Survey for Retrospective Study
Waterbirth
PARENT SURVEY

1. Your Name: ____

2. Education level completed (Please check one)
_____ High School _____ 4 years of college
_____ 2 years of college _____ Graduate school or more
_____ Less than 4 years of college _____ Specialized training program
_____ Other, please explain: ____

3. How many children have you birthed? ______

4. Please give us some information about each child:

						Where did you give birth?
						HomeHospitalBirth CenterOther (please describe)

FOR EACH WATERBIRTH, PLEASE ANSWER THE FOLLOWING QUESTIONS. PLEASE DESCRIBE **ONE** WATERBIRTH PER SURVEY FORM. IF YOU NEED EXTRA COPIES, PLEASE CALL US AT (800)641-2229 or make a copy. You can also download this survey on our website at: www.waterbirth.org

5. Where did you first hear about waterbirth?
_____ Book _____ Childbirth Education Class _____ Friend
_____ Magazine _____ Doctor _____ Doula
_____ Internet _____ Midwife
_____ Other: Please specify ____

6. Did you participate in any formal childbirth education classes?

_____ Yes Name of Class or type of training _____ No (Skip Question #7)

7. How helpful was the childbirth education class? (Circle one number)
Very Helpful Helpful Not Helpful

1 2 3 4 5

8. How did you prepare for your birth in water? (Check any that apply)
_____ Read books about waterbirth _____ Attended waterbirth talk
_____ Watched waterbirth videos _____ Talked with other waterbirth mothers
_____ Took special classes _____ Talked with Waterbirth International staff
_____ Took a prenatal swim class
_____ Other, Please describe:

_____

9. Who attended your waterbirth? (Check all that apply)
_____ Partner _____ Doctor
_____ Parents _____ Nurse(s)
_____ Child's Sibling(s) _____ Naturopathic physician
_____ Friends _____ Doula
_____ Your Sibling(s) _____ Unassisted
_____ Other, describe _____
_____ Midwife: Kind? ____ Certified Nurse Midwife _____Certified Professional Midwife
____ State-licensed Midwife _____Other, describe: _____

10. How supportive of waterbirth was your caregiver (doctor, midwife)?
Very Supportive Supportive Not Supportive

1 2 3 4 5

11. Did their support change during the birth?
_____ Yes _____ No

If yes, please explain: _____

_____

12. Was your waterbirth (Please check ONLY one)
_____ Planned from the start (You intentionally expected to birth in water.)
_____ Spontaneous during labor (It happened because water was available.)

13. What kind of pool/bath did you use?
_____ Portable pool designed for water labor _____ Built-in bath
_____ Other, please describe: _____

_____

14. How long was your labor? _____

15. If you know, how long was each stage?
1st stage_____ 2nd stage_____ 3rd stage_____

(0 – 10 cm dilated) (Pushing) (Placenta Delivery)

16. When, during your labor, did you get into the water?
Centimeters Dilated _____ and/or Hour of Labor _____

17. What part(s) of your labor was spent in the water? _____

_____

18. How long (hours, minutes) were you in the water during your labor?_____

19. Please describe any feeling(s) or experience that you recall when you first got into the water?
_____

_____

_____

20. What position were you in while pushing? (Check any that apply)
_____ Squatting _____ Reclining (semi-sitting)
_____ On hand/knees _____ Leaning over side of tub
_____ Sitting
_____ Other, please describe: _____

_____

21. How long did your baby remain under the water after her/his entire body emerged from you?
_____ 10 seconds or less _____ More than 10 seconds

22. Was the baby suctioned? ___ Yes ___ No

23. How long after the baby came out of the water did he/she start to breathe?
_____ Right away (a few seconds)
_____ Within 1 minute _____ Other, please explain: _____
_____ 2 – 3 minutes
_____

24. Was there any problem with the baby's breathing? ___ Yes ___ No
If yes, please explain: _____

25. How long after the birth was the cord cut? ___ 5 minutes or less ___ More than 5 min.
_____ Other, please describe:_____

26. Check any words that describe your baby at her/his birth
_____ Alert _____ Aware _____ Active _____ Awake
_____ Sleepy _____ Relaxed _____ Calm _____ Excited
_____ Agitated _____ Stressed _____ Quiet _____ Mellow

_____ Other, please describe: _____

27. Was the placenta delivered in the water?
_____ Yes _____ No

28. Did you have an episiotomy? ___ Yes ___ No

29. Did you tear or require stitches after your birth in the water? ___ Yes ___ No

30. Did you receive any pain medication with your birth in the water? ___ Yes ___ No

31. Was your baby hospitalized for any reason following your birth in water?
___ Yes ___ No
If yes, please explain: _____

_____

32. Were you separated from your baby after the birth? ___ Yes ___ No

33. Did your baby receive any extra treatments such as injections, eye drops, spinal tap, etc.? ___ Yes ___ No

34. How soon after the birth did your baby start breastfeeding?
_____ Immediately _____ Within 30 minutes
_____ 30 – 60 minutes _____ Other, please explain: _____

_____

35. How long did you breast feed? _____

36. How "in charge" of your birth experience did you feel?
Very Much Mostly Not At All

1 2 3 4 5

37. How would you change your experience of your birth in the water?

_____

_____

_____

38. Would you recommend a waterbirth to anyone else? ___ Yes ___ No

39. Would you consider another birth in the water? ___ Yes ___ No

40. Please share any further comments about your birth or labor in water.

_____

_____

_____

_____

MOTHERS WHO GAVE BIRTH PRIOR TO THEIR WATERBIRTH EXPERIENCE, PLEASE ANSWER THE FOLLOWING QUESTIONS:

41. If you gave birth to another child before your waterbirth experience, did you have any of following

procedures?
_____ Episiotomy _____ Epidural
_____ Baby Monitor _____ Forceps or Vacuum
_____ Pain relieving drugs _____ IV

42. Were your previous birth(s) cesarean births? ___ Yes ___ No

43. Were there any notable differences at birth between your water-born baby and any of your other babies? ___ Yes ___ No

If yes, please describe: _____

_____

44. Were there any notable differences *for your partner* between your waterbirth and any other births that were not in the water?
___ Yes ___ No

If yes, please describe: _____

_____

FOR PARTNERS ONLY (If partner is not available, mothers may answer these questions.)

45. What were your feelings about waterbirth prior to your baby's birth?
Very Supportive Supportive Not Supportive

1 2 3 4 5

46. After your waterbirth experience, how did you feel about waterbirth?
Very Supportive Supportive Not Supportive

1 2 3 4 5

If you answered 4 or 5, please explain why: _____

_____

47. Do you feel that your partner benefited from using water during her birth?
Very Much Somewhat Not At All

1 2 3 4 5
If you answered 4 or 5, please explain why: _____

_____

48. Did you notice anything specific about your water-birthed child? ___ Yes ___ No

If yes, please describe: _____

_____

49. Would you recommend a waterbirth to anyone else? ___ Yes ___ No

50. Would you consider another birth in the water? ___ Yes ___ No

51. Any additional comments about your waterbirth experience?

_____

_____

_____

Would you please give us the name and address of your midwife or doctor who assisted you with your birth in water? We would like to send them a professional survey.

Name: _____

Address:

City/State/Zip: _____
Phone: _____ Email:_____

It is not necessary for us to have your name and address for this survey, however it will be beneficial, especially if we receive funding to do follow-up studies on the babies.
I give my permission for GMCHA to use my name with all or any part of my survey comments in publications such as newsletters, books, or magazine articles.___Yes ___No

Name: _____

Address: _____

City/State/Zip: _____
Phone: _____ Email:_____

Signature: _____

Date: _____

THANK YOU!

Together, we're making a difference!!

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Appendix F
Survey for Prospective Study
Waterbirth
PARENT SURVEY

1. Your Name: _____

2. Education level completed (Please check one)
_____ High School _____ 4 years of college
_____ 2 years of college _____ Graduate school or more

_____ Less than 4 years of college _____ Specialized training program
_____ Other, please explain: _____

3. How many children have you birthed? _____

4. Please give us some information about each child:

						Where did you give birth?
						HomeHospitalBirth CenterOther (please describe)

5. Did you choose to participate in a waterbirth?
____Yes ____No

IF YOU SELECTED **YES** TO A WATERBIRTH, PLEASE ANSWER THE FOLLOWING QUESTIONS. PLEASE DESCRIBE **ONE** WATERBIRTH PER SURVEY FORM.

IF YOU SELECTED **NO** TO A WATERBIRTH, PLEASE DO NOT ANSWER THE FOLLOWING QUESTIONS: 8-13, 15-18, 20, & 26.
PLEASE INCLUDE YOUR REASONS FOR NOT CHOOSING A WATERBIRTH (QUESTION 39).

IF YOU NEED EXTRA COPIES, PLEASE CALL US AT (800)641-2229 or make a copy. You can also download this survey on our website at: www.waterbirth.org

6. Where did you first hear about waterbirth?
_____ Book _____ Childbirth Education Class _____ Friend
_____ Magazine _____ Doctor _____ Doula
_____ Internet _____ Midwife
_____ Other: Please specify _____

7. Did you participate in any formal childbirth education classes?
_____ Yes Name of Class or type of training _____ _____ No (Skip Question #7)

8. How helpful was the childbirth education class? (Circle one number)
Very Helpful Helpful Not Helpful

1 2 3 4 5

9. How did you prepare for your birth in water? (Check any that apply)
_____ Read books about waterbirth _____ Attended waterbirth talk
_____ Watched waterbirth videos _____ Talked with other waterbirth mothers
_____ Took special classes _____ Talked with Waterbirth International staff
_____ Took a prenatal swim class
_____ Other, Please describe:

_____

10. Who attended your waterbirth? (Check all that apply)
_____ Partner _____ Doctor
_____ Parents _____ Nurse(s)
_____ Child's Sibling(s) _____ Naturopathic physician
_____ Friends _____ Doula

_____ Your Sibling(s) _____ Unassisted
_____ Other, describe _____
_____ Midwife: Kind? ____ Certified Nurse Midwife _____Certified Professional Midwife
____ State-licensed Midwife _____Other, describe: _____

11. How supportive of waterbirth was your caregiver (doctor, midwife)?
Very Supportive Supportive Not Supportive

1 2 3 4 5

12. Did their support change during the birth?
_____ Yes _____ No

If yes, please explain: _____

_____

13. Was your waterbirth (Please check ONLY one)
_____ Planned from the start (You intentionally expected to birth in water.)
_____ Spontaneous during labor (It happened because water was available.)

14. What kind of pool/bath did you use?
_____ Portable pool designed for water labor _____ Built-in bath
_____ Other, please describe: _____

_____

15. How long was your labor? _____

16. If you know, how long was each stage?
1st stage_____ 2nd stage_____ 3rd stage_____
(0 – 10 cm dilated) (Pushing) (Placenta Delivery)
17. When, during your labor, did you get into the water?
Centimeters Dilated _____ and/or Hour of Labor _____

18. What part(s) of your labor was spent in the water? _____

_____

19. How long (hours, minutes) were you in the water during your labor?_____

20. Please describe any feeling(s) or experience that you recall when you first got into the water?
_____

_____

_____

21. What position were you in while pushing? (Check any that apply)
_____ Squatting _____ Reclining (semi-sitting)
_____ On hand/knees _____ Leaning over side of tub
_____ Sitting
_____ Other, please describe: _____

_____

22. How long did your baby remain under the water after her/his entire body emerged from you?
_____ 10 seconds or less _____ More than 10 seconds

23. Was the baby suctioned? ___ Yes ___ No

24. How long after the baby came out of the water did he/she start to breathe?
_____ Right away (a few seconds)
_____ Within 1 minute _____ Other, please explain: _____
_____ 2 – 3 minutes

25. Was there any problem with the baby's breathing? ___ Yes ___ No

If yes, please explain: _____

26. How long after the birth was the cord cut? ___ 5 minutes or less ___ More than 5 min.
_____ Other, please describe:_____

27. Check any words that describe your baby at her/his birth
_____ Alert _____ Aware _____ Active _____ Awake
_____ Sleepy _____ Relaxed _____ Calm _____ Excited
_____ Agitated _____ Stressed _____ Quiet _____ Mellow

_____ Other, please describe: _____

28. Was the placenta delivered in the water?
_____ Yes _____ No

29. Did you have an episiotomy? ___ Yes ___ No

30. Did you tear or require stitches after your birth in or out of the water? ___ Yes ___ No

31. Did you receive any pain medication with your birth in or out of the water? ___ Yes ___ No

32. Was your baby hospitalized for any reason following your birth in or out of the water?
___ Yes ___ No
If yes, please explain: _____

_____

33. Were you separated from your baby after the birth? ___ Yes ___ No

34. Did your baby receive any extra treatments such as injections, eye drops, spinal tap, etc.? ___ Yes
___ No

35. How soon after the birth did your baby start breastfeeding?
_____ Immediately _____ Within 30 minutes
_____ 30 – 60 minutes _____ Other, please explain: _____

_____

36. How long did you breast feed? _____

37. How "in charge" of your birth experience did you feel?
Very Much Mostly Not At All

1 2 3 4 5

38. How would you change your experience of your birth in or out of the water?

_____

_____

_____

39. Would you recommend a waterbirth to anyone else? ___ Yes ___ No

40. Would you consider another birth in the water? ___ Yes ___ No

41. Please share any further comments about your birth or labor in water.
If you choose not to participate in a waterbirth, please explain why not.

_____

_____

_____

MOTHERS WHO GAVE BIRTH PRIOR TO THEIR WATERBIRTH EXPERIENCE, PLEASE ANSWER THE FOLLOWING QUESTIONS:

42. If you gave birth to another child before your waterbirth experience, did you have any of following procedures?
_____ Episiotomy _____ Epidural
_____ Baby Monitor _____ Forceps or Vacuum
_____ Pain relieving drugs _____ IV

43. Were your previous birth(s) cesarean births? ___ Yes ___ No

44. Were there any notable differences at birth between your water-born baby and any of your other babies? ___ Yes ___ No

If yes, please describe: _____

_____

45. Were there any notable differences *for your partner* between your waterbirth and any other births that were not in the water?
___ Yes ___ No

If yes, please describe: _____

_____

FOR PARTNERS ONLY (If partner is not available, mothers may answer these questions.)

46. What were your feelings about waterbirth prior to your baby's birth?

Very Supportive Supportive Not Supportive

1 2 3 4 5

47. After your waterbirth experience, how did you feel about waterbirth?
Very Supportive Supportive Not Supportive

1 2 3 4 5

If you answered 4 or 5, please explain why: _____

_____

48. Do you feel that your partner benefited from using water during her birth?
Very Much Somewhat Not At All

1 2 3 4 5
If you answered 4 or 5, please explain why: _____

_____

49. Did you notice anything specific about your water-birthed child? ___ Yes ___ No

If yes, please describe: _____

_____

50. Would you recommend a waterbirth to anyone else? ___ Yes ___ No

51. Would you consider another birth in the water? ___ Yes ___ No

52. Any additional comments about your water birth experience?

_____

_____

_____

_____

Would you please give us the name and address of your midwife or doctor who assisted you with your birth in water? We would like to send them a professional survey.

Name: _____

Address: _____

City/State/Zip: _____
Phone: _____ Email:_____

It is not necessary for us to have your name and address for this survey, however it will be beneficial, especially if we receive funding to do follow-up studies on the babies.
I give my permission for GMCHA to use my name with all or any part of my survey comments in publications such as newsletters, books, or magazine articles.___Yes ___No
Name: _____

Address: _____

City/State/Zip: _____
Phone: _____ Email:_____

Signature: _____

Date: _____

THANK YOU!

Together, we're making a difference!!

.....

Appendix G
Demographic Data
Prospective study

Name:_____

Date:_____

Age:_____

Ethnicity:_____

Gravida:_____

Parity:_____

Waterbirth participant:

Yes No

Labor Record:

Gestational Age at Delivery:_____

Rupture of Membranes:

Spontaneous

Artificial

Length of Rupture:_____

Color of Fluid:_____

Use of oxytocin:

Induction

Augmentation

Total Length of Labor:_____

Incidence of Abnormal Labor Patterns:

Prolonged latent phase

Prolonged active phase

Secondary arrest of dilation

Arrest of Descent

Incidence of Abnormal Fetal Heart Rate Patterns:

Late decelerations

Variable decelerations

mild moderate severe

Delivery Type:

Vaginal

Operative:

Vacuum

Forceps

Caesarean section

Nuchal cord

Yes No

Apgar Scores:

One minute_____

Five minutes_____

Ten minutes_____

NICU Admission:

Yes

No

Reason for admission _____

Any other deviations from normal please state below:

_____

_____

_____

Thank you for you time!

.....e

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