



## Evidence on: Waterbirth

### What is Waterbirth?

Before we talk about the evidence on waterbirth, it's important for you to understand some standard terms. During water immersion in *labor*, a person gets into a tub or pool of warm water during the first stage of labor, before the baby is born. In a *waterbirth*, a person remains in the water during the pushing phase and actual birth of the baby ([Nutter et al., 2014a](#)). The baby is then brought to the surface of the water after he or she is born. A waterbirth may be followed by the birth of the placenta in or out of the water.

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The term *land birth* is often used in waterbirth research to refer to a birth in which the baby is born on dry land—not in a tub. Also, the word *hydrotherapy* is sometimes used to describe the use of water during labor and/or birth.

Waterbirth was first reported in an 1805 medical journal, and became more popular in the 1980s and 1990s. The safety of water immersion *during labor* is well accepted ([Cluett & Burns, 2009](#); [Shaw-Battista, 2017](#)). However, on the other hand, people in the United States (U.S.) and some other countries disagree about the safety of waterbirth.

This article will mostly focus on the evidence surrounding the safety of *waterbirth*. We have divided this article into four sections:

**DISCLAIMER:** Nothing in this article shall be construed as advice from a healthcare provider (i.e. midwife, nurse, nurse practitioner, doctor or physician assistant). This article is strictly intended to provide general information regarding its subject-matter and may not apply to you as an individual. It is not a substitute for your own healthcare provider's medical care or advice and should not be relied upon by you other than upon the advice of your treating provider. If you need someone to examine you or discuss your pregnancy or baby's health, see a midwife, nurse practitioner, or doctor.





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- An overview of the available evidence on waterbirth
- Pros and cons of waterbirth for mothers
- Pros and cons of waterbirth for newborns
- An overall summary of the potential benefits and risks of waterbirth

Before we dive into the evidence, it's important to note that laboring in water—whether or not the person goes on to give birth in the water—likely impacts many of the waterbirth effects that we address in this article.

For example, a recent review of seven randomized trials with 2,615 participants looked at water immersion during labor, before normal land birth ([Shaw-Battista, 2017](#)). The study found that laboring in water poses no extra risks to mother or baby and helps relieve pain, leading to less use of pain medication. In addition, Shaw-Battista (2017) found that mothers who labored in water had less anxiety, better fetal positioning in the pelvis, less use of drugs to speed up labor, and were more satisfied with privacy and the ability to move around.

In many of the waterbirth studies we will review in this article, women who had waterbirths also spent time laboring in the water. So some benefits seen from the waterbirths may be influenced by water immersion during labor.

## Overview of Evidence on Waterbirth

### Cochrane Review on Water Immersion during Labor *and* Birth

In a meta-analysis, researchers combine data from multiple studies to get stronger evidence. Cochrane researchers combined 11 randomized trials on water immersion during labor *and* during birth ([Cluett & Burns, 2009](#)). Eight of these trials only studied water immersion during the first stage of labor (before the pushing phase). The Cochrane reviewers found evidence that laboring in water reduces the use of epidurals and spinals for pain relief. They also found that laboring in water shortened the first stage of labor by an average of 32 minutes. There was no evidence of harm to the mother or baby from laboring in water.

### Randomized Controlled Trials on Waterbirth

There have been five randomized trials on waterbirth, and so far they show that waterbirth holds several potential benefits for mothers including lower pain scores, less use of pain medication, less use of artificial oxytocin, shorter labors, a higher rate of normal vaginal birth, a higher rate of intact perineum, less use of episiotomy, and greater satisfaction with the birth. As we noted previously, those benefits could be due, at least in part, to water immersion before the birth.

Three of the trials in the Cochrane review (mentioned above) looked at the effects of actually giving birth in the water. One of these trials was an unpublished student thesis from South Africa ([Nikodem, 1999](#)). In this study, 60 people were randomly assigned (like flipping a coin) to waterbirth and 60 people to land birth. There was no water labor—participants assigned to waterbirth entered the pool at the start of the pushing phase. The researchers found that the waterbirth group was more satisfied with their birth experience (78% vs. 58%) and that the pain was less than they expected it to be (57% vs. 28%). They found no difference in overall trauma to the birth canal between groups. The researchers defined trauma to the birth canal as injury to the vaginal wall, labial tears, or perineal tears.

The other two waterbirth trials included in the Cochrane review took place in the United Kingdom (U.K.) and Iran ([Woodward & Kelly, 2004](#); [Chaichian et al., 2009](#)). In the trial from the U.K., only 10 out of 40





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people who were assigned to the waterbirth group actually gave birth in the water. Since people didn't stay in their assigned groups, it is not possible to draw any conclusions from this study.

The trial from Iran included 53 people assigned to waterbirth and 53 people assigned to land birth ([Chaichian et al., 2009](#)). Everyone who was assigned to the waterbirth group gave birth in the water. The researchers didn't find any differences in newborn outcomes, but they found quite a few differences in maternal health outcomes between groups. Compared to the people randomly assigned to give birth on land, those assigned to give birth in the water had a higher rate of normal vaginal birth (100% vs. 79.2%), a shorter active phase of labor (cervix dilates more rapidly) (114 minutes vs. 186 minutes), a shorter third stage of labor (birthing the placenta) (6 minutes vs. 7.3 minutes), less use of artificial oxytocin (0% vs. 94.3%), less use of any pain medications (3.8% vs. 100%), a 23% lower rate of episiotomy (a surgical cut to the area of tissue between the vagina and rectum, called the *perineum*), and a 12% higher rate of perineal tears. They didn't find any differences between groups in the length of the pushing phase of labor or the rate of breastfeeding.

Since the 2009 Cochrane review, two more randomized trials have come out on waterbirth—one from Iran and one from China ([Ghasemi et al. 2013](#); [Gayiti et al., 2015](#)).

The 2013 Iranian trial randomly assigned 100 people to waterbirth and 100 people to land birth, making it the largest randomized trial ever done on waterbirth. In the end, 83 people ended up staying in the waterbirth group and 88 people stayed in the land birth group; it's not clear why people left the study. This study was published in Persian, not English, but we were able to get some of the details thanks to our volunteer translators (Personal correspondence, [Clausen and Basati, 2017](#)). The study found that fewer people in the waterbirth group had Cesareans compared to people in the land birth group (5% versus 16%). People in the waterbirth group also reported less pain with labor compared to the land birth group, but they do not give any details on how pain was measured. There was less meconium (baby's first stool) in the mother's amniotic fluid with waterbirth (2% versus 24%) and also fewer low Apgar scores with waterbirth compared to land birth. An Apgar score is a test of how well the baby is doing at birth. A low Apgar score means that the baby may require more medical assistance.

The trial from China randomly assigned 60 people to waterbirth and 60 people to land birth. Everyone who was randomly assigned to the waterbirth group gave birth in the water. The researchers didn't find any differences in newborn health outcomes between groups, but they found a few differences in maternal outcomes. Compared to the land birth group, the waterbirth group had a higher rate of intact perineum (25% vs. 8%). The waterbirth group also had a much lower rate of episiotomy (2% vs. 20%) and lower pain scores. The total length of labor was also shorter in the waterbirth group by an average of 50 minutes. They did not find any difference in the amount of lost blood between groups.

**Table 1 (page 23) shows details about the five randomized trials that have been done on waterbirth.**

In all of these trials, there was no evidence of harm to the mother or baby from waterbirth. However, these studies were too small to tell differences in rare health problems. Researchers figure that there would need to be at least 1,000 people in each group of a waterbirth trial in order to see at least two rare events occurring ([Burns et al., 2012](#)).

### Systematic Reviews and Meta-Analyses that include both Observational Studies and Randomized Trials

Because large randomized trials (with 2,000+ people) are difficult to carry out, we must turn to other types of evidence about waterbirth. In observational (non-randomized) studies, researchers do not attempt to control who gives birth in the water versus on land, but they record where people choose to

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give birth and measure their health outcomes. There have been at least four recent systematic reviews or meta-analyses, where researchers combined research from multiple studies on waterbirth.

In 2014, Nutter et al. published a review article in the *Journal of Midwifery and Women's Health*. This large review included two randomized trials ([Woodward & Kelly, 2004](#); [Chaichian et al., 2009](#)) as well as 36 observational studies, with a total of 31,453 waterbirths. The studies included in the review were conducted in 11 countries, including the United Kingdom, Italy, Switzerland, Austria, Australia, Iran, Turkey, France, Germany, South Africa, and the U.S.

The reviewers concluded that waterbirth increases how satisfied mothers are with their pain relief and the overall experience of childbirth. Waterbirth may also increase the chance of birthing with an intact perineum, since waterbirth is linked to a lower rate of episiotomy and severe tears. In addition, the included studies suggest that waterbirth may reduce the rate of postpartum hemorrhage, or excess blood loss after the birth.

Three reviews and meta-analyses focused on newborn outcomes following waterbirth have been published in recent years ([Vanderlaan et al., 2017b](#); [Taylor et al., 2016](#); [Davies et al., 2015](#)). They came to the conclusion that there was no increase in the chance of infant death or any other poor health outcome with waterbirth compared to land birth—but that the evidence is not strong enough to examine rare bad health outcomes or potential long-term benefits or harms of waterbirth.

The Vanderlaan et al. (2017b) meta-analysis covers the longest time span and the largest number of studies (39) on newborn outcomes in waterbirth vs. land birth. Because it is the largest meta-analysis, we will talk about its findings in detail in the Newborn Pros and Cons section of this article.

Vanderlaan et al. (2017b) wanted to be able to apply their findings to hospital waterbirths, so they only included hospital births. They included the five randomized, controlled trials on waterbirth, as well as 34 observational studies. Overall, the studies provided data on 28,529 births, of which 12,592 were waterbirths. All of the studies described their participants as low-risk, although the definition of low-risk varied. Most of the studies only included full-term mothers with a single, head-down baby.

The Taylor et al. (2016) meta-analysis is somewhat different in that it included both hospital and out-of-hospital waterbirths. They included the five randomized, controlled trials on waterbirth as well as 24 observational studies. The total number of births amounted to 39,302, nearly 14,000 of which were waterbirths. Again, most of the studies were restricted to healthy people, at low-risk of complications.

The Davies et al. (2015) meta-analysis only combined 12 studies on newborn outcomes with waterbirth: two randomized trials and ten observational studies. The two randomized trials included were the Nikodem (1999) thesis from South Africa and the Woodward & Kelly (2004) trial from the U.K. in which only 10 out of the 40 people who were randomly assigned to the waterbirth group actually gave birth in the water. The included studies involved healthy, low-risk participants and took place in both hospitals and community settings.

### The Midwives Alliance of North America Statistics Project

The largest observational study on waterbirth to date—and the largest published study to report results from the U.S.—used data from the Midwives Alliance of North America Statistics Project, commonly referred to as MANA Stats ([Bovbjerg et al., 2016](#)). This was a retrospective study design, meaning that researchers look back in time (“retro”) at medical records in order to make conclusions. Midwives could choose to participate in the study by enrolling clients earlier in pregnancy, and collecting data on them all the way through their pregnancy and birth—called *prospective logging*. This prospective logging





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protects against a type of bias called *selection bias*. Selection bias did not occur in this study, because midwives were not allowed to select clients with only good birth outcomes to include in the study.

The study included data from 18,343 midwife-attended births in the U.S. between 2004 and 2009, with 97.6% occurring at homes and birth centers. In the sample, 6,534 people had waterbirths, 10,290 people had land births, and 1,573 people intended to have a waterbirth but left the pool and had a land birth. This is the first study to examine *intended* waterbirths in U.S. out-of-hospital birth settings—when people plan to give birth in water but leave the pool before the actual birth.

Laboring people who have intended waterbirths may get out of the pool for many reasons: 1) the midwife or physician may have concerns with the fetal heart rate, 2) the mother may need pain medicine, or 3) the mother's labor may be taking too long. In contrast, people who stay in the pool for a waterbirth are already doing well, and may be more likely to have better results. So these two groups are not equal to begin with. This is a type of bias called *self-selection bias*. This means that any positive outcomes that we observe might not be because of the waterbirth itself, but because the two groups were different (had different risk profiles) to begin with. The MANA stats study helped to prevent self-selection bias by putting actual waterbirths, intended waterbirths, and intended land births in separate groups for analysis.

The researchers found that in this large U.S. study, waterbirth does not appear to increase the risk of bad health outcomes for newborns. However, they found that waterbirth might be linked to an increased risk of minor labial tears for mothers. We will discuss these results in detail in the section on “Intact Perineum” later on in the article. Overall, babies born in the water experienced better health outcomes than babies born on land; however, it's important to note that the group that fared the worse was the group of people who intended to have waterbirths but left the pool before giving birth—leaving the lower-risk people in the waterbirth group. Another way to look at it is that the midwives in this study showed good judgment, by assessing risk and getting people out of the tub as required.

### Case Reports

The other type of evidence that we have on newborn outcomes after waterbirth is from case reports. Case reports are considered the lowest level of research evidence. A strength of a case report is that it can give us information about rare side effects from waterbirth, which can help to improve safety. However, since case reports only discuss a single event, we do not know how often this side effect occurs. We will talk about the case reports on waterbirth later on in this article.

### Pros and Cons of Waterbirth for Mothers

In the next section of this article, we will discuss what researchers have found out about the specific pros and cons of waterbirth for mothers. In coming up with this evidence, we used findings from the five randomized trials on waterbirth, the Cluett and Burns (2009) Cochrane meta-analysis, the Nutter et al. (2014a) review, and the largest published observational study on waterbirth from MANA. We have organized the evidence by how waterbirth affects the following:

- Normal Vaginal Birth
- Episiotomy
- Perineal Tears/Trauma
- Pain/Need for Pain Relief
- Length of Labor
- Postpartum Blood Loss
- Upright Birth Positioning
- Hands-off Delivery
- Maternal Satisfaction
- Pelvic Floor Function
- Maternal Transfers to Hospital and Hospitalizations
- Maternal Infection





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## Normal Vaginal Birth

Researchers commonly refer to normal vaginal birth as *physiologic* labor and birth. This means that the birth process begins on its own at term, with minimal or no use of medications or medical procedures, and ends in a vaginal birth without complications ([Shaw-Battista, 2017](#)). People who are assigned to waterbirth have higher rates of normal vaginal birth compared to people who are assigned to birth on land. This is likely an effect of laboring in water at any time, since hydrotherapy also promotes normal vaginal birth even if mothers choose to get out of the pool before giving birth.

In two randomized trials, researchers have found that people who were assigned to waterbirth had higher rates of spontaneous vaginal births (no vacuum or forceps) compared to those who were randomly assigned to give birth on land. The first trial had 106 participants and found that the rate of spontaneous vaginal birth was 100% in people assigned to waterbirth versus 79% in those assigned to land birth ([Chaichian et al., 2009](#)). The second trial with 171 participants found that the rate of spontaneous vaginal birth was 94% in the waterbirth group versus 84% in the land birth group ([Ghasemi et al., 2013](#)).

In an observational study, researchers found that the Cesarean rate for everyone who labored in water and/or gave birth in the pool was only 4.4%, compared to a national Italian average of 38% ([Henderson et al., 2014](#)). Most of the other studies excluded people who gave birth by Cesarean, so we are usually not able to compare Cesarean rates between people who plan waterbirth and those who plan land births.

## Episiotomy

Waterbirth is protective against episiotomies. An *episiotomy* is when the care provider makes a surgical cut in the perineum during birth. Research evidence has shown that episiotomies are more harmful to mothers than a natural tear, increase the risk of severe perineal trauma, and should rarely be used ([Jiang et al., 2017](#)). So a decrease in episiotomies is a benefit to mothers.

In ten out of 12 studies that looked at the rate of episiotomy, researchers found a decrease in the use of episiotomies for people who had waterbirths, compared to those who had land births. The link between waterbirth and a decreased episiotomy rate was quite strong, with researchers reporting anywhere from a two-fold to 33-fold reduction in the use of episiotomies in the water ([Otigbah et al., 2000](#); [Burns, 2001](#); [Geissbuehler et al., 2004](#); [Thoeni et al., 2005](#); [Zanetti-Daellenbach et al., 2007a](#); [Chaichian et al., 2009](#); [Torkamani et al., 2010](#); [Mollamahmutoglu et al., 2012](#); [Menakaya et al., 2013](#); [Gayiti et al., 2015](#)). This finding makes sense, because it is much more difficult for a care provider to cut the mother's perineum when she is in the water.

The two out of 12 studies that did not find a difference in the rate of episiotomy between waterbirth and land birth groups had very low rates of episiotomy overall— 0.3% in the MANA Stats study, consisting of mostly out-of-hospital, midwife-led births in the U.S., and 5.9% in the randomized trial from two hospitals in South Africa ([Bovbjerg et al., 2016](#); [Nikodem, 1999](#)). The Nutter et al. (2014a) review looked over this evidence and concluded that waterbirth is indeed linked to a decreased use of episiotomy compared with land birth.

## First or Second Degree Perineal Tears

The Nutter et al. (2014a) review found mixed results, but the overall evidence suggests that waterbirth may be linked to more 1<sup>st</sup> and 2<sup>nd</sup> degree tears but fewer severe tears compared to land birth. Rates of 1<sup>st</sup> or 2<sup>nd</sup> degree perineal tears were higher in people who gave birth in water in one randomized trial ([Chaichian et al., 2009](#)) and five observational studies ([Otigbah et al., 2000](#); [Geissbuehler et al., 2004](#);





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[Zanetti-Daellenbach et al., 2007a](#); [Mollamahmutoglu et al., 2012](#); [Torrise et al., 2010](#)). On the other hand, two observational studies found waterbirth to be protective against minor tears ([Baxter, 2006](#); [Burke & Kilfoyle, 1995](#)) and four studies did not find a difference ([Burns, 2001](#); [Thoeni et al., 2005](#); [Menakaya et al., 2013](#); [Garland & Jones, 2000](#)).

In the MANA Stats study, the percentage of 1<sup>st</sup> or 2<sup>nd</sup> degree perineal tears was not different between waterbirth and land birth groups; however, the intended (but did not have) waterbirth group had an increase in the odds of 1<sup>st</sup> or 2<sup>nd</sup> degree perineal tears compared to those who had land births ([Bovbjerg et al., 2016](#)). This makes sense because the intended waterbirth group is biased towards higher risk births, since many of the people were probably asked to leave the pool so that problems could be watched more closely.

Researchers say that the reason 1<sup>st</sup> and 2<sup>nd</sup> degree tear rates may be higher in people who have waterbirths is because many of these people would have had episiotomies instead if they had given birth on land. It could be that people who have land births have lower 1<sup>st</sup> and 2<sup>nd</sup> degree tear rates, but only because many of them are cut surgically (with episiotomies) instead of being allowed to tear naturally. To learn more about the difference between 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> degree tears, click [here](http://mayoclinic/2DR7zVN) (<http://mayoclinic/2DR7zVN>).

### Third and Fourth Degree Tears

Waterbirth is linked to a decrease in the rate of third and fourth degree tears, which cause injury to the anal sphincter. A decrease in severe tears is very beneficial, because severe tears can lead to many potential problems for the mother, including fecal incontinence (not able to control the release of bowels), long-term problems with perineal pain and painful sex, fistulas (a hole in the birth canal), and wound infections ([Fernando et al., 2013](#)).

The Nutter et al. (2014a) review found that 3<sup>rd</sup> and 4<sup>th</sup> degree tears were lower with waterbirth compared to land birth in six observational studies ([Dahlen et al., 2012](#); [Geissbuehler & Eberhard, 2000](#); [Geissbuehler et al., 2004](#); [Menakaya et al., 2013](#); [Otigbah et al., 2000](#); [Zanetti-Daellenbach et al., 2007a](#)) and made no difference in three observational studies ([Garland, 2006](#); [Baxter, 2006](#); [Burns & Greenish, 1993](#)). The unpublished randomized trial from South Africa and the large observational study from MANA also found no difference in 3<sup>rd</sup> and 4<sup>th</sup> degree tears between groups ([Nikodem, 1999](#); [Bovbjerg et al., 2016](#)). Only one observational study by [Cortes et al. \(2011\)](#) found an increase in 3<sup>rd</sup> degree tears among people who had waterbirths compared to land births (2.5% versus 1.2%). The lower risk of severe tears with waterbirth is probably due to the fact that waterbirth decreases the use of episiotomies—and evidence shows that episiotomies can increase the risk of 3<sup>rd</sup> and 4<sup>th</sup> degree tears ([Jiang et al., 2017](#)).

Several other studies reported the rates of severe tears, but did not have a comparison group. Without a comparison group we cannot compare waterbirths to land births. However, if the study is large, we can still get some useful information about how often certain rare events may occur.

- In a study with 1,519 Italians who had waterbirths, [Henderson et al. \(2014\)](#) found that 0.3% of those who had waterbirths had a 3<sup>rd</sup> degree tear, and there were zero 4<sup>th</sup> degree tears.
- In the U.K., [Burns et al. \(2012\)](#) reported that 2% of 5,192 people who had waterbirths had a 3<sup>rd</sup> degree tear. They did not report 4<sup>th</sup> degree tear rates.

### Intact Perineum

There are many factors other than whether the birth took place in water or on land that can impact perineal tears and overall genital tract trauma. It is likely that the midwives and physicians in the

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waterbirth studies had different practices about perineal care during birth—not just due to midwife/physician differences, but also because these studies were done in such diverse places. Studies have also found an increase in perineal tears when people give birth vaginally for the first time, are over 35 years of age, have longer pushing phases of labor, give birth to larger babies, and use upright birthing positions (Suto et al., 2015; Dahlen et al., 2013).

It may be that simply laboring in the water benefits the rate of intact perineum. Out of four randomized trials included in the Shaw-Battista (2017) review, one found that mothers who labored in water (and got out to give birth) were more likely to have an intact perineum, possibly due to less use of forceps or vacuum after water labor (Rush et al., 1996). The other three trials that examined this outcome found no difference in intact perineum between study groups.

The Nutter et al. (2014a) review examined this outcome in 13 studies and found a higher rate of intact perineums among people who had waterbirths compared with those who had land births. When tears did occur, they tended to be less severe (1<sup>st</sup> and 2<sup>nd</sup> degree) with waterbirth compared with land birth. Likewise, the recent Gayiti et al. (2015) randomized trial found that the waterbirth group had more intact perineums (25% vs. 8%) compared with the land birth group.

Researchers will sometimes compare overall trauma to the birth canal, or *genital tract trauma*, between groups. This is a broad category that includes 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> degree perineal tears as well as labial tears and vaginal wall tears. The labia and vaginal wall are not part of the perineum, so these tears do not get counted when looking only at perineal tears, even though they may (or may not) require repair. Because of this, overall genital tract trauma may be a better measure than perineal tears or the risk of needing “stitches.”

As we mentioned previously, the Nikodem (1999) trial defined genital tract trauma as any injury to the vaginal wall, labial tears or perineal tears. This small study found no difference in genital tract trauma between groups.

However, the large MANA Stats study found an 11% increase in the odds of genital tract trauma in people who gave birth in water versus on land (Bovbjerg et al., 2016). Like Nikodem (1999), they define genital tract trauma as injury to the vaginal wall, labial tears, or perineal tears, but they also include data from midwives who said that, yes, there was trauma, but did not specify the exact location. Those with the greatest amount of trauma were in the intended (but did not have) waterbirth group.

Normally in waterbirth studies, the higher rate of episiotomy with land births helps to explain the higher rate of intact perineum with waterbirths, but the MANA Stats study took place in an extremely low episiotomy setting. This allows us to examine the effect of waterbirth on the perineum when episiotomy wasn't a factor. It's important to note that the MANA Stats study did not find that waterbirth increased the odds of severe perineal tears, or even first or second degree perineal tears when compared to land birth; what they saw was an increase in overall genital tract trauma that includes those types of tears as well as trauma to the vaginal wall and labial tears. More people in the waterbirth group had mild labial tears, and this contributed to an overall higher rate of genital tract trauma from waterbirth (Personal correspondence, Bovbjerg, 2018).

Here's the main thing— if you labor or birth in water you are less likely to have an episiotomy and less likely to have a severe tear, but may be more likely to have a minor tear. Birthing people tend to assume different and more positions in water than when outside of water. This could affect the frequency and location of tearing, as might differences in how attendants handle birth in and out of water. More







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research is needed to better understand how water immersion affects the perineum during labor and birth (e.g., its elasticity) and if the effect depends on the duration of time spent in the water.

### Need for Pain Relief

The Nutter et al. (2014a) review looked at eight studies that included this outcome and found that people who give birth in water use less pain medication than people who give birth on land. This agrees with the findings of the Shaw-Battista (2017) review, which also found that people who labor in water report less pain and anxiety. Four research teams found that fewer people who gave birth in water required any pain relief at all ([Otigbah et al., 2000](#); [Geissbuehler et al., 2004](#); [Chaichian et al., 2009](#); [Torkamani et al., 2010](#)), and two research teams mentioned that people who had waterbirths had a 0% epidural rate ([Thoeni et al., 2005](#); [Zanetti-Daellenbach et al., 2007a](#)).

### Pain Scores

The Nutter et al. (2014a) review concluded that more mothers report being satisfied with their pain relief following waterbirth compared with land birth. The Gayiti et al. (2015) randomized trial found that only 3% of people in the waterbirth group experienced pain classified as “Degree III – moderately intolerable and unable to cooperate with the doctor” compared to 23% of people in the land birth group. The Ghasemi et al. (2013) randomized trial from Iran also reported less pain with waterbirth but they do not give any details on how pain was measured.

In the largest study so far to compare pain levels between waterbirths and land births, Eberhard et al. (2005) followed 3,327 people who had waterbirths, 2,763 people who had land births in bed, and 1,409 people who gave birth on a Maia stool. On a scale from 0-100 with 0 being no pain and 100 being intensely strong pain, average pain levels from the late first stage through the second stage were high for all three groups, ranging from 65-77. Out of everyone who had land births in bed, about 13% had epidurals for pain relief, and 32% of people who had given birth before and 65% of people giving birth for the first time had medication injections or suppositories for pain relief. A smaller number of people having waterbirths had medication injections for pain relief (15%- 35%). The researchers found that in people giving birth for the first time:

- During early labor (1-3 cm), people choosing land births in bed reported more pain than those choosing water births or Maia stool births.
- During pushing, people choosing waterbirths reported higher levels of pain compared to those who had land births in bed.
- After the birth, people who had waterbirths recalled a lower level of pain than those who had land births in bed.
- There were no other differences between groups with expected levels of pain, late first stage pain levels, or levels of pain in the second stage before pushing began.

Among people who had given birth before:

- Before labor began, people who had land births in bed expected a lower amount of pain than those who had waterbirths.
- During early first stage (1-3 cm), people who had waterbirths had lower pain levels than those having land births in bed.
- During late first stage, people who had waterbirths reported lower levels of pain than land births in bed.
- During pushing, people who had waterbirths reported higher levels of pain than those who had land births in bed.





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- After the birth, people who had waterbirths recalled a lower level of pain than those who had land births in bed.

Because the pain levels were high in all of the groups, the researchers concluded that water birth relieves labor pain “in just as poor a manner” as do morphine drugs. This is a very important finding that means when waterbirth is used for pain relief, the effects are similar to the effects of injectable opioids. The same effect...” Instead, it should say, However, in a study of U.S. births from 2000-2002 (Declercq et al., 2002), 49% of mothers who used a pool for water immersion said it was “very helpful” compared with only 24% of those who rated opioids as very helpful. Eberhard et al. (2005) points out that waterbirth also avoids the potential side-effects of morphine-derived medications—such as decreasing the mother’s level of consciousness or slowing newborn breathing. However, we can’t say from the Eberhard study how waterbirth compares to epidural analgesia at relieving pain, since the rate of epidural use during land births was very low (14% in first-time mothers and 9% in experienced mothers). Of note, 78% of the mothers in the Declercq et al. (2002) study rated epidurals as “very effective.”

Another important finding of the Eberhard et al. (2005) study was that people who had land births in bed had lower levels of pain during pushing. However, after the birth, people who had waterbirths recalled less pain. Because of this finding, the researchers propose that waterbirth may alter birthing people’s perceptions so that after birth, they remember the birth as being less painful than it actually was. This may have an important influence on mother’s feelings about their birth, and could explain why researchers conducting qualitative studies (in-depth interviews) have found that mothers generally use very positive words to describe their waterbirths ([Richmond, 2003](#)).

Other studies have also found a positive recall effect. Nikodem (1999) asked mothers 24 hours after the birth if the pain they experienced during pushing was more or less than they expected it to be. Of the waterbirth group, 57% reported that the pain was less than they expected it to be compared to 28% of the land birth group. When asked how they felt about the way they coped with the pain of pushing, 78% of the waterbirth group reported that they felt very satisfied with how they coped versus 58% of the land birth group.

Cochrane researchers have looked at whether hypnosis during birth has an affect on how pleased mothers are with their pain relief when asked two weeks after the birth ([Madden et al., 2016](#)). They didn’t find any differences in how people recalled their pain relief between the people who had hypnosis and those who did not *except* when the people in the hypnosis group also received water immersion. When water immersion was combined with hypnosis, people recalled being more satisfied with their pain relief on average.

### Total Length of Labor

In the Gayiti et al. (2015) randomized trial of 160 first-time mothers, researchers found that the total length of labor was shorter for the people giving birth in water by 50 minutes on average compared to the people having land births. In another study, Thoeni et al. (2005) also found that the overall length of labor was shorter in people giving birth in the water, and they stated that this was mostly due to a decrease in the average length of the second stage of labor.

Studies of water immersion during labor provide better evidence for the effect of water on the length of labor than do the studies of waterbirth. This is because waterbirth studies usually do not record how much time laboring people spend in the water before giving birth, so it is hard to figure out the relationship between waterbirth and the length of the first stage of labor. Interestingly, the Shaw-





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Battista (2017) review of randomized trials found that the labors of the people assigned to hydrotherapy progressed at the same rate as the labors of people treated with artificial oxytocin and amniotomy (breaking the mother's water).

There are several other potential problems with studying length of labor and waterbirth. Most researchers do not say how they defined the beginning and the end of each stage of labor. The tradition has been to wait until “active labor” before beginning water immersion, and the definition of active labor has changed recently, adding further confusion. Also, on average, mothers giving birth for the first time may have longer labors, and this was not always figured into the study results.

Finally, in an observational study, Vanderlaan (2017a) found that people who spent more time laboring in water were also more likely to be removed from the pool before giving birth, for medical reasons. Those who went on to give birth in the water, on the other hand, had shorter labors, and thus spent less time in the water. At first glance, it seems that a shorter period of water immersion leads to fewer labor complications; but actually, it's that people with faster, more straightforward labors just spend less time in the water.

### Length of the First Stage of Labor

The Cluett and Burns (2009) Cochrane meta-analysis found that people who labored in water experienced a shorter first stage of labor by an average of 32 minutes compared with people who labored on land. The results on the length of the first stage of labor for people who give birth in water are mixed. Three out of five research studies showed that people who had waterbirths had a shorter first stage of labor compared to those who had land births ([Zanetti-Daellenbach et al., 2007a](#); [Chaichian et al., 2009](#); [Torkamani et al., 2010](#)). One study found no difference in the average length of the first stage of labor between waterbirths and land births ([Menakaya et al., 2013](#)). In another study, researchers found that there was a longer first stage of labor during waterbirth—both for people who had given birth before and for those who were giving birth for the first time ([Mollamahmutoglu et al., 2012](#)).

### Length of the Second Stage of Labor

Research results on the length of the second stage are also mixed. Three research teams found that people who had waterbirths had shorter pushing phases ([Zanetti-Daellenbach et al., 2007a](#); [Torkamani et al., 2010](#); [Mollamahmutoglu et al., 2012](#)), while two groups found no difference between waterbirths and land births in the length of the second stage ([Chaichian et al., 2009](#); [Menakaya et al., 2013](#)). Only one study separated out people who had given birth before and those who were giving birth for the first time. They found that in both of these groups, the average length of the second stage was shorter in waterbirths ([Mollamahmutoglu et al., 2012](#)).

### Length of the Third Stage of Labor

Only four research teams have compared the length of the third stage of labor between waterbirths and land births, and again the results are mixed. Two of the studies found that the third stage was shorter ([Chaichian et al., 2009](#); [Mollamahmutoglu et al., 2012](#)), one research study reported a longer third phase ([Zanetti-Daellenbach et al., 2007a](#)), and one study found no difference in the length of the third stage ([Thoeni et al., 2005](#)). These results are confused by the fact that some researchers required participants to get out of the pool to birth the placenta ([Mollamahmutoglu et al., 2012](#)); while in other studies they didn't say whether people got out of the pool during the third stage. The way care providers handled the third phase of labor was probably different from study to study, but it is difficult to tell because the management style was usually not recorded.





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No studies have compared giving birth to the placenta in the pool versus on land.

### Postpartum Blood Loss

The Nutter et al. (2014a) review concluded that people who give birth in water experience either less total blood loss or equal blood loss to people who give birth on land. The Gayiti et al. (2015) trial found no difference in volume of lost blood between groups. In another study, researchers found that people who gave birth on a birthing stool on land were two times more likely to have a postpartum hemorrhage than those who had waterbirths, even after taking into account birth weight, whether the mother had given birth before, the length of the second stage, whether the care provider was a midwife or OB, and whether the mother had any perineal trauma (Dahlen et al., 2013).

### Upright Birth Positioning

In the Henderson et al. (2014) study, researchers compared a small subgroup of people who used the birthing pool at some point during labor to those who did not use the pool at all because it was not available or they did not want to use it. They found that people who used the pool were more likely to have an upright birth position and a hands-off delivery technique (defined below). When the researchers looked at everyone who actually birthed in water (1,519 people), they found that 87% of them used upright positioning during birth.

### Hands-off Delivery

*Hands-off (or poised)* means that the care provider does not routinely touch the baby's head or the mother's perineum as the baby is coming out. The opposite technique is called *hands-on (or guarding)*, in which case the attendant's hands are used to support the perineum and/or fetal head and encourage the baby to come out in an "unhurried" way.

The hands-off delivery method is frequently preferred in clinical guidelines for waterbirth (RCOG/RCM 2006; [Nutter et al., 2014b](#)). In the large Henderson et al. (2014) study, researchers found that 79% of people who had waterbirth had a hands-off delivery.

In research not looking at waterbirth, a recent Cochrane meta-analysis of 20 studies (involving over 15,000 participants) did not find a difference between hands-on and hands-off technique in the rate of intact perineum or perineal tears of any degree ([Aasheim et al., 2017](#)). They did find, however, that the participants who gave birth with the hands-off technique had 42% less risk of an episiotomy.

### Satisfaction

The Nutter et al. (2014a) review concluded that waterbirth is linked to reports of a better overall experience of childbirth compared with land birth. In one study, 72.3% of people who had waterbirths stated that they would certainly choose this method of giving birth again, while only 8.7% of those who had land births would choose that method of giving birth again ([Torkamani et al., 2010](#)).

In 2003, a researcher conducted a study with 170 mothers who had completed waterbirths at five birthing centers in England during the years 1993-1994. The mothers were asked to respond to a written survey about their experience with waterbirth ([Richmond, 2003](#)). In their responses, the majority of people described their waterbirth as "quite pleasurable" or "very pleasurable and fulfilling." Most people (81%) were in favor of having another waterbirth in the future. When asked to describe their feelings when they entered the pool, mothers used the words *relaxation*, *relief*, *pain relief*, *warmth*, *buoyancy*, *control*, and *calming*. When people who had given birth before were asked to describe how their waterbirth was different from previous births, mothers said they felt more in control, and that the





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waterbirth was more relaxing and less painful. Fewer people voiced dislikes about waterbirth. A small number said that they got cold or the baby got cold, that their contractions went away, or that staff were not supportive. Two-thirds of the mothers commented that the best part of waterbirth was that no one took their babies away from them right after the birth.

## Pelvic Floor Function

Only one study has looked at the effects of waterbirth on pelvic floor function. Using ultrasound tests, Mistrangelo et al. (2007) found no differences in pelvic floor function at six months postpartum between 25 first-time mothers who had waterbirths and 27 first-time mothers who had land births.

## Maternal Transfers to Hospital and Hospitalizations

The large MANA Stats study found that people who had waterbirths in homes and birth centers had fewer transfers to the hospital after the birth and fewer hospitalizations in the first 6 weeks postpartum compared to people who had land births out-of-hospital ([Bovbjerg et al., 2016](#)).

## Maternal Infection

The MANA Stats study shows that waterbirth does not appear to increase the risk of maternal infections compared to land birth ([Bovbjerg et al., 2016](#)). The findings from the Nutter et al. (2014a) review agree with this conclusion.

## Pros and Cons of Waterbirth for Newborns

In the next section of this article, we cover the effects of waterbirth on newborns. We have organized the evidence by the relationship between waterbirth and the following newborn health outcomes:

The evidence we discuss for each of these outcomes comes from one or more meta-analyses—studies

- Newborn Death
- Apgar Scores
- Breathing Difficult
- Umbilical Cord pH
- Shoulder Dystocia
- Newborn Infections
- Group B Strep
- NICU or Special Care Nursery Admissions
- Newborn Transfers to Hospital and Hospitalizations
- Newborn Microbiome
- Umbilical Cord Tears
- Newborn Resuscitation
- Newborn Hypothermia

that combine the evidence from many studies to look at the effects of waterbirth on infants. We primarily refer to the Vanderlaan et al. (2017) meta-analysis, because they covered the largest number of studies. In some cases, we also include results from individual studies that have reported on that outcome.

## Newborn Death

Four studies in the Vanderlaan et al. (2017) meta-analysis reported on newborn death. Vanderlaan et al. (2017b) found no statistical difference in the odds of newborn death between waterbirth and land birth; however, four studies may be too few to find a difference for such a rare outcome.

There was one death in a waterbirth group. It was considered to be due to a pre-existing uterine infection and not related to the waterbirth ([Nikodem, 1999](#)). The baby was born to a mother who was HIV positive and had been treated for heavy vaginal discharge and burning two weeks before the birth. Right after the birth, the baby appeared healthy and breastfed well. However, about three hours after





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the birth, hospital staff observed that the baby was not breathing. Attempts to revive the baby were not successful. The mother declined autopsy, but the doctors suspect that the death was most likely due to a pre-existing uterine infection, and not due to the waterbirth.

The Taylor et al. (2016) meta-analysis reported 27 newborn deaths (water and land) from 10 studies that included 31,368 total participants. The researchers did not report the exact number of infant deaths from waterbirths versus land births since the studies were of such mixed quality and design that it was impossible to combine the data in a meaningful way (Personal correspondence, Taylor, 2017). However, they did report that they did not find any increased risk of newborn death with birth in water compared to birth on land.

The MANA Stats study of mostly out-of-hospital births in the U.S. also found no evidence of increased risk of newborn death from waterbirth, although the number of deaths was too small to draw firm conclusions (Bovbjerg et al., 2016). There were nine newborn deaths out of the 10,290 people who gave birth on land. Six of these infants died before 7 days of life, and three died after 7 days of life but before they reached 28 days old. The 1,573 people who intended to give birth in water but gave birth on land experienced three newborn deaths, two occurred in the first week and one occurred later in that first month. Among the 6,534 people who gave birth in water, there were three newborn deaths, two occurred in the first week, and one occurred later in the first month. The deaths were caused by hypoxic ischemic encephalopathy (lack of oxygen to the brain), congestive heart failure, and unknown causes (no autopsy). The authors believe that none of the three deaths of the infants born in water were caused by the waterbirth.

### Apgar Scores

Assessing the Apgar scores is a way to quickly check the health of a newborn baby at one and five minutes, and scores can range from 0 to 10. Apgar scores of 7 or higher are considered to be normal. The Vanderlaan et al. (2017b) meta-analysis included 17 studies that reported 5-minute Apgar scores and did not find a difference between waterbirths and land births. They were not able to combine the data on 1-minute Apgar scores because the results for this outcome varied so much between studies.

The Taylor et al. (2016) meta-analysis of 26 studies that reported this outcome did not find a difference in Apgar scores at one and five minutes between babies born into water versus on land.

The MANA Stats study also reported no difference between waterbirth and land birth groups in Apgar scores < 7 at five minutes (Bovberg et al. 2016). However, they found that newborns whose mothers had intended to have a waterbirth but did not have one had an increase in the odds of a five-minute Apgar score less than seven. That is not surprising since the intended waterbirth group is made up of the people who left the pool for some reason, possibly because they needed to be watched more closely due to a problem with the birth.

### Breathing Difficulty

Five studies in the Vanderlaan et al. (2017b) meta-analysis reported on this outcome. Overall, the results favored waterbirth—the odds of breathing difficulty were less for babies born underwater. However, a single large study was responsible for contributing half of the data; when that study was removed, there was no difference in the rate of breathing difficulty between waterbirth and land birth. It doesn't make sense that waterbirth would reduce the odds of breathing difficulty. Instead, this finding likely means that care providers exercised caution and removed people from the pool when they suspected fetal problems.





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## NICU or Special Care Nursery Admissions

Data on this outcome was reported in 17 of the studies included in the Vanderlaan et al. (2017b) meta-analysis. Overall, the results favored waterbirth, showing the odds of NICU admission to be less after waterbirth. As with the above outcome, this was likely due to higher-risk births occurring on land after mothers were asked to exit the pool due to problems. When the reviewers looked at only the highest quality studies, they did not find a difference between waterbirth and land birth groups.

In the MANA Stats study, fewer infants in the waterbirth group required NICU admission in the first six weeks of life (1.4%), compared to the land birth group (2.4%), and the intended waterbirth group (2.9%). This again suggests that waterbirth was only used with the healthiest childbearing families.

## Newborn Transfers to Hospital and Hospitalizations

The MANA Stats study found that infants who were born into water were less likely to transfer to the hospital (from the home or birth center) for a newborn health problem directly following the birth compared to infants born on land (0.5% versus 1.2%) and less likely to have to go to the hospital in the first six weeks of life (3.4% versus 4.5%). As would be expected from their elevated risk status, the newborns in the intended waterbirth group went to the hospital most often following the birth (1.6%) and in the first six weeks (5.5%).

## Umbilical cord pH

Higher umbilical cord blood pH results are considered to mean a newborn is healthier. Vanderlaan et al. (2017b) found that seven studies showed no difference between waterbirth and land birth groups.

## Shoulder Dystocia

Shoulder dystocia occurs when the baby's head passes through the birth canal but the baby's shoulders become stuck. All four studies in the Vanderlaan et al. (2017b) meta-analysis that examined this outcome found no difference in the rate of shoulder dystocia between waterbirth and land birth.

## Newborn Infections

Vanderlaan et al. (2017b) divided the data on infections into pneumonia and non-pneumonia infections. Four studies provided data on pneumonia infections; there was no difference between waterbirth and land birth. Data on non-pneumonia infections came from 13 studies. They found lower odds of non-pneumonia infections with waterbirth compared to land birth; however, looking only at the highest quality studies, there was no difference in the rates between waterbirth and land birth.

Eleven studies in the Taylor et al. (2016) meta-analysis reported on newborn infection rates after waterbirth. Ten of the studies found no difference between waterbirth and land birth groups. One observational study of 3,617 waterbirths found more infections in the infants born on land (1.0% vs. 0.6%) and fewer newborn eye infections in the waterbirth group compared to the land birth group (0.4% versus 0.8%) (Geissbuehler et al., 2004).

## Group B Strep

There is limited evidence on the relationship between waterbirth and group B strep. In one study, researchers took nasal and throat swabs from 139 infants who were born in the water and 84 infants who were born on land after their mothers labored in water (Zanetti-Dallenbach et al., 2007b). The samples were collected within one hour of birth, before washing or any breastfeeding. They also collected samples of pool water after each birth. About one-fourth of the mothers were positive for





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Group B Strep, according to swabs done after 37 weeks. The article didn't say whether the mothers had received antibiotics, but when I contacted the researchers, they told me that they had received antibiotics during labor for GBS.

There was more GBS in the pools in which waterbirths had taken place compared with the pools used only for immersion during the first stage of labor. However, infants who were born in the water were less frequently colonized with GBS than those born on land. Nasal swabs were positive for GBS in 11.7% of the land birth group compared to 1.5% of the waterbirth group. And throat swabs were positive for GBS in 8.4% of the land birth group compared to 1.4% of the waterbirth group.

Although this study seems to support the theory that waterbirth may “wash away” harmful group B strep bacteria, only a very small number of people were actually GBS carriers in this study. Also, there is a difference between GBS colonization and GBS infection; newborns may have the bacteria present on their skin without it causing problems, much like their parents may carry GBS without having symptoms. We would need a very large study to see if there are differences in GBS infection rates between infants born in the water and those born on land. This one small study does not give us that information. See the [Evidence Based Birth article on Group B Strep](https://evidencebasedbirth.com/groupbstrep/) (<https://evidencebasedbirth.com/groupbstrep/>) to learn more about the difference between GBS colonization and GBS infection.

### Newborn Microbiome

One of the potential risks of waterbirth is that it could change the first bacteria that grow in the newborn's intestine, leading to changes in the early development of the gut microbiome. This is thought to occur after Cesarean and has been linked to disorders of the immune system and obesity in childhood ([Taylor et al., 2016](#)). Research has yet to answer the question of the effects of waterbirth on the normal, healthy bacteria to first colonize the newborn microbiome, as well as the harmful bacteria that cause disease.

In one study, Fehervary et al. (2004) swabbed the mouths and ears of newborns right after water birth (34 infants), land birth with pool use prior to birth (26 infants), and land birth with no pool use (34 infants). They found no major differences in bacterial flora between the three groups. The most common bacteria in all three groups were *Staphylococcus epidermidis*, *Escherichia coli*, and *Enterococci*. Two types of bacteria were observed only after land birth: *Corynebacteriaceae* (five swabs in the land birth groups) and *Proteus spp* (two swabs in the land birth groups). Rarely, two types of bacteria were seen only after waterbirth or water immersion: Group B *streptococcus* (one swab in the waterbirth group; one swab in the land birth with pool use prior to birth group) and *Citrobacter spp* (one swab in the waterbirth group).

### Umbilical Cord Tears

In 2014, Schafer reviewed all published cases of waterbirth umbilical cord tearing. An umbilical cord tear is also called umbilical cord “snap,” “rupture,” or “avulsion.” The author estimated that there are about 3.1 umbilical cord snaps per 1,000 waterbirths. Out of all the cases of umbilical cord snap, about 23% lead to NICU admission, 13% lead to the need for a newborn blood transfusion, and there have been no reports of any long-term harmful effects.

Burns et al. (2012) reported 20 umbilical cord snaps in a study with 5,192 waterbirths and 3,732 land births where people left the tub before giving birth. Eighteen out of these twenty snaps occurred during waterbirth. Unfortunately, we cannot compare the overall numbers of umbilical cord snap between waterbirths and land births, because other than the Burns et al. (2012) study, there have been no studies that describe how often umbilical cord snaps happen on land.







# Evidence on: Waterbirth

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## Newborn Resuscitation

Six studies in the Vanderlaan et al. (2017b) meta-analysis provided data on the need for resuscitation between waterbirth and land birth. The researchers did not find a difference in this outcome between groups, even after restricting to only the highest quality studies.

## Newborn Hypothermia

Four studies in the Vanderlaan et al. (2017b) meta-analysis provided data on newborn hypothermia, or a dangerous drop in body temperature after exposure to cold temperatures. The results favored waterbirth, showing a decrease in the odds of hypothermia among babies born in the water. However, there was no longer a difference between groups once the data was restricted to only the highest quality studies.

## What rare adverse events have been seen in case reports?

A number of researchers have published case reports of individual infants who have had bad effects possibly caused by waterbirth—and in some cases definitely caused by waterbirth.

It's important to understand that there are different types of case reports. When a case report is formally published as a peer-reviewed article in a scientific journal, it is called a *case study*. Case studies are used to describe a rare event in great detail so that other health care professionals can learn from that rare event. However, some case reports are published as *letters to the editor*. These brief letters to the editor are not peer-reviewed. They often lack enough detail to get a clear picture of what really happened.

The pros of case reports are that they allow us to take an in-depth look (or brief look, in the case of letters to the editor) at a rare event. We can learn lessons from the case study that can help us improve the quality of care for birthing people and infants in the future.

The main drawback of case reports is that they are not a research study. When researchers publish a case report of a rare event, there is no way for us to know how often an event like that has occurred. Also, some of the case reports about waterbirth are incomplete—they barely give us any information about the type of care that the mother and infant received during the waterbirth.

**To help you understand the case reports that have been published on waterbirth, we have included Table 2 (page 25) with their findings.**

## What can we learn from these case reports?

If you read the case reports, most of the authors do not call for a ban on waterbirths. Instead, they make recommendations to improve safety and informed consent. Some of their recommendations are:

- *Pseudomonas* can be found in water supplies both in hospitals and in the community, and it can cause severe infections in newborns. Plastic tubing is the perfect environment for *Pseudomonas* to grow, especially if the strain of bacteria is resistant to disinfectants (Vochem et al., 2001). Providers who offer waterbirth in facilities may want to take frequent cultures from the birthing pool system or after each water birth, shorten the length of filling and exit hoses, and heat disinfect hoses after each use (Rawal et al., 1994).
- Track outcomes in hospitals that provide waterbirth as an option (Nguyen et al., 2002)
- Track infection rates of mothers and infants, and have policies in place to prevent infections, such as pool maintenance, decontamination, and universal precautions (Franzin et al., 2004)





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- As part of the informed consent process, inform pregnant mothers who are interested in waterbirth that although very rare, it is possible for infants to try to breathe under water, even if they only have a very brief submersion (Hagadorn et al. 1997)
- Caution should be used if a mother with a recent diarrheal illness is considering a waterbirth (Soileau et al., 2013)
- Spa-like pools that have both a heater and a re-circulation pump contain complex plumbing that can promote the growth of bacteria and be difficult to disinfect. The environment is especially risky when the tubs are filled in advance of labor and held at a warm temperature. A rigid or inflatable pool that is filled at the start of labor poses less of a risk for bacterial infections (Collins et al., 2016).

### Can you summarize the pros and cons for me?

Research evidence shows that there are both potential benefits and risks with waterbirth. Some of these findings partly reflect the effect of water immersion during labor, before the birth.

#### Potential benefits of waterbirth

- Less pain and higher satisfaction with the birth experience
- Less medication use for pain relief—this may be important for people who want or need to avoid epidurals or narcotic medications during labor
- Less use of artificial oxytocin and possibly shorter labors
- Higher rates of normal vaginal birth
- Lower rates of episiotomy
- Higher rates of intact perineum, especially in high-episiotomy settings
- Possibly lower rates of severe tears (3<sup>rd</sup> or 4<sup>th</sup> degree), especially in high-episiotomy settings
- Possibly lower rates of postpartum hemorrhage

It is not clear if waterbirth provides any health benefits to newborns. The studies we have are complicated by the fact that care providers help some mothers out of the pool for medical reasons—leaving the more straightforward births to take place in the water.

#### Potential risks of waterbirth

- We need more research evidence on waterbirth, so this makes it more difficult to make a truly informed choice.
- There may be a higher rate of mild labial tears from waterbirth in low-episiotomy environments such as homes and birth centers
- Umbilical cord snap is a rare but possible occurrence. Care providers need to take care not to place too much traction on the cord when guiding the infant out of the water and identify the source of any bleeding immediately.
- There have been several case reports of water aspiration. These cases have not been observed in prospective research since 1999, and almost all of the infants in the case reports made a complete recovery.
- Although large research studies have not shown any increase in the risk of infection, there have been several case reports of infections after waterbirths. This risk can be lowered by using pools that are easy to disinfect, filling tubs closer to the time of the birth, and regularly testing hospital water supply, hoses, and birthing pools.





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### What is the bottom line?

New research evidence on waterbirth is continuing to emerge! For mothers, there are several benefits associated with waterbirth. There is strong evidence that waterbirth is associated with a lower episiotomy rate, and that people who use waterbirth in high-episiotomy environments will have higher rates of intact perineums. However, there is some evidence that when waterbirth takes place in environments with low rates of episiotomy, such as midwife-led births in homes and birth centers, waterbirth may increase the odds of sustaining minor tears compared with land birth. People who have waterbirths also use less medicine for pain relief compared with people who give birth on land and report higher levels of satisfaction with pain relief and the experience of childbirth. Studies show that some of the benefits found with waterbirth may also be achieved from water immersion during labor.

The benefits or risks of waterbirth for the newborn are less clear, but so far the evidence shows no increase in newborn death or any other bad health outcome including NICU admissions, low Apgar scores, breathing difficulty, need for resuscitation, infections, umbilical cord pH, or hypothermia.

Based on the data that we have, waterbirth is a reasonable option for low-risk people during childbirth, provided that they understand the potential benefits and risks. If a pregnant person has a strong desire for waterbirth, and there are experienced staff who are comfortable in attending waterbirths, then at this time there is no evidence to deny people this option of pain relief.

Finally, although more research on waterbirth is needed, current evidence shows that hospital “bans” on waterbirth are not evidence-based.

### Free Resources:

- The ACNM created a two-page handout on waterbirth, written for families. To access this printer-friendly PDF handout, [click here](http://bit.ly/2Ebopwe) (<http://bit.ly/2Ebopwe>).
- The Royal College of Midwives released a response to 2014 ACOG/AAP Opinion Statement. To access this printer-friendly Word document, [click here](http://bit.ly/2ndhaNc) (<http://bit.ly/2ndhaNc>).
- A 2014 article in the Journal of Midwifery and Women’s Health contains information about waterbirth fundamentals for care providers, a sample informed consent document, and a sample hospital policy. Available with some medical library subscriptions (check with your institution) or for purchase. [Click here](http://bit.ly/2EbjRpJ) (<http://bit.ly/2EbjRpJ>).
- In the process of writing this article, I purchased several waterbirth books from Amazon. By far, the most evidence-based book that I read was Diane Garland’s “Revisiting Waterbirth: An Attitude to Care.” It was originally written for midwives, but expecting parents will also find this book helpful. [Click here](http://amzn.to/2BwSaEN) (<http://amzn.to/2BwSaEN>).
- Several waterbirth experts offer online and on-site trainings for birth attendants and hospitals who want to offer hydrotherapy during labor and birth or improve their current practices:
  - Midwife Experts at Waterbirth Works (Jenna Shaw-Battista and Liz Nutter): Visit them on [Facebook](http://bit.ly/2Ebpyny) (<http://bit.ly/2Ebpyny>) or email [communitymidwife@gmail.com](mailto:communitymidwife@gmail.com) for more information
  - Waterbirth International (Barbara Harper): [Click here](http://bit.ly/2BvYts8) (<http://bit.ly/2BvYts8>), or email [info@waterbirth.org](mailto:info@waterbirth.org) for more information.





# Evidence on: Waterbirth

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**Table 1: Randomized, controlled trials of waterbirth**

Author (Year)	Sample	Randomization	Results	Notes
Nikodem 1999 (Thesis)	Low-risk people >36 weeks gestation giving birth at one of two hospitals in South Africa	60 people were randomly assigned to waterbirth and 60 people were randomly assigned to land birth  59 people in the waterbirth group completed a waterbirth (1 person got out for a vacuum-assisted birth)	<b>Maternal Outcomes:</b> The waterbirth group reported greater satisfaction (78% vs. 58%) and were more likely to report that the pain was less than they expected it to be (57% vs. 28%). There were no differences in trauma to the birth canal and there were no adverse maternal affects.  <b>Newborn outcomes:</b> This study didn't measure newborn outcomes but did report that one death occurred in the waterbirth group. The death was not attributed to the waterbirth; it was most likely due to a pre-existing uterine infection.	Unpublished dissertation; No immersion in water was used during the first stage of labor
Woodward and Kelly (2004)	Low-risk people >37 weeks gestation with no prior Cesarean giving birth at a hospital in the U.K.	40 people were randomly assigned to waterbirth and 20 people were randomly assigned to land birth; an additional 10 people were assigned to a "waterbirth preference group" and 10 people to a "land birth preference group"  Only 10 out of the 40 people who were randomly assigned to the waterbirth group actually gave birth in the water. And only 5 of the 10 people in the "waterbirth preference group" actually ended up having a waterbirth.	<b>Maternal outcomes:</b> No differences between groups  <b>Newborn outcomes:</b> No differences other than a lower cord arterial carbon dioxide in the waterbirth group; however, most of the people in this group did not actually give birth in water so the result must be viewed with caution	Data were analyzed according to the participants' assigned groups (which is problematic since they didn't stay in those groups), so it is difficult to draw any conclusions from this study.





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<p>Chaichian et al. 2009</p>	<p>Low-risk people 37-42 weeks gestation with no prior Cesarean giving birth at a hospital in Iran; mostly people who had given birth before</p>	<p>53 people were randomly assigned to waterbirth and 53 people were randomly assigned to land birth.</p> <p>Everyone who was randomly assigned to the waterbirth group gave birth in the water.</p>	<p><b>Maternal outcomes:</b></p> <ul style="list-style-type: none"> <li>Higher rates of normal vaginal births (100% vs. 79.2%)</li> <li>Shorter active phase of the first stage (114 minutes vs. 186 minutes)</li> <li>Shorter third stage (6 minutes vs. 7.3 minutes)</li> <li>Lower oxytocin use (0% vs. 94.3%)</li> <li>Lower use of analgesics (3.8% vs. 100%)</li> <li>The episiotomy rate was 23% higher in the land birth group and perineal tears were 12% higher in the waterbirth group</li> <li>No differences in the length of the second stage or the rate of breastfeeding</li> </ul> <p><b>Newborn outcomes:</b> No differences between groups</p>	<p>The study did not report the rates of interventions (such as epidurals) in the land birth group</p>
<p>Ghasemi et al. 2013 <i>[Persian]</i></p>	<p>Low-risk people giving birth at a hospital in Iran</p>	<p>100 people were randomly assigned to waterbirth and 100 people were randomly assigned to land birth.</p> <p>The final results included 83 people in the waterbirth group and 88 people in the land birth group. People were excluded if they decided to not continue in the study. It is not clear why someone would opt out of the study during labor—perhaps to crossover to the other group or to receive pain medication.</p>	<p><b>Maternal outcomes:</b> Fewer people in the waterbirth group had Cesareans compared to the land birth group (5% versus 16%). People in the waterbirth group reported less pain with labor compared to the land birth group.</p> <p><b>Newborn outcomes:</b> There was less meconium in the mother's amniotic fluid with waterbirth (2% versus 24%). There were also fewer low Apgar scores with waterbirth compared to land birth.</p>	<p>It is not clear if the participants were first-time mothers or experienced mothers.</p> <p>People in the waterbirth group could drink freely and move around while people in the land birth group were not allowed to drink and were confined to bed.</p>
<p>Gayiti et al. 2015</p>	<p>Low-risk, first-time mothers &gt;38 weeks gestation giving birth at a hospital in China</p>	<p>60 people were randomly assigned to waterbirth and 60 people were randomly assigned to land birth.</p> <p>Everyone who was randomly assigned to the waterbirth group gave birth in the water.</p>	<p><b>Maternal outcomes:</b> The waterbirth group had more intact perineum (25% vs. 8%), lower episiotomy (1.7% vs. 20%), and lower pain scores. The length of labor was also shorter in the waterbirth group by an average of 50 minutes. There was no difference in volume of lost blood between groups.</p> <p><b>Newborn outcomes:</b> There was no difference in Apgar scores at one and five minutes between groups.</p>	<p>Only the land birth group had IV fluids, artificial rupture of membranes and continuous fetal monitoring.</p>







## Table 2: Case Reports on Waterbirth

First Author	Type of Report	Country	Case	Note
Rosser (1994)	Magazine article	The cases took place in Austria, England, and Sweden	This magazine article described 3 stories about newborn drownings: 1) The parents did not remove the infant from the water until 25 minutes after the birth, 2) An infant was born on dry land but still inside the membranes, and the parents did not know how to remove the infant from the membranes, 3) A baby died after a home waterbirth attended by 2 experienced midwives. The baby showed no signs of stress during labor, but was born with severe respiratory distress and made breathing movements as it came up to the surface.	This article was not a case report but was a magazine story.  It was cited as case report evidence of two “waterbirth drownings” in the Pinette et al. (2004) review article entitled the “Risks of underwater birth,” published in the <i>American Journal of Obstetrics and Gynecology</i> .
Rawal (1994)	Case report	England	A male infant was born at term and developed a <i>Pseudomonas</i> blood infection after a hospital waterbirth. Culture samples from the birthing tub, filling hose, taps, exit hose, and disposable lining of the tub all grew <i>Pseudomonas</i> . Within two days he made a complete recovery, and he was discharged after being treated with antibiotics for seven days.	The authors stated that there should be regular laboratory testing of birthing tubs and strict infection control policies. Before this case, their hospital policy was to wash the system with hot water and detergent and allow it to dry after each birth. Now, they take cultures from the birthing tub system after each water birth, keep the filling and exit hoses short, and heat-disinfect the hoses after each use.
Barry (1995)	Letter to the editor	England	After a waterbirth, the newborn had some difficulty breathing and a seizure. A laboratory work-up revealed hyponatremia (low sodium levels). It was thought that the hyponatremia may have been due to inhaling fresh water.	No other details were provided about the infant or the birth.





# Evidence on: Waterbirth

Hagadorn (1997)	Abstract	U.S.	<p>A male infant was born at 38 weeks in a waterbirth in a disinfected outdoor hot tub at home, attended by a midwife. He was admitted to the NICU shortly after birth for respiratory distress. Chest x-ray showed fluid in the lungs, and he was intubated at 16 hours of age and received 3 doses of surfactant, after which his breathing improved. Cultures of a specimen from his trachea grew “scant but pure growth” of <i>Berkholderia picketti</i>, an organism usually found in water. The <i>Berkholderia picketti</i> was not present in any cultures of the hospital water. Cultures later taken from the tub in which the infant was born grew <i>Berkholderia picketti</i>. The infection did not spread to the baby’s bloodstream. He remained on a ventilator for 5 days, had 14 days of antibiotics, and his symptoms resolved completely.</p>	<p>The infant’s final diagnosis was aspiration pneumonia, which contributed to a surfactant deficiency, and incidental colonization of the trachea with <i>B picketti</i>. The organism was not the cause of the respiratory symptoms—however, the fact that the same rare organism was present in the tub and present in his trachea “is compelling evidence that he aspirated tub water during the delivery.”</p>
Parker (1997)	Letter to the editor	U.S.	<p>A female infant who was born in the water at 37 weeks gestation, attended by a CNM. At age 19 days, the infant presented with a one-week history of yellow drainage from the right ear. The infant was alert, vigorous, and had no fever or any other signs of illness. The ear drum was ruptured and the culture was positive for <i>Pseudomonas</i> and rare <i>E coli</i>. The infant’s blood cultures were positive for <i>Pseudomonas</i>. The infant received two weeks of intravenous antibiotics and had a normal follow-up one month after completion of therapy.</p>	<p>It is not clear whether the facility was a hospital or birth center. No culture or lab samples were available from the birthing tub where the infant was born. The facility closed before this letter to the editor was written.</p>





## Evidence on: Waterbirth

Vochem (2001)	Case report	Germany	<p>A 23 year old mother took a 30-minute tub bath at term. Later that day she gave birth to a male infant, on land. At 11 days, the baby was not feeding well, was lethargic, and had seizures. He was diagnosed with <i>Pseudomonas aeruginosa</i> meningitis and underwent immediate treatment with antibiotics. At nine months of age, he has normal psychomotor development. <i>Pseudomonas</i> bacteria cultured from the shower tubing at home were genetically identical to bacteria present in the infant's cultures.</p>	<p>This was not a waterbirth, although it is cited as a complication of waterbirth in the Pinette et al. (2004) review article published in the <i>American Journal of Obstetrics and Gynecology</i>. It is impossible to tell if the infant was contaminated because of the mother's tub bath before giving birth or if he was contaminated at some other point prior to developing meningitis at 11 days of age.</p>
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# Evidence on: Waterbirth

<p>Nguyen (2002)</p>	<p>Case study</p>	<p>New Zealand</p>	<p>Four infants who experienced complications from water birth and were transferred to their facility:</p> <ol style="list-style-type: none"> <li>1. An infant with respiratory distress was transferred to their facility after an accidental waterbirth. The mother initially hid the waterbirth from the providers. The infant was thought to have aspirated water but made a complete recovery.</li> <li>2. After a waterbirth, an infant developed respiratory distress at 6 hours and was transferred to the NICU. The mother initially hid the water birth. Chest x-ray showed fluid in the lungs. The infant made a complete recovery within 24 hours.</li> <li>3. The third infant was born at term during a planned waterbirth. He was vigorous at birth but needed resuscitation at 5 minutes of age. Chest x-ray showed fluid in the lungs. The infant made a rapid improvement over 24 hours.</li> <li>4. The fourth infant was born at term during a planned water birth, had normal Apgars, but developed respiratory distress at 10 minutes and needed respiratory support. Chest x-ray showed fluid in the lungs. The infant improved dramatically over 24 hours.</li> </ol>	<p>It is not clear whether the infants were born at home or in the hospital, and it is possible that several of the births were unattended. The authors provided no information on whether safety procedures were followed during the waterbirth; for example, it is not known how long the infants were submerged in the water before being lifted up to the surface. They also did not report water temperature.</p>
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# Evidence on: Waterbirth

Bowden (2003)	Letter to the editor	U.S.	<ol style="list-style-type: none"> <li>1. A 37-week gestation male infant was born in a hospital tub. Water inhalation was suspected but not confirmed.</li> <li>2. A male infant born at home in a bathtub, developed seizures at 8 hours of age, and was diagnosed with hyponatremia and probable water intoxication.</li> <li>3. A female infant, born in the water in a hospital tub, was diagnosed as having no left lung, no left kidney, and a heart defect. 4. An infant born at home in a bath tub was admitted at 4 days of age with group B strep meningitis.</li> </ol>	<p>Only the first two cases appear to be related to water birth. The authors did not present the cases thoroughly. It is not known whether the cases reported are directly due to the water birth, or if standard safety procedures were followed. No other details about these births were provided, including whether or not the infants recovered.</p>
Nagai (2003)	Case report	Japan	<p>A 42-week infant girl was born unassisted (no midwife present) in a bathtub in her home. The home was installed with "ever-ready" hot water system in which hot water is always circulating through the plumbing. The infant had a normal assessment at birth but developed a fever and jaundice on day 4 of life. She was admitted to the hospital for phototherapy and discharged the next day. On day seven the infant was vomiting and had a fever, and the next day she stopped breathing. She was transported to the emergency room, where she was unable to be resuscitated. An autopsy showed <i>Legionella</i> lung disease. In an environmental investigation, the bathtub laboratory tests were positive for numerous <i>Legionella</i>.</p>	<p>The authors attribute this case to the 24-hour "always ready" bathing system. In these systems, the same water is used over and over for days or months, and kept at a warm temperature. Even though the water may be filtered, heated, chemically disinfected, or have UV light disinfection, some organisms may survive. The water may be clean enough for normal bathing, but it is not clean enough for drinking or use by newborn infants.</p>
Franzin (2004)	Case study	Italy	<p>A newborn developed <i>Legionella</i> pneumonia 7 days after a hospital waterbirth.</p>	<p>The entire hot water supply of the hospital was positive for <i>Legionella</i>, and the bacteria were present in very high numbers.</p>





## Evidence on: Waterbirth

Kassim (2005)	Case study	United Kingdom	A 40-week gestation infant developed respiratory distress after a hospital waterbirth. The baby did not need resuscitation at birth, but at one hour he was grunting and was admitted to the NICU with respiratory distress. A chest x-ray showed changes consistent of aspirating water. The infant made a complete recovery.	The authors did not report whether standard safety procedures were followed during the waterbirth.
Byard (2010)	Case study	Australia	A 42-week gestation infant died of meconium aspiration and <i>Pseudomonas</i> pneumonia after a home waterbirth	The <i>Pseudomonas</i> infection was thought to have come from the birthing pool, although no laboratory tests were done on the pool or water.
Dressler (2011)	Case study	Germany	The authors described three drownings: two after waterbirth and one after a shower birth. In all three cases, the drownings were likely intentional, although investigators were not able to prove it. All three women had hidden pregnancies, had no prenatal care, had unassisted births, and one of the women did not even know she was pregnant when she birthed into the tub.	These were criminal cases in which mothers were thought to have intentionally drowned their newborns.
Soileau (2013)	Case report	U.S.	A female infant was born at 40 weeks and 4 days via a planned waterbirth at home. The mother had diarrhea and a low-grade fever for one week before giving birth. She had a bowel movement in the water prior to the baby's birth. The infant was healthy until 4 days of age when she developed a fever, was hospitalized, and diagnosed with sepsis and adenovirus. The infant's condition grew worse and she died shortly after the parents decided to withdraw medical support. Autopsy results showed adenoviral pneumonia, bleeding in the colon, and multi-organ failure.	Newborn adenovirus infections are very rare and few cases have ever been described. It is thought that the mother typically transfers immune protection for adenovirus to the fetus through the placenta, which is why newborns do not usually get this illness. The authors propose that this newborn's infection was transmitted during the waterbirth since the mother had an infectious bowel movement (diarrhea) in the water bath immediately prior to delivery. Because the water was heavily contaminated, this increased the newborn's risk of contact with the virus.





# Evidence on: Waterbirth

Schafer (2014)	Systematic review of all case reports of umbilical cord tears during waterbirth	N/A	The authors reviewed all published cases of waterbirth umbilical cord tearing. An umbilical cord tear is also called umbilical cord “snap,” “rupture,” or “avulsion.” Based on their review, they estimated that there are about 3.1 umbilical cord snaps per 1,000 waterbirths. Out of all the cases of umbilical cord snap, about 23% lead to NICU admission, 13% lead to the need for a newborn blood transfusion, and there have been no reports of any long-term harmful effects.	The authors provided a list of guidelines that can be used to prevent and treat umbilical cord tears. It is impossible to compare the rates of umbilical cord tears between waterbirth and land birth because researchers have not recorded how often cord tearing occurs during land births.
Fritschel (2015)	Case study	Texas, USA	The authors described a newborn who died from infection with Legionella bacteria following a home waterbirth in 2014. The infant was admitted to the hospital at 6 days old with sepsis and died after 19 days of treatment in hospital	By the time legionellosis was reported for investigation, the midwives had already drained and disinfected the tub, so no evidence could be found to directly link the tub to the infection. However, in the event that the water in the tub did cause the infection, the State Health Department issued guidance to reduce the risk of future infections from water immersion during labor and birth.
Kaushik (2015)	Case study	Connecticut, USA	A newborn developed an infection with Haemophilus parainfluenzae following a home waterbirth. The infant was admitted to the NICU the day after the birth for respiratory distress and poor feeding. The infant was treated with antibiotics and sent home well on his 12th day of life.	It was not possible to obtain a sample from the water in the tub used during the birth to confirm that the infection occurred because of immersion in water. However, since it is possible that the newborn was exposed to the bacteria from the waterbirth, this case highlights the importance of infection control measures during waterbirths.





# Evidence on: Waterbirth

Collins (2016)	Case study	England	<p>A newborn developed symptoms from an infection with Legionella bacteria 3 days following a home waterbirth. No other details are provided on the infant.</p> <p>Investigators swabbed the birthing pool and were able to confirm the presence of Legionella bacteria. They then conducted a survey of 10 additional heated pools. Three of the pools tested positive for Legionella bacteria. They also found other types of bacteria in the pools that could potential cause infections in infants. In response, the National Health Service and Public Health England issued a Patient Safety Alert stating that birthing pools with a re-circulation pump and heater filled in advance of labor should not be used for labor or birth in the home setting.</p>
Al-Assaf (2017)	Case report	Canada	<p>A full-term infant developed an infection with Herpes Simplex Virus (HSV) Type 1 following a waterbirth. Initially, Apgar scores were very good and the infant went home on day 1 of life. The infant developed a fever and poor feeding at 40 hours of life and was admitted to a special care unit at 60 hours. The fever did not go away despite 48 hours of antibiotics so the baby was transferred to a NICU on day 6. The infant did not respond to treatment and died on day 8 of life.</p> <p>The mother did not recall a history of genital herpes; however, she reported blisters on her hand and thigh, suggesting that she may have been shedding the virus at the time of the birth. The father—who had also been in the birthing pool—reported a history of cold sores, but none recently. It is possible that waterbirth may increase the risk of a newborn coming into contact with the herpes virus if someone with a herpes sore is in contact with the water. The authors recommend that HSV be a contraindication to waterbirth and that care providers and family members with direct contact with the water or pool be screened for HSV.</p>







## Evidence on: Waterbirth

Barton (2017)	Case report	Canada	<p>A healthy infant was born under water without complications. On day seven of life, she developed a fever, poor feeding, and fussiness. She was admitted to the NICU on day 8 with difficulty breathing and multiorgan failure. Lab cultures returned positive for <i>Legionella</i> bacteria. The infant received mechanical ventilation at the hospital for five weeks and was discharged home at two months of age with home oxygen and close follow-up.</p> <p>It was not possible to test the birthing pool to confirm the source of <i>Legionella</i> infection since the pool had already been emptied and disinfected. In this case, the birthing pool was a jetted hot tub that had been filled three days prior to the birth. Current recommendations from the U.K. and the U.S. stress that birthing pools should not be filled well ahead of the birth and should not contain recirculating pumps and heaters, as they are more difficult to properly disinfect.</p>
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