



## Evidence on: Eating and Drinking during Labor

**In many hospitals, people are told not to eat or drink during labor. The medical term for this is “NPO,” which comes from the Latin *nil per os*, meaning nothing by mouth.**

In a recent survey of mothers who gave birth in U.S. hospitals, 60% of them reported not drinking during labor, and 80% said that they did not eat ([Declercq, Sakala et al. 2014](#)). When people are free to eat and drink as desired during labor, as is typical in U.S. freestanding birth centers, very few of them (5%) choose to not eat or drink ([Rooks, Weatherby et al. 1989](#)).

This article was updated in February 2017 by [Rebecca Dekker, PhD, RN, APRN](#) and [Anna Bertone, MPH](#).

### What are the energy needs of people in labor?

The uterus is mostly made of muscle tissue. Muscles use fuel as they work and require enough nutrition to meet these energy needs. Very little research has been done about the nutrition needs of women in labor, but research in sports nutrition has found that taking in carbohydrates during exercise improves performance and protects against fatigue and ketosis ([Rodriguez et al. 2009](#)).

*Ketosis* means that there are raised levels of ketones that can be measured in blood and urine. During times of starvation, ketones take fat from the liver and burn it for energy. It's not clear whether ketosis during labor is normal and harmless or if it requires an intervention like IV fluids or food and drink ([Toohill et al. 2008](#)).

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# Evidence On: Eating & Drinking during Labor

## What impact do these NPO policies have on people giving birth today?

In a Cochrane review, researchers combined evidence from five trials involving a total of 3,103 women, in which women were randomly assigned to eat/drink or not during labor ([Singata et al. 2013](#)). All of the women were in active labor and at low risk of needing a Cesarean. A few of the trials reached opposite conclusions on outcomes like Cesareans, vomiting, and labor duration. Unfortunately, none of the researchers looked at maternal satisfaction. They concluded that there is no harm or benefit in restricting low-risk women from consuming food and drink during labor.

**Table 1 (page 10) shows details about the five randomized trials in the Cochrane review.**

In 2017, another review set out to evaluate the benefits and harms of food and drink during labor ([Ciardulli et al. 2017](#)). The researchers included all five studies from the Cochrane review and added five more, amounting to 3,982 participants. The authors found that the people laboring under less restrictive eating and drinking policies had shorter labors by about 16 minutes. There were no differences in any other health outcomes. Only one of the trials considered maternal satisfaction and found that more of the eating group participants reported satisfaction with their nourishment during labor compared to the women given sips of water only (97% versus 55%).

**Table 2 (page 11) shows details about the five additional randomized trials included in the Ciardulli et al. review.**

There were no cases of aspiration in any of the trials; however, the study sizes were not large enough to determine how often this rare outcome truly occurs. *Aspiration* can happen when a person is put to sleep with medication, otherwise known as going under general anesthesia. If they vomit stomach contents into their mouth while “sleeping” and these contents go back down through the airway—the “wrong tube”— this can lead to infection and breathing problems (aspiration pneumonia). Before scheduled surgeries and procedures, patients are often asked to fast for at least eight hours due to this possible risk.

The authors of the Cochrane review note that most women seem to naturally limit their intake as labor gets stronger. They concluded that low-risk women should have the right to choose whether or not they would like to eat and drink during labor ([Singata et al. 2013](#)). No trial has examined eating during labor in people who are at higher risk of needing Cesareans with general anesthesia.

Interestingly, in a recent [position statement update](#), the American Association of Anesthesiologists reviewed much of the same evidence and decided that because there isn’t evidence of harm or benefit, hospitals should limit solid food during labor. Maternal satisfaction was not factored into their opinion.

We found two recent studies, both by researchers in Iran, that surveyed mothers on their perceptions of food and drink restrictions during labor. The first study interviewed 600 women and found an association between reported pain levels and environmental sources of stress, meaning that laboring people under stress experienced more pain ([Manizheh & Leila, 2009](#)). One of the greatest reported sources of stress was “restricted fluid intake.” About half of first-time moms and 78% of moms who had given birth before mentioned this as a stressor.

In the second study, researchers conducted in-depth interviews with 24 low-risk women after they had given birth, but before leaving the hospital ([Irvani et al. 2015](#)). The women were in three different hospitals, demographically diverse, and all had healthy infants. The interview responses were grouped into common themes and coded for data analysis. One of the reoccurring responses was disappointment





# Evidence On: Eating & Drinking during Labor

about restrictions on eating and drinking during labor. Women commented that they “felt out of energy,” “had no more strength,” and “felt hungry from going so long without eating.”

Ultimately, people have the human right to decide if they would like to eat or drink during labor, or not. Hospital policy is not binding on patients, including birthing people, and hospitals do not have the legal authority to prevent a laboring person from eating and drinking if they so choose.

## Where did these NPO policies come from?

The “Nothing by Mouth” policy during labor began in the 1940s, when women were given inhaled anesthetics (ether or chloroform in imprecise amounts) or *Twilight Sleep* (an injection of morphine and scopolamine that caused unconsciousness and no memory of the birth).

Back then, anesthesia was much less safe, and aspiration was more common than it is today. When aspiration was recognized as a major problem during birth in the 1940s, anesthesiologists were using very primitive tools to keep a person’s airway open when under general anesthesia, and some didn’t use airway tools at all. New versions of a tool called a laryngoscope were developed in the 1940s, allowing doctors to view a patient’s vocal cords so that they could place a tube in the trachea (intubation) and keep an open and protected airway during general anesthesia (Robinson & Toledo, 2012). The design, technique, and popularity of laryngoscopes and intubation continued to improve over the second half of the 20th century.

In 1946, Dr. Curtis Mendelson published the landmark study responsible for “Nothing by Mouth” policies. He found that people who had general anesthesia while giving birth could inhale stomach contents, which in rare cases could lead to severe lung disease or death. He called this illness “Mendelson’s syndrome” (Mendelson, 1946).

When Dr. Mendelson looked at 44,016 women who gave birth from 1932 to 1945, he found that aspiration occurred in 66 of those women (0.15% or 1 in 667). All of the people who experienced aspiration had a mixture of gas, ether, and oxygen given to them through a mask during the delivery. It is not clear if any of these women had airway protection. General anesthesia wasn’t limited to Cesarean deliveries; it was also used to control pain during vaginal births. More than half of the people in the study had a longer anesthesia time and greater anesthesia depth than usual. Most of the aspirations were from liquids, and only a few were from solids. There were two deaths in the study; both women went under general anesthesia without airway protection, aspirated solid food, and died of suffocation on the delivery table.

Mendelson concluded that aspirations are preventable and recommended replacing oral intake with IV fluids. He also recommended switching to local anesthesia when possible, instead of general anesthesia. His advice caught on, and “Nothing by Mouth” became the norm in hospitals across the U.S. and even around the world. The practice has persisted, becoming a part of hospital culture, even though the modern population is nothing like the people who gave birth back in Dr. Mendelson’s time, who were exposed to general anesthesia routinely and without airway protection.

## What is the risk of death from aspiration?

Let’s jump ahead to 1997, when researchers conducted the first large U.S. study to look at maternal deaths related to anesthesia between the years 1979 to 1990. General anesthesia was used in 41% of the sample in the earlier years, and 16% of the sample in the later years. The risk of death as a result of aspiration during Cesarean was 0.7 per million births, or 1 death for every 1.4 million births (Hawkins et al. 1997).





# Evidence On: Eating & Drinking during Labor

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A follow-up study looked at anesthesia-related maternal deaths in the U.S. between 1991 and 2002 ([Hawkins et al. 2011](#)). In this time period, general anesthesia was used in approximately 14% of cases. They found that anesthesia-related maternal deaths fell 60% when data from 1979-1990 were compared to data from 1991-2002. The authors calculated that there were 6.5 maternal deaths per million general anesthetics from the later years in the sample (1997-2002). The number of these deaths directly caused by aspiration was not studied because it was too difficult to distinguish them from the other deaths related to airway problems, such as intubation problems, inadequate ventilation, or respiratory failure (Personal correspondence, Hawkins, 2016).

Similarly, a study of anesthesia-related maternal deaths in Michigan between 1985 and 2003 reported eight anesthesia-related deaths, five involving general anesthesia; none of the women in this study died from aspiration ([Mhyre et al. 2007](#)).

Some people may argue that the reason there are fewer deaths from aspiration today is because people are not allowed to eat or drink during labor. However, in the United Kingdom, clinical guidelines were updated in 2007 to recommend that drinks and a light meal be offered to low-risk people in labor. So it may be helpful to look at aspiration deaths in the United Kingdom since 2007 when they began to encourage eating and drinking during labor.

The United Kingdom reviews every pregnancy-related death in regular “Confidential Enquiries into Maternal Deaths Reports.” Between 2000 and 2008 (spanning three reports), one woman died from aspiration out of more than six million births ([Cantwell et al. 2011](#)). The death occurred between 2006 and 2008, but it’s not clear whether this was before or after the change in guidelines. The woman in this particular case had a known placenta previa and was hospitalized for monitoring but was not in labor. She consumed a full meal in the hospital, but then started bleeding due to the previa and had an emergency Cesarean with general anesthesia. She vomited while the tube was being removed in the recovery room and died a few days later from the resulting aspiration pneumonitis. The report recommends that when general anesthesia is administered in a suspected full stomach situation, the person should ideally be fully awake and able to protect their airway when it comes time for the tube to be removed (extubation). Attempts to reduce stomach contents with a tube inserted into the stomach through the mouth (orogastric tube) should also take place, but in this case were not.

Everyone going into labor is assumed to be at risk of aspiration because it is not possible to predict who will end up needing a Cesarean surgery under general anesthesia. However, the studies above show that aspiration death is extremely rare in the overall birthing population. This is because so few Cesareans require general anesthesia, and when they do, failed airway management deaths are rare.

## How often does illness from aspiration occur?

In 1989, researchers looked at 11,814 low-risk women who gave birth in 84 freestanding U.S. birth centers from 1985 to 1987 ([Rooks et al. 1989](#)). There were no aspirations, even though 95% of the women drank or ate while in labor. The women in this study experienced a Cesarean rate of only 4.4%; it’s not clear how many of those were under general anesthesia. This sample population was at especially low-risk of aspiration because of the low rate of surgical deliveries.

In 2014, researchers looked at 57 million hospital births in the U.S. between 1998 and 2011 to better understand cardiac arrest in people giving birth ([Mhyre et al. 2014](#)). *Cardiac arrest* is an emergency that happens when the heart suddenly stops beating. The researchers found that cardiac arrest happened in 1 in 12,000 women and that aspiration pneumonitis possibly contributed to 346 out of 4,843 (7%)





# Evidence On: Eating & Drinking during Labor

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of these cardiac arrests. This means that about 6 cardiac arrests per million births may have been related to aspiration. However, the researchers relied on diagnosis codes and did not have access to the actual medical records. This means that they cannot tell which came first—the aspiration, or the cardiac arrest. Some of the birthing women may have had cardiac arrest due to another cause, and then experienced aspiration as a complication of the arrest. It's also not possible to tell from this study how many of the 346 aspirations occurred in high-risk births. Pre-eclampsia/eclampsia, for example, increases the odds of cardiac arrest by 7 times. Most (83%) of the women who had experienced both cardiac arrest and aspiration pneumonitis survived to hospital discharge.

North America's Society for Obstetric Anesthesia and Perinatology developed a registry of obstetric anesthesia complications between 2004 and 2009 (D'Angelo et al. 2014). Thirty U.S. hospitals provided information on more than 307,000 people giving birth. Most of the birthing persons (257,000) had regional (epidural, spinal or combined spinal-epidural) or general anesthesia. General anesthesia accounted for 5.6% of Cesareans in this study. Out of 5,000 women who received general anesthesia, there were zero cases of aspiration. We don't know how many of these women ate or drank during labor.

The Royal College of Anaesthetists and the Difficult Airway Society conducted a study to estimate how often major airway events (also called “near deaths”) occur during general anesthesia in the United Kingdom 2009 (Cook et al. 2011). Out of approximately 720,000 births that took place during 2008-2009, only one case of aspiration was documented. And the aspiration wasn't considered the primary cause of the woman's airway problems. Instead, this woman's main complication was due to the fact that they had difficulty placing a tube in her airway. We don't know what the mother's oral intake was during labor, only that she transferred from a midwifery unit for a long pushing stage, and had a Cesarean with regional anesthesia but then needed general anesthesia during the surgery. She gave birth to a live infant and made a full recovery within a week.

## Recent findings presented at the Anesthesiology Annual Meeting

In 2015, several researchers at the annual meeting of anesthesiologists in the U.S. reported their research findings that most healthy people would benefit from a light meal in labor (Harty et al. 2015).

The researchers combined 385 research studies of hospital births published in 1990 or later. They also reviewed the American Society of Anesthesiology's Closed Claims Project database. In all, they found only one case of aspiration in the U.S. between 2005 and 2013, in a woman who was obese and had pre-eclampsia. They concluded that fasting is not necessary in low-risk laboring people. In fact, fasting can lead to ketosis, making stomach juices more dangerously acidic if there were an aspiration.

The reviewers mentioned a few circumstances that can increase risk of aspiration – eclampsia, pre-eclampsia, obesity, and the use of intravenous (IV) opioids (such as morphine) to manage labor pain (which further delay stomach emptying). They ended by saying that more research focusing on high-risk birth is needed, but people with these risk factors could possibly benefit from fasting during labor.

In an interview we did with the authors of this study, they said that the anesthesiology profession has made great progress since the 1940s. Even though Cesarean rates have risen as high as 32% of all U.S. deliveries, widely increased use of regional anesthesia during surgery, such as a spinal or an epidural, has resulted in far fewer anesthesia-related maternal deaths. When a general anesthetic is used, doctors now use new strategies to reduce the volume of stomach contents, make stomach juices less acidic (by administering medications), and keep the person's airway safe. These advances were not available back in Dr. Mendelson's time (Personal communication, M. Bautista, 2015).

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5



# Evidence On: Eating & Drinking during Labor

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Recall that the large [Hawkins et al. 1997 study](#) (of around 45 million births) looked at birth and death certificates and found the risk of aspiration death during delivery to be 0.7 per million women. That estimate is from a sample in the 1980s, before general anesthetic use decreased from 41% of all Cesareans to less than 6% now (nearly all involving emergent situations) ([D'Angelo et al. 2014](#)), and before maternal deaths fell an additional 60% ([Hawkins et al. 2011](#)). So the risk of aspiration during surgery under general anesthesia is likely even lower today than in 1997, the last time we have exact numbers published about aspiration death in the U.S. population.

Therefore, the researchers who presented at the Anesthesiology meeting concluded that “Nothing by Mouth” is an outdated restriction that should not be applied to low-risk people giving birth today. Their findings were echoed in a 2016 opinion paper published by [Sperling et al.](#) in the American Journal of Obstetrics and Gynecology.

## Is the stomach really empty when women are not allowed to eat and drink during labor?

The main reason that some hospitals have a “Nothing by Mouth” policy is to ensure that laboring people have an empty stomach should they need emergency surgery with general anesthesia. But is this effective? Stomach emptying slows down once labor starts, so fasting for 8, 12, or even 24 hours after contractions begin may not guarantee an empty stomach at the time of birth. It’s interesting to note the findings of a small study published in 1992 that used ultrasound imaging to look at the stomach contents of 39 healthy, full-term women in active labor after they had received epidurals ([Carp et al. 1992](#)). The women told the researchers (but not the person giving the ultrasound exam) when they had last eaten. The ultrasound found solid food in nearly two-thirds of the women’s stomachs. Of the 25 who reported not eating for 8-24 hours, 16 still had solid food in their stomachs at the time of the ultrasound. Importantly, the presence of solid food in the stomach was not related to how long a woman had gone without eating.

Although labor likely slows down stomach emptying, another small study suggests that people with epidurals may still be able to empty their stomachs during labor ([Bataille et al. 2014](#)). The researchers did stomach ultrasound measurements in 60 laboring women with epidurals to track the changes in their stomach contents during labor. In early labor, half of the women had stomach contents considered likely to be a risk for aspiration, even though most of them had been without liquids for more than five hours and solids for more than 13 hours. This is more evidence that stomach emptying slows down at the start of labor.

However, by the pushing stage, nearly 90% of the women in this study were no longer at risk for aspiration, suggesting that the stomach continues to empty during labor. The researchers concluded that neither the length of fasting nor the presence of stomach contents at the start of labor were good indicators of aspiration risk further along in labor.

## Professional guidelines from other organizations

In this context, “high-risk” means morbid obesity, diabetes, more likely to require a Cesarean delivery because of a medical condition or pregnancy complication, and/or the possibility of having difficulty managing an airway during anesthesia.





# Evidence On: Eating & Drinking during Labor

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**Several professional organizations recommend that low-risk birthing people eat or drink as they desire during labor:**

- The World Health Organization (WHO) ([“Care in normal birth: a practical guide. Technical Working Group.” 1997](#))
- The American College of Nurse-Midwives (ACNM) ([“Providing Oral Nutrition to Women in Labor,” 2016](#))
- NICE Clinical Guidance for the United Kingdom ([Delgado Nunes et al. 2014](#))
- The Society of Obstetricians and Gynecologists of Canada (SOGC) ([Lee et al. 2016](#))

Although Canadian guidelines recommend the option of food and drink, researchers recently surveyed 118 hospital maternity centers in Canada, and found that the majority of low-risk people are not allowed to eat or drink during active labor ([Chackowicz et al. 2016](#)). In early labor, 98% of low-risk laboring people were free to consume fluids and solids. However, in active labor, 60% of people without epidurals and 83% of those with epidurals were restricted to ice chips and clear fluids. The authors concluded with their hope that this study will spark revisions of current hospital policy to be in line with Canadian professional guidelines and best practices and meet “psychological and physiological requirements in labor.”

**Other organizations recommend that low-risk people avoid solid food during labor but be free to drink clear liquids, such as water, sports drinks, black coffee, tea, and soda:**

- The American College of Obstetricians and Gynecologists (ACOG) ([Committee on Obstetric Practice, 2009](#))
- The American Society of Anesthesiologists (ASA) ([“Practice Guidelines for Obstetric Anesthesia,” 2016](#))

In their position statement, the ASA noted that aspiration has become so rare that randomized trials and even large databases have been unable to calculate an incidence:

***“There is insufficient evidence to draw conclusions about the relationship between fasting times for clear liquids or solids and the risk of aspiration during delivery.”***

In the absence of evidence, they decided to base their guidelines on expert opinion. They conducted an official survey of 357 members and 77% opined that clear liquids were okay in low-risk women. 91% said that solid foods should be avoided in all laboring women. So these opinions became the basis of ASA practice guidelines and ACOG’s Obstetric Practice Bulletin. Note that it is not evidence-based practice to allow opinions to restrict people’s autonomy simply because evidence from credible studies is not available.

**Neither ACOG nor ASA recommends restricting low-risk people to ice chips or sips of water during labor.** Providers that continue to enforce NPO policies are not in line with their professional organization’s standards of best practice. In a recent statement, ACOG’s Committee on Obstetric Practice reaffirms their recommendation to allow people without complications free access to moderate amounts of clear liquids ([“Committee Opinion No. 687: Approaches to Limit Intervention During Labor and Birth,” 2017](#)). They continue to advise against consuming solid foods while in labor; however, they note that the evidence for this recommendation has been questioned and is under review.

In 2009, when ACOG revised its recommendations to allow clear liquids during labor, it was part of a wider trend in the anesthesia community to relax rules on fasting before all surgeries. Meta-analysis of randomized trials comparing fasting times of two to four hours versus more than four hours found that the patients who fasted longer were at greater risk of aspiration from larger and more acidic stomach contents





# Evidence On: Eating & Drinking during Labor

(“Practice Guidelines for Preoperative Fasting and the Use of Pharmacologic Agents to Reduce the Risk of Pulmonary Aspiration: Application to Healthy Patients Undergoing Elective Procedures: An Updated Report” 2017). Healthy patients undergoing elective surgeries are now advised to consume clear liquids up until two hours before the procedure, instead of “NPO after midnight.”

## Conclusion

In the mid 1900s, when anesthesia methods were crude and unsafe, “Nothing by Mouth” policies came about to prevent the dangerous consequences of aspiration with general anesthesia. Now that the safety of anesthesia has greatly improved, hospital policies need to be rewritten to be in line with current evidence. We’ve started to see some movement in that direction. Other countries have started encouraging people to eat and drink as desired during labor, and in the U.S., obstetric practice guidelines were updated in 2009 to allow clear liquids.

The research is limited, but fasting as soon as contractions begin may still not guarantee an empty stomach during birth, since it is thought that stomach emptying slows down at the start of labor (Carp et al. 1992). Fasting could even be harmful; it could cause stomach juices to become more dangerously acidic if an aspiration were to occur (Harty et al. 2015).

Overall, the Cochrane review of five randomized trials with low-risk women did not find any evidence for harm or benefit from eating and drinking during labor (Singata et al. 2013). Maybe we would have seen benefits if any of the trials had looked at maternal satisfaction—but none of them did.

A larger, more recent review found that the people laboring under less-restrictive eating and drinking policies had shorter labors by about 16 minutes and no other differences in health outcomes (Ciardulli et al. 2017). Only one of the trials in the review considered maternal satisfaction and found that more of the eating group participants reported satisfaction with their nourishment during labor compared to the women given sips of water only (97% versus 55%) (Goodall & Wallymahmed, 2006).

The issue of eating and drinking during labor should be reframed as one of bodily choice. **Low-risk laboring people, including those with epidurals, have the right to choose whether or not they would like to eat and drink during labor.** Maternal satisfaction should also be considered. We know that women often complain about their distress in being denied food and drink in labor (Manizheh & Leila, 2009).

In high-risk birthing persons, the informed consent discussion might look a bit different. People should know there is no evidence from randomized trials that could be applied to their situation. More research needs to be done to better define risk factors for aspiration, but it appears that some people – those with a **difficult to manage airway, eclampsia, pre-eclampsia, a body mass index of 40 or greater, and who receive intravenous (IV) opioid medications during labor** – may lower their risk of aspiration by fasting during labor.

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# Evidence On: Eating & Drinking during Labor

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# Evidence On: Eating & Drinking during Labor

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# Evidence On: Eating & Drinking during Labor

**Table 1: Singata et al. 2013 Meta-Analysis on Eating or Drinking during Labor**

Study	Randomization	Outcomes	Notes
<a href="#"><u>Tranmer, Hodnett et al. 2005</u></a>	<ul style="list-style-type: none"> <li>• Counseled during prenatal visits to eat and drink freely (163) — <b>versus</b> —</li> <li>• Ice chips and sips water only (165).</li> </ul>	No differences in labor duration, augmentations, Cesareans, operative vaginal deliveries, or any other outcome assessed	
<a href="#"><u>Kubli, Scrutton et al. 2002</u></a>	<ul style="list-style-type: none"> <li>• 500mL carbohydrate drink “Sports drink” every 3-4 hours plus sips water (30) — <b>versus</b> —</li> <li>• Water only (30)</li> </ul>	<p>No differences in labor duration, augmentations, Cesareans, or Apgar scores</p> <p>Significantly reduced maternal ketosis without increasing gastric volume in “Sports Drink” group</p>	The carbohydrate solution was a low concentration, 6.4 g carbs/100 mL
<a href="#"><u>Scheepers, Thans et al. 2002</u></a>	<ul style="list-style-type: none"> <li>• Unlimited carbohydrate drink (102) — <b>versus</b> —</li> <li>• Unlimited flavored water placebo (99)</li> </ul>	<p>No differences in augmentations, operative vaginal deliveries, or Apgar scores.</p> <p>Significantly increased (2.9 times) greater risk of Cesarean and slightly longer labors in the carbohydrate group</p>	The carbohydrate solution was a high concentration, 12.6g carbs/ 100 mL
<a href="#"><u>O’Sullivan, Liu et al. 2009</u></a>	<ul style="list-style-type: none"> <li>• Specific foods/fluid (1219) — <b>versus</b> —</li> <li>• Water only (1207)</li> </ul>	No differences in Cesareans, labor duration, operative vaginal deliveries, vomiting, Apgar scores, or any other outcome assessed	
<a href="#"><u>Scrutton, Metcalfe et al. 1999</u></a>	<ul style="list-style-type: none"> <li>• Specific foods/fluid (45) — <b>versus</b> —</li> <li>• Water only (43)</li> </ul>	<p>No differences in labor duration, augmentations, Cesareans, or Apgar scores.</p> <p>Significantly increased gastric volume and vomiting in the eating group, and less development of ketosis</p>	
<a href="#"><u>Singata, Tranmer et al. 2013</u></a>	Included all above studies (3130)	<p>The number of studies that included each variable of interest is specified below:</p> <p>No differences in Cesareans (all studies), operative vaginal births (all studies), Apgar scores (four studies), maternal ketosis (one study), labor duration (three studies), maternal nausea (one study), maternal vomiting (three studies), augmentation (all studies), epidural analgesia (all studies), or NICU admissions (one study)</p>	Dominated by the large, highly medicalized O’Sullivan trial, potentially making it more difficult to detect differences in outcomes



# Evidence On: Eating & Drinking during Labor

**Table 2: Ciardulli et al. 2017 Meta-Analysis on Eating or Drinking during Labor**

This review includes all five studies in the Singata et al. Cochrane review and adds five more.

Study	Randomization	Outcomes	Notes
<a href="#">Rahmani et al. 2012</a>	<ul style="list-style-type: none"> <li>Intervention of: 3 medium dates plus 110 ml water; 3 dates plus 110 ml light tea without sugar; or 110 ml orange juice (87) — versus —</li> <li>Water only (90)</li> </ul>	<p>No differences in duration of active labor, Cesareans, operative vaginal deliveries, vomiting, or Apgar scores</p> <p>Significantly shorter second stage of labor (pushing) in the carbohydrates group</p>	<p>The intervention amounted to 13 g/110 mL (orange juice) or 15 g/110 mL (dates)</p> <p>Ongoing at the time of the Cochrane review</p>
<a href="#">Scheepers et al. 2004</a>	<ul style="list-style-type: none"> <li>Up to 200 mL of a carbohydrate drink (100) — versus —</li> <li>Up to 200 mL flavored water placebo (102)</li> </ul>	<p>No differences in operative vaginal deliveries, Cesareans, duration of active or second stage of labor, augmentations, or Apgar scores</p>	<p>The carbohydrate solution was a high concentration, 12.6 g carbs/ 100 mL</p> <p>Participants were not randomized until the start of the second stage. Both groups could eat and drink at will until randomization.</p>
<a href="#">Laifer et al. 2000</a>	<ul style="list-style-type: none"> <li>Unlimited carbohydrate drink (48) — versus —</li> <li>Ice chips (55)</li> </ul>	<p>Significantly shorter second stage of labor in the carbohydrates group and fewer Cesareans</p>	<p>Unpublished abstract</p>
<a href="#">Goodall &amp; Wallymahmed, 2006</a>	<ul style="list-style-type: none"> <li>Food low in fat and fiber with a neutral pH (110) — versus —</li> <li>Sips water only</li> </ul>	<p>Significantly higher percentage of the eating group participants responded that they were satisfied with their nourishment during labor (97% versus 55%)</p>	<p>Unpublished personal communication</p>
<a href="#">Kordi et al. 2010</a>	<ul style="list-style-type: none"> <li>Honey date syrup (45) — versus —</li> <li>Sips water only (45)</li> </ul>	<p>Significantly shorter duration of active and second stage labor in the group receiving honey date syrup</p>	<p>Awaiting assessment at the time of the Cochrane review</p>
<a href="#">Ciardulli et al. 2017</a>	<p>Included all above studies and all studies in Table 1. (3,983)</p>	<p>No differences in Cesareans (eight studies), operative vaginal births (seven studies), Apgar scores (five studies), maternal ketosis (one study), maternal vomiting (four studies), augmentation (five studies), epidural analgesia (five studies), or NICU admissions (two studies)</p> <p>Significantly shorter duration of labor (16 minutes on average) with less-restrictive food intake (nine studies)</p>	<p>Dominated by the large, highly medicalized O'Sullivan trial, potentially making it more difficult to detect differences in outcomes</p>

