

ANSWER TO OBSERVATION QUIZ

(from page 57) Ellie has a gene for achondroplasia, the most common form of dwarfism, which affects her limb growth, making her a little person. Because of her parents and her sister, she is likely to have a long and accomplished life: Her problems are less likely to come from her genotype than from how other people perceive her phenotype. ●

Timing and Terminology

Popular and professional books use various words to segment pregnancy. The following comments help to clarify the terms used.

- **Beginning of pregnancy.** Pregnancy begins at conception, which is also the starting point of *gestational age*. However, the organism does not become an embryo until about two weeks later, and pregnancy does not affect the woman (and cannot be confirmed by blood or urine testing) until implantation. Paradoxically, many obstetricians date the onset of pregnancy from the date of the woman's last menstrual period (LMP), about 14 days before conception.
- **Length of pregnancy.** Full-term pregnancies last 266 days, or 38 weeks, or 9 months. If the LMP is used as the starting time, pregnancy lasts 40 weeks, sometimes referred to as 10 lunar months (a lunar month is 28 days long).
- **Trimesters.** Instead of *germinal period*, *embryonic period*, and *fetal period*, some writers divide pregnancy into three-month periods called *trimesters*. Months 1, 2, and 3 are called the *first trimester*; months 4, 5, and 6, the *second trimester*, and months 7, 8, and 9, the *third trimester*.
- **Due date.** Although doctors assign a specific due date (based on the woman's LMP), only 5 percent of babies are born on that exact date. Babies born between three weeks before and two weeks after that date are considered "full term" or "on time." Babies born earlier are called *preterm*; babies born later are called *post-term*. The words *preterm* and *post-term* are more accurate than *premature* and *postmature*.

germinal period

The first two weeks of development after conception, characterized by rapid cell division and the beginning of cell differentiation.

embryonic period

The stage of prenatal development from the end of the second week through the eighth week after conception, during which the basic forms of body structures, including internal organs but not sex organs, develop.

fetal period

The stage of prenatal development from nine weeks after conception until birth, during which the fetus grows in size and matures in functioning.

stem cells

Cells from which any other specialized type of cell can form.

From Zygote to Newborn

Prenatal development is often divided into three main periods: The first two weeks are the **germinal period**; the third through the eighth week is the **embryonic period**; the ninth week until birth is the **fetal period** (see Table 2.2 for alternative terms).

Germinal: The First 14 Days

Within hours after conception, the zygote begins *duplication* and *division*. First, the 23 pairs of chromosomes duplicate, forming two complete sets of the genome. The cell divides neatly down the middle into two cells, each containing the original genetic code. These two new cells duplicate and divide, becoming four, which duplicate and divide, becoming eight, and so on.

Those first cells are **stem cells**, able to produce every other cell and thus become a complete person. If conception occurs in vitro, in a laboratory, one stem cell could be removed and analyzed (for instance, if both parents are carriers of a serious disease). If no abnormality is found, the other cells are implanted, to become a normal, complete human being.

After about the eight-cell stage, a third process, *differentiation*, begins. Cells specialize, taking different forms and reproducing at various rates, depending on where they are located. They are no longer omnipotent stem cells.

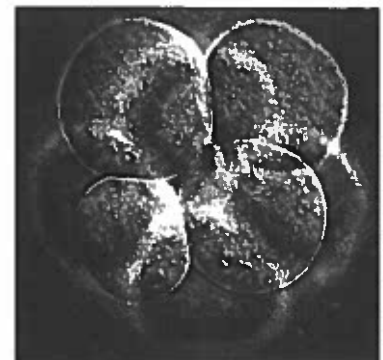
First Stages of the Germinal Period The original zygote as it divides into (a) two cells, (b) four cells, and (c) eight cells. Occasionally at this early stage, the cells separate completely, forming the beginning of monozygotic twins, quadruplets, or octuplets.



(a)



(b)



(c)

TABLE 2.3 Vulnerability During Prenatal Development**The Germinal Period**

An estimated 60 percent of all zygotes do not grow or implant properly and thus do not survive the germinal period. Many of these organisms are abnormal, few women realize they were pregnant.

The Embryonic Period

About 20 percent of all embryos are aborted spontaneously. This is usually called an early *miscarriage*, a term that implies something wrong with the woman, when in fact the most common reason for a spontaneous abortion is a chromosomal abnormality.

The Fetal Period

About 5 percent of all fetuses are aborted spontaneously before viability at 22 weeks or are *stillborn*, defined as born dead after 22 weeks. This is much more common in poor nations.

Birth

Because of all these factors, only about 31 percent of all zygotes grow and survive to become living newborn babies. Age of the mother is crucial. One estimate is that less than 3 percent of all conceptions after age 40 result in live births.

Data from Bentley & Mascie-Taylor, 2000; Corda et al., 2012; Laurino et al., 2005

Differentiation means that some cells become part of an eye, others part of a finger, still others part of the brain. About a week after conception, the multiplying cells (now numbering more than 100) separate into two distinct masses.

The outer cells form a shell that will become the *placenta* (the organ that surrounds and protects the developing creature), and the inner cells form a nucleus that will, in a few more days, become the embryo. The placenta grows first, because it must convey nourishment, enabling the embryo to grow.

The first task of those outer cells is **implantation**—that is, to embed themselves in the lining of the uterus. This is far from automatic; about 50 percent of natural conceptions and an even larger percentage of in vitro conceptions never implant (see Table 2.3). Most new life ends before an embryo begins (Sadler, 2015).

Embryo: From the Third Through the Eighth Week

The start of the third week after conception initiates the *embryonic period*, during which the formless mass of cells takes shape and merits a new name, **embryo**.

implantation

The process, beginning about 10 days after conception, in which the developing organism burrows into the tissue that lines the uterus, where it will be nourished.

embryo

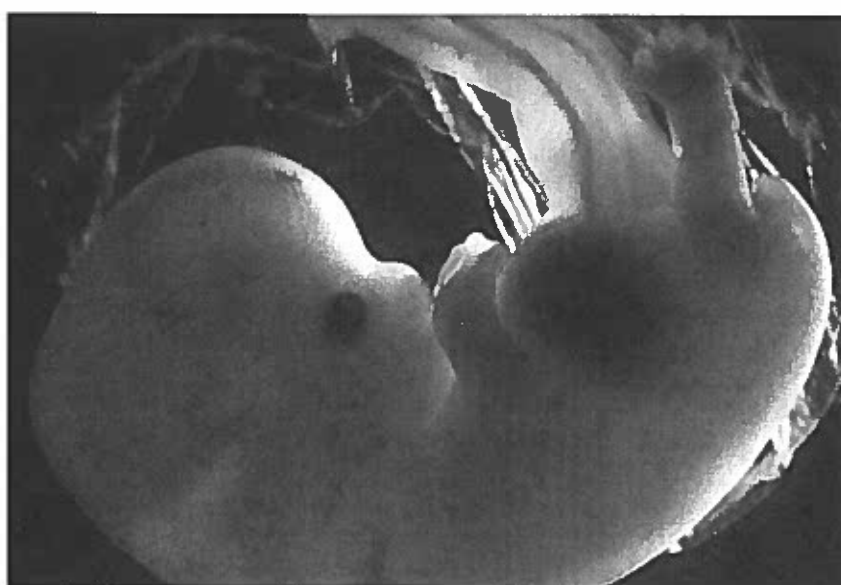
The name for a developing human organism from two to eight weeks after conception.

The Embryonic Period (a) At 4 weeks past conception, the embryo is only about 1/8 inch (3 millimeters) long, but already the head has taken shape. (b) By 7 weeks, the organism is somewhat less than an inch (2 centimeters) long. Eyes, nose, the digestive system, and even the first stage of toe formation can be seen.



(a)

OMIKRON/SCIENCE SOURCE



(b)

PETER FURNIUS/SCIENCE SOURCE

The embryonic period begins when a thin line (called the *primitive streak*) appears down the middle of the cell mass. That line becomes the neural tube, eventually becoming the central nervous system, including the brain and spine (Sadler, 2015). The head appears in the fourth week, as eyes, ears, nose, and mouth start to form. Also in the fourth week, a minuscule blood vessel that will become the heart begins to pulsate.

sonogram

An image of a fetus (or an internal organ) produced by using high-frequency sound waves. (Also called *ultrasound*.)

fetus

The name for a developing human organism from the start of the ninth week after conception until birth.

By the fifth week, buds that will become arms and legs emerge. The upper arms and then forearms, palms, and webbed fingers grow. Legs, knees, feet, and webbed toes, in that order, are apparent a few days later. Then, 52 and 54 days after conception, respectively, the fingers and toes separate (Sadler, 2015).

At the end of the eighth week after conception (56 days), the embryo weighs just one-thirtieth of an ounce (1 gram) and is about 1 inch (2½ centimeters) long. It has all the organs and body parts (except sex organs) of a human being, including elbows and knees. It moves frequently, about 150 times per hour, but such movement is random and imperceptible to the woman, who may not yet realize that she is pregnant.

Meet Your Baby This is Elisa Clare McGuinness at 22 weeks postconception. She continued to develop well for the next four months, becoming a healthy, 3,572-gram newborn, finally able to meet her family—two parents and an older brother.



COURTESY OF MAJIDY MCCURRISS

Fetus: From the Ninth Week Until Birth

The fetal period encompasses dramatic change, from a tiny, sexless creature smaller than the final joint of your thumb to a boy or girl about 20 inches (51 centimeters) long.

In the ninth week, sex organs develop, soon visible via a **sonogram** (also called *ultrasound*). The male **fetus** experiences a rush of the hormone testosterone, affecting the brain (Lombardo et al., 2012).

By 3 months, the fetus weighs about 3 ounces (87 grams) and is about 3 inches (7.5 centimeters) long. Those numbers—3 months, 3 ounces, 3 inches—are rounded off for easy recollection, but growth rates vary—some 3-month-old fetuses do not quite weigh 3 ounces and others already weigh 4.

Mid-pregnancy (months 4, 5, and 6) is the period of the greatest brain growth of the entire life span. The brain increases about six times in size and develops many new neurons (*neurogenesis*) and synapses (*synaptogenesis*), as well as divides into hemispheres (O’Rahilly & Müller, 2012). Before this, the cortex had been smooth, but now the brain begins to have the folds and wrinkles that allow a human brain to be far larger and more complex than the brains of other animals.

The entire central nervous system begins to regulate basic body functions such as breathing and sucking (Johnson, 2011). Advances in neurological functioning at the end of this trimester allow the fetus to reach the **age of viability**, the time past gestation when a fetus born far too early can become a baby who is able to survive.

LaunchPad

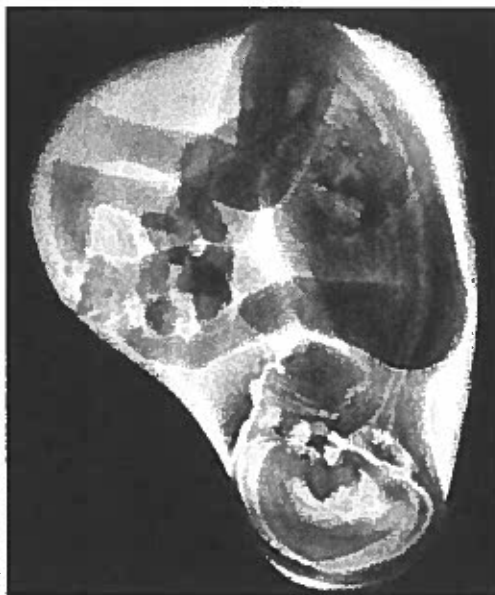


COURTESY OF MAJIDY MCCURRISS

Video: Prenatal Period: 3D Ultrasound shows a real-life ultrasound of a developing fetus.

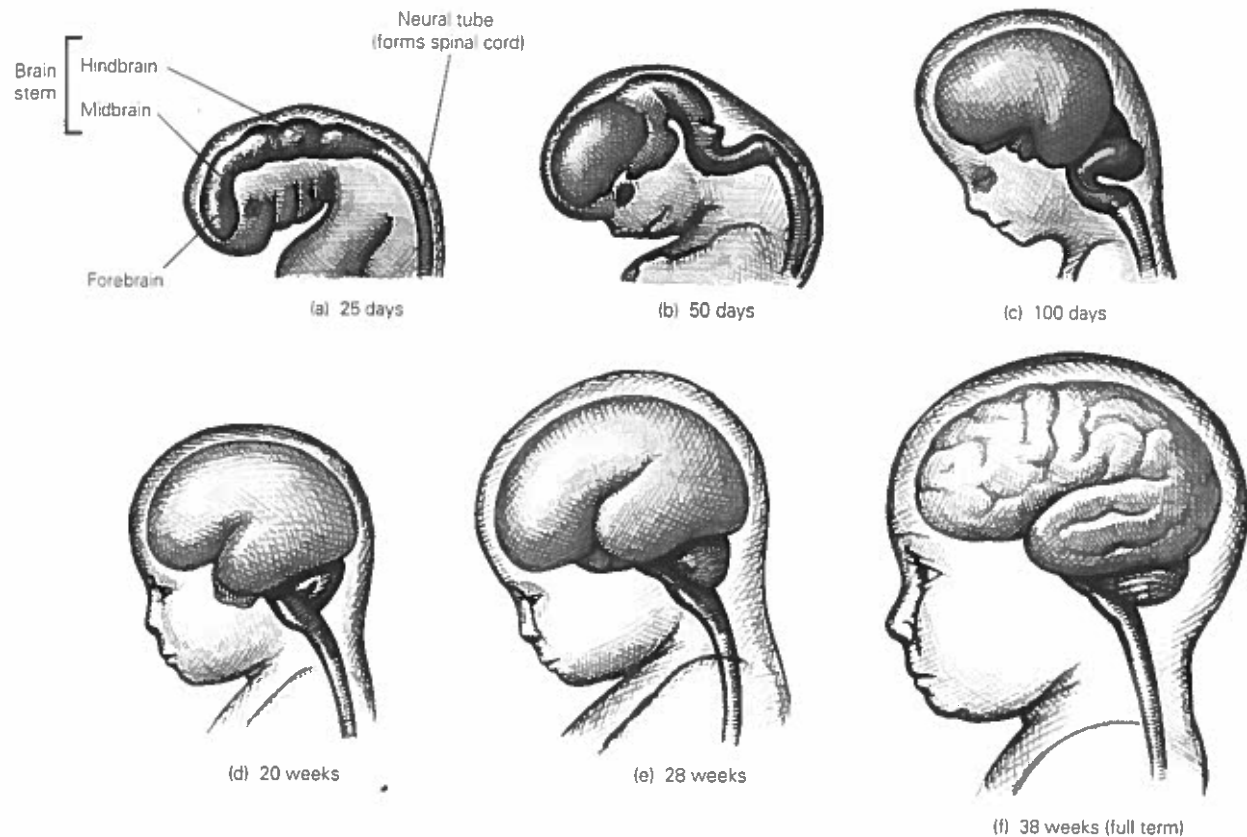
age of viability

The age (about 22 weeks after conception) at which a fetus may survive outside the mother’s uterus if specialized medical care is available.



SP/SCIENCE SOURCE

Ready for Birth? We hope not, but this fetus at 27 weeks post-conception is viable, although very small. At full term (38 weeks), weight gain would mean that the limbs are folded close to the body, and the uterus is almost completely full.



Adapted from Cowan, 1997, p. 116.

FIGURE 2.4 Prenatal Growth of the Brain Just 25 days after conception (a), the central nervous system is already evident. The brain looks distinctly human by day 100 (c). By the 28th week of gestation (e), when brain activity begins, the various sections of the brain are recognizable. When the fetus is full term (f), all the parts of the brain, including the cortex (the outer layers), are formed, folding over one another and becoming more convoluted, or wrinkled, as the number of brain cells increases.

Thanks to intensive medical care, the age of viability decreased dramatically in the twentieth century, but it now seems stuck at about 22 weeks after conception because even the most advanced technology cannot maintain life without some brain response (see Figure 2.4).

Attaining the age of viability simply means that life outside the womb is possible. Whether or not a non-breathing 22- to 25-week-old newborn should be resuscitated is a complex ethical issue for many doctors (Leuthner, 2014). Each day of the final three months improves the odds, not only of survival but also of life without disability.

Usually, by nine months or so, newborns are ready to thrive at home on mother's milk—no expert help, oxygenated air, or special feeding required. The fetus typically gains more than 4½ pounds (2.1 kilograms) in the third trimester, increasing, on average, to almost 7½ pounds (about 3.4 kilograms) at birth (see At About This Time).

Finally, a Baby

About 38 weeks (266 days) after conception, the fetal brain signals the release of hormones to start labor. The average baby is born after about 12 hours of active labor



Video: Brain Development
Animation: Prenatal
<http://qrs.ly/j34eoyp>




HENNING DALHOFF/BOHNER PUBLICATIONS/SCIENCE SOURCE



LOYOLA UNIVERSITY HEALTH SYSTEM PHOTO

One of the Tiniest Rumaisa Rahman was born after 26 weeks and 6 days, weighing only 8.6 ounces (244 grams). Nevertheless, she has a good chance of living a full, normal life. Rumaisa gained 5 pounds (2,270 grams) in the hospital and then, 6 months after her birth, went home. Her twin sister, Hiba, who weighed 1.3 pounds (590 grams) at birth, had gone home two months earlier. At their first birthday, the twins seemed normal, with Rumaisa weighing 15 pounds (6,800 grams) and Hiba 17 pounds (7,711 grams) (Nanj, 2005).

for first births and 7 hours for subsequent births, although labor may take twice or half as long. The definition of “active” labor varies, which is one reason some women believe they are in active labor for days and others say 10 minutes.

Women’s birthing positions vary—sitting, squatting, lying down. Some women give birth while immersed in warm water, which helps the woman relax (the fetus continues to get oxygen via the umbilical cord).

At About This Time: Average Prenatal Weights*

Period of Development	Weeks Past Conception	Average Weight (nonmetric)	Average Weight (metric)	Notes
End of embryonic period	8	1/30 oz	1 g	Most common time for spontaneous abortion (miscarriage).
End of first trimester	13	3 oz	85 g	
At viability (50/50 chance of survival)	22–25	20–32 oz	565–900 g	A birthweight of less than 2 lb, 3 oz (1,000 g) is extremely low birthweight (ELBW).
End of second trimester	26–28	2–3 lb	900–1,400 g	Less than 3 lb, 5 oz (1,500 g) is very low birthweight (VLBW).
End of preterm period	35	5½ lb	2,500 g	Less than 5½ lb (2,500 g) is low birthweight (LBW).
Full term	38	7½ lb	3,400 g	Between 5½ lb and 9 lb (2,500–4,000 g) is considered normal weight.

* To make them easier to remember, the weights are rounded off (hence the imprecise correspondence between metric and nonmetric). Actual weights vary. For instance, normal full-term infants weigh between 5½ and 9 pounds (2,500 and 4,000 grams), viable preterm newborns, especially twins or triplets, weigh less than shown here.



HELENE HENSE/ARND BRONKHORST/ALAMY



FRANK HEHROLD/GETTY IMAGES

Preferences and opinions on birthing positions (as on almost every other aspect of prenatal development and birth) are partly cultural and partly personal. In general, physicians find it easier to see the head emerge if the woman lies on her back. However, many women find it easier to push the fetus out if they sit up. (Figure 2.5 shows the stages of birth.)

Choice, Culture, or Cohort?

Why do it that way? Both of these women (in Peru, on the left, in England, on the right) chose methods of labor that are unusual in the United States, where birth stools and birthing pools are uncommon. However, in all three nations, most births occur in hospitals—a rare choice a century ago.

THE NEWBORN'S FIRST MINUTES Newborns usually breathe and cry on their own. Between spontaneous cries, the first breaths of air bring oxygen to the lungs and

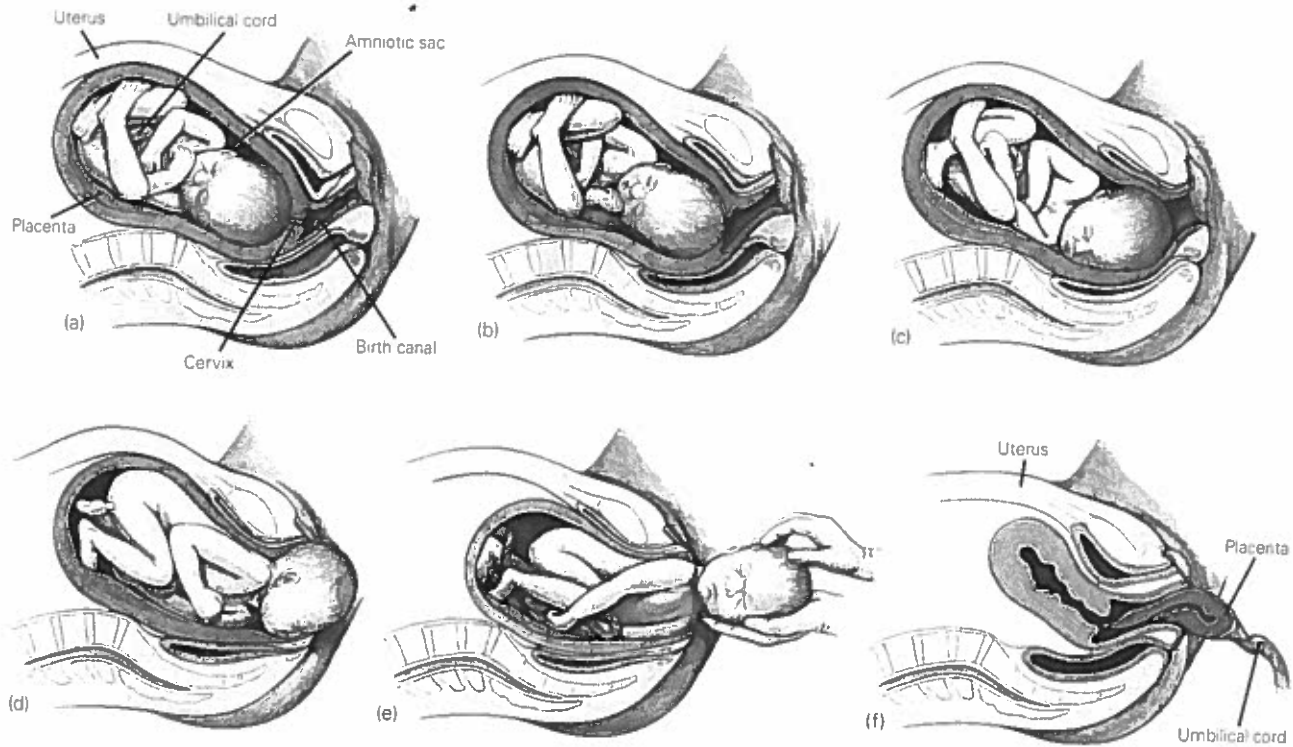


FIGURE 2.5 A Normal, Uncomplicated Birth (a) The baby's position as the birth process begins. (b) The first stage of labor: The cervix dilates to allow passage of the baby's head. (c) Transition: The baby's head moves into the "birth canal," the vagina. (d) The second stage of labor: The baby's head moves through the opening of the vagina (the baby's head "crowns") and (e) emerges completely. (f) The third stage of labor is the expulsion of the placenta. This usually occurs naturally, but the entire placenta must be expelled, so birth attendants check carefully. In some cultures, the placenta is ceremonially buried, to commemorate its life-giving role.

Apgar scale

A quick assessment of a newborn's health. Heart rate, respiratory effort, muscle tone, color, and reflexes are given a score of 0, 1, or 2, with the total compared with the ideal score of 10 (which is rarely attained).

cesarean section (c-section)

A surgical birth, in which incisions through the mother's abdomen and uterus allow the fetus to be removed quickly, instead of being delivered through the vagina.

blood, and the infant's color changes from bluish to pinkish. (Pinkish refers to blood color, visible beneath the skin, and applies to newborns of all hues.) Eyes open wide; tiny fingers grab; even tinier toes stretch and retract. The full-term baby is instantly, zestfully, ready for life.

One assessment of newborn health is the **Apgar scale**, first developed by Dr. Virginia Apgar. When she earned her MD in 1933, Apgar wanted to work in a hospital but was told that only men did surgery. Consequently, she became an anesthesiologist.

Apgar saw that "delivery room doctors focused on mothers and paid little attention to babies. Those who were small and struggling were often left to die" (Beck, 2009, p. D1). To save those young lives, Apgar developed a simple rating scale of five vital signs—color, heart rate, cry, muscle tone, and breathing—to alert doctors when a newborn was in crisis.

Since 1950, birth attendants worldwide have used the Apgar (often using the name as an acronym: Appearance, Pulse, Grimace, Activity, and Respiration) at one minute and again at five minutes after birth, assigning each vital sign a score of 0, 1, or 2. If the five-minute Apgar is at least 7, the baby does not need immediate, life-saving care.

MEDICAL ASSISTANCE AT BIRTH The specifics of birth depend on many factors, including the position and size of the fetus, the skill of the birth attendant, and the customs of the culture. In developed nations, births almost always include sterile procedures, electronic monitoring, and drugs to dull pain or speed contractions. A recent U.S. study found that 87 percent of hospital births are free of any complications (Glance et al., 2014).

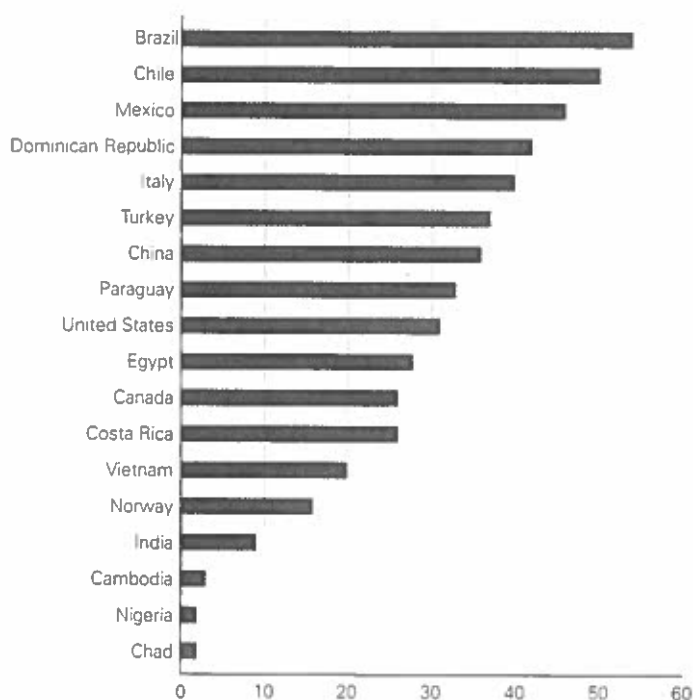
Midwives are as skilled at delivering babies as physicians are, but in most nations only medical doctors perform surgery. More than one-third of U.S. births occur via **cesarean section (c-section, or simply section)**, whereby the fetus is removed through incisions in the mother's abdomen.

The World Health Organization suggests that cesareans are medically indicated in 10–15 percent of births. Fifty-four nations have rates of less than 10 percent; 69 have



Pick Up Your Baby! Probably she can't. In this maternity ward in Beijing, China, most patients are recovering from cesarean sections, making it difficult to cradle, breast-feed, or carry a newborn until the incision heals

Rates of Cesarean Sections in Selected Countries



Data from UNICEF, 2014

FIGURE 2.6 Too Many Cesareans or Too Few?

Rates of cesarean deliveries vary widely from nation to nation. Latin America has the highest rates in the world (note that 50 percent of all births in Chile are by cesarean), and sub-Saharan Africa has the lowest (the rate in Chad is 2 percent). The underlying issue is whether some women who should have cesareans do not get them, while other women have unnecessary cesareans.

more than 15 percent (Gibbons et al., 2012b) (see Figure 2.6). Nations with very low cesarean rates also have high death rates in childbirth.

In the United States, the cesarean rate rose between 1996 and 2008 (from 21 percent to 34 percent) and then stabilized. Variation is dramatic from one hospital to another—from 7 to 70 percent (Kozhimannil et al., 2013).

Cesareans are usually safe for mother and baby, saving lives when the fetal head is too large for the pelvis. Twins may survive more often with c-sections (Roberts et al., 2015). Cesareans also have many advantages for hospitals (easier to schedule, quicker, and more expensive than vaginal deliveries) and for women who want to plan when to give birth.

Disadvantages appear later. C-sections increase medical complications after birth and reduce breast-feeding (Malloy, 2009). By age 3, children born by cesarean have double the rate of childhood obesity: 16 percent compared to 8 percent (Huh et al., 2012). The reason may be that babies delivered vaginally have beneficial bacteria in their gut but those delivered surgically do not (Wallis, 2014).

Less studied is the *epidural*, an injection in the spine that alleviates pain. Epidurals are often used in hospital births, but they increase the rate of cesarean sections, decrease newborn sucking immediately after birth, and increase rates of other complications—at least according to a large study in Pennsylvania (Kjerulff, 2014).

Another medical intervention is *induced labor*, when labor is started, speeded, or strengthened with a drug. The rate of induced labor in developed nations has more than doubled since 1990, up to 20 or 25 percent. Sometimes induction is necessary for the health of the mother or the fetus. However, induced labor itself increases complications (Grivell et al., 2012).

Questions of costs and benefits abound. For instance, c-section and epidural rates vary more by doctor, hospital, day of the week, and region than by medical circumstances.

Complications vary as well. A study of 750,000 births in the United States divided hospitals into three categories—low, average, and high quality—based on obstetric complications for the woman. In low-quality hospitals, cesareans led to five times as many complications (20 percent) and vaginal births twice as many (23 percent) compared to high-quality hospitals (4 and 11 percent) (Glance et al., 2014).

Most U.S. births now take place in hospital labor rooms with high-tech facilities and equipment nearby. Another 5 percent of U.S. births occur in *birthing centers* (not in a hospital), and less than 1 percent occur at home (illegal in some jurisdictions). About half of the home births are planned and half are unexpected because labor happened too quickly. The latter situation is hazardous if no one is nearby to rescue a newborn in distress.

Compared with the United States, *planned* home births are more common in many other developed nations (2 percent in England, 30 percent in the Netherlands) where midwives are paid by the government. In the Netherlands, special ambulances called *flying storks* speed mother and newborn to a hospital if needed. Dutch research finds home births better for mothers and no worse for infants than hospital births (de Jonge et al., 2013).

doula

A woman who helps with the birth process, including massage during birth and help with breast-feeding.

Many women in the United States and elsewhere have a **doula**, a person trained to support the laboring woman. Doulas time contractions, use massage, provide encouragement, and do whatever else is helpful. The term originally came from ancient Greece, and doulas have been traditional in Latin America for centuries.

Every comparison study finds that the rate of medical intervention is lower when doulas are part of the birth team. Doulas have proven to be particularly helpful for



Mother Laboring, Doula Working In many nations, doulas work to help the birth process, providing massage, timing contractions, and preparing for birth. In the United States, doulas typically help couples decide when to leave home, avoiding long waits between hospital admittance and birth. Here, in Budapest, this expectant mother will have her baby with a licensed midwife at home. Nora Schimcsig is her doula, the two women will be together from this moment in early labor to the first breast-feeding of the newborn.



REUTERS/SHAM

Everyone Healthy and Happy A few decades ago in the developing world and a century ago in advanced nations, hospital births were only for birthing women who were near death, and only half of the fetuses survived. That has changed, particularly in Asia, where women prefer to give birth in hospitals. Hospital births themselves are not what they were. Most new mothers participate in the process. Here Le Thi Nga is about to greet her newborn after pulling with all her strength on the belt that helped her push out the head.

immigrant, low-income, or unpartnered women who may be intimidated by doctors (Kang, 2014; Vonderheid et al., 2011).

The New Family

Humans are social creatures, seeking interaction with their families and their societies. We have already seen how crucial social support is during pregnancy; social interaction may become even more important for newborns.

THE NEWEST FAMILY MEMBER A newborn's appearance (big hairless head, tiny toes, and so on) stirs the human heart, evident in adults' brain activity and heart rate. Fathers are often enraptured by their scraggly newborn and protective of the exhausted mother, who may appreciate their husband more than before, for hormonal as well as practical reasons.

Newborns are responsive social creatures in the first hours of life (Zeifman, 2013). They listen, stare, cry, stop crying, and cuddle. In the first day or two, a professional might administer the **Brazelton Neonatal Behavioral Assessment Scale (NBAS)**, which records 46 behaviors, including 20 reflexes. Parents who watch their baby responding in the NBAS are often amazed—and this fosters early parent-child connection (Hawthorne, 2009).

Technically, a **reflex** is an involuntary response to a particular stimulus. Humans of every age reflexively protect themselves (the eye blink is an example). Reflexes seem automatic. Not quite. The strength and reliability of newborn reflexes varies depending on genes, drugs at birth, and overall health.

Newborns' senses are also responsive: New babies listen more to voices than to traffic, for instance. Thus, in many ways, newborns connect with the people of their world, who are predisposed to respond (Zeifman, 2013). If the baby performing these

OBSERVATION QUIZ

What evidence shows that even in Hanoi, technology is part of this birth? (see answer, page 68) ◀



IJJAA ASTRAKHONOVASHUTTEISTOCK

Video: Newborn Reflexes shows several infants displaying the reflexes discussed in this section.

Brazelton Neonatal Behavioral Assessment Scale (NBAS)

A test often administered to newborns that measures responsiveness and records 46 behaviors, including 20 reflexes.

reflex

An unlearned, involuntary action or movement in response to a stimulus. A reflex occurs without conscious thought.

actions on the Brazelton NBAS were your own, you would be proud and amazed; that is part of being human.

postpartum depression

The deep sadness and inadequacy felt by some new mothers in the days and weeks after giving birth.

ANSWER TO OBSERVATION QUIZ

(from page 67) The computer printout on the far right. Monitors during labor track contractions, fetal heart rate, and sometimes more, printing out the record minute by minute so that medical staff can judge whether to speed up labor or birth. In this case, no medical help was required. ●

Expecting a Girl She is obviously thrilled and ready, and they bought a crib, but he seems somewhat nervous. Perhaps someone should tell him that his newborn will become a happy and accomplished child and adult, a source of paternal pride and joy for the next 40 years or more.



1010 DALIANJIANSE • GETTY IMAGES

NEW MOTHERS Many women experience significant physical problems soon after birth, such as healing from a c-section, painfully sore nipples, or problems with urination. However, worse than physical problems are psychological ones. When the level of birth hormones decreases, between 8 and 15 percent of women experience **postpartum depression**, a sense of inadequacy and sadness (called *baby blues* in the mild version and *postpartum psychosis* in the most severe form).

With postpartum depression, baby care (feeding, diapering, bathing) feels very burdensome. The newborn's cry may not compel the mother to carry and nurse her infant. Instead, the mother may be terrified that she might neglect or abuse her infant.

The first sign that something is amiss may be euphoria after birth. A new mother may be unable to sleep, or to stop talking. After the initial high, severe depression may set in.

Postpartum depression is affected by anesthesia, hormones, pain, financial stress, marital problems, a birth that did not go as planned, surgery, and a baby with feeding or other problems. Successful breast-feeding reduces maternal depression (Figueiredo et al., 2014), but success is elusive for many new mothers. A lactation consultant is an important part of the new mother's support team.

Some researchers believe that postpartum depression is a consequence of modern life, because contemporary women consume less omega-3 fatty acids (especially found in fish), exercise less (especially in the sun), and are far from their mothers and other relatives (Hahn-Holbrook & Haselton, 2014). In any case, a depressed mother needs help, not only for her sake but for the sake of the baby.

NEW FATHERS At birth, the father's presence reduces complications. I observed this when my daughter Elissa birthed Asa (now 5, as noted in the opening of this chapter). Asa's birth took much longer than his younger brother's; Elissa's anxiety rose when the doctor and midwife discussed a possible cesarean for "failure to progress" without

consulting her. Her husband told her, "All you need to do is relax between contractions and push when a contraction comes. I will do the rest." She listened. He did. No cesarean.

Whether or not he is present at the birth, the father's legal acceptance of the birth is important to mother and newborn. A study of all live, single births in Milwaukee from 1993 to 2006 (151,869 babies!) found that complications correlated with several expected variables (e.g., maternal cigarette smoking) and one unexpected one—no father listed on the birth record. This connection was especially apparent for European Americans: When no father was listed, rates of long labor, cesarean section, and other complications increased (Ngui et al., 2009).

Currently, about half of all U.S. women are not married when their baby is born (U.S. Census Bureau, 2014), but fathers are usually listed. When fathers acknowledge their role, birth is better for mother and child.