Chapter 4

Childbirth and Newborn Health

CHAPTER OUTLINE AND OVERVIEW

The Childbirth Experience
What is the process of labor and delivery? What are the common methods of childbirth?

The Baby at Birth: Health and Risk
What are the physical features of the newborn? What are the typical complications of birth? What is premature birth, what are its effects, and what are the most effective interventions to help premature infants?

Prenatal Mortality
How many babies and mothers die during the prenatal period? How do families respond to infant death?

Family and Society
What are the mother’s psychological reactions to childbirth? What are some cultural differences in childbirth practices? Is it better to breast-feed or to bottle-feed babies?

Applications: The Case of Baby Doe
What is euthanasia? Under what conditions is euthanasia applied to newborns?

Experiential Exercises
This chapter deals with the infant’s transition from prenatal to postnatal life. Family members have been anticipating the moment of birth with both hope and concern, while the fetus is making movements that prepare for the next phase of its life. In normal circumstances, the pregnancy period ends with parents already being attached to their infants. The baby is born not only into a world of light and air, but also into a world of love.

After reviewing some data on birthrates, the process of birth will be covered, along with some of the birth complications that may affect the infant’s development. The next section covers the physical features of the newborn infant and aspects of newborn health. Behavior and development in the first few weeks and months of life will be covered in the next chapter. The causes and cures for infant mortality in the United States and in different parts of the world is discussed, followed by a section on the parents’ psychological adaptation to the birth process, breast- versus bottle-feeding, and some cross-cultural differences in the management of birthing.

THE CHILDBIRTH EXPERIENCE

Birthrates

How many babies are born each year? The birthrate is the average number of infants born for every 1,000 people. Birthrate data is usually kept by government agencies as part of a country’s vital statistics. Vital statistics are numerical estimates in a population of events related to birth, death, and the incidence of illnesses and accidents. The birthrate for women in the United States between 1950 and 2004 is given in Table 4.1.

The birthrate has been cut almost in half in the United States since 1950. In 1950, women in the United States had an average of three children. This dropped to two children in 1980 and remains about the same today. Table 4.1 also shows the number of children per family in more and less developed nations. The lowest birthrates are in Western Europe and in Eastern Asia. Some countries, such as Italy and Japan, have an average of only one child per family today. This birthrate is not enough to maintain the present population of those countries, so their work force is increasingly being filled by immigrants. The effect of this is that the racial and cultural balance of these two countries, which traditionally have had a relatively homogenous population, changes. The highest birthrates are in Africa, with some countries having birthrates between 40 and 60 infants per 1,000 people.

The Stages of Labor

The birth process itself begins during the last several weeks of pregnancy. The muscles in the uterus begin to contract and expand at irregular intervals, sometimes days or weeks apart. These gentle muscle contractions, called Braxton-Hicks contractions or false labor, have two important effects. First, they help to widen (dilate) the cervix to a width of 1
to 2 centimeters. The cervix is the membrane at the opening between the uterus and the vagina. Normally closed during pregnancy, the cervix must dilate to a width of about 10 centimeters (5 inches) to enable the fetus to pass from the uterus into the vagina.

Second, the Braxton-Hicks contractions may help to move the fetus closer to the cervix in preparation for birth. In almost all cases, the fetus’s head is oriented downward. About 4% of all births are breech presentations (with the buttocks first), and a small fraction are transverse presentations (the fetus is oriented on its side). These presentations are shown in Figure 4.1. Cesarean deliveries are usually recommended when there is a breech or transverse presentation, since the fetus cannot be turned once it has descended into its prebirth position.

Labor begins when contractions start to appear at regular intervals spaced about 10 to 20 minutes apart. Labor is usually divided into three stages (see Figure 4.2). The first stage lasts until the cervix is fully dilated to 10 centimeters and effaced (made thin). Contractions in this stage help to efface and open the cervix. This is the longest stage of labor and may vary in duration from a few minutes to a few days (Guttmacher, 1973). The mean duration of the first stage is about 8 to 14 hours for primiparous mothers (mothers giving birth for the first time) and about 6 hours for multiparous mothers (Danforth, 1977; Parfitt, 1977).

During the first stage of labor, the pain of the contractions increases over time. During the early part of the first stage, contractions are regular and moderately intense. Women may be able to walk around, do household chores, watch television, nap, or take a bath. During the late part of the first stage is the time to go to the hospital or birthing center. Contractions last 40 to 60 seconds and are spaced at intervals of 3 to 4 minutes. The pain is especially intense in the final phase of the first stage, when the cervix must dilate between 8 and 10 centimeters. This is the time that a woman may elect to begin the use of pain control methods (see next section). Mothers can move around, change positions, or take a warm bath or shower.

In the second stage of labor, the infant passes through the cervix and vagina. For women who choose natural childbirth, the pain of this phase of labor may be accompanied by panic, anger, and confusion (Lesko & Leski, 1984). Some mothers begin to shake or feel nausea. Contractions last 60 to 90 seconds and come once every 2 or 3 minutes. Fortunately, this stage is not as long as the previous stage. As the infant begins to descend into the vagina, contractions serve to push the baby out. In natural childbirth, mothers will feel an urge to push. If a local anesthetic is used, mothers feel pressure and will need

### TABLE 4.1 Vital Statistics for Births

<table>
<thead>
<tr>
<th>Year</th>
<th>1950</th>
<th>1980</th>
<th>2004</th>
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<tbody>
<tr>
<td>Birthrate per 1,000 population (USA)</td>
<td>24.1</td>
<td>15.9</td>
<td>14.0</td>
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<tr>
<td>More-developed nations</td>
<td>11.0</td>
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<tr>
<td>Less-developed nations</td>
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coaching to determine when to push. The intensity of the pain and feelings of nausea or disorientation are balanced by the sense of relief that the end is near. Some women may begin to feel euphoria.

The final stage of labor is the birth of the placenta, often called the afterbirth. This stage takes less than 1 hour in most cases. By that time, the mother’s attention and emotion are occupied with the newborn, and most women do not pay much attention to what is happening in the vaginal area. Contractions continue for several hours as the placenta is expelled and the uterus closes up to prevent bleeding. These contractions are not as intense as during the previous stages, but the woman may continue to experience some pain.

If you ever wondered where the name “labor” comes from, it is because difficult muscular work is involved. Although some fortunate women go through all three stages in a matter of several hours, other mothers may be in labor for 20 or 30 hours, during which time they have little chance to sleep or rest.

Babies are expected to be born 280 days from the first day of the mother’s last menstrual period, but only about 4% of all births occur on their exact due date. Births occurring within 2 weeks before or after the due date are generally considered to be in the normal range.

The timing of birth is controlled by a protein called corticotropin-releasing hormone (CRH). Women with the highest levels of CRH in their blood during the fourth month of pregnancy were more likely to deliver their infants prematurely. Tests for the concentration of CRH are currently being developed. Given the risks of premature birth (see the section on prematurity in this chapter), it may be possible in the future to delay birth by regulating the production of CRH during pregnancy (R. Smith, 1999).

Technologies for Labor and Delivery

Advances in medical technology have led to the development of a variety of tools to assist childbirth. These include fetal monitoring, mechanical aids to speed delivery (forceps
and vacuum extraction), cesarean section (a surgical rather than vaginal delivery), and drugs to reduce pain and speed labor.

**Fetal monitoring** is the use of electronic devices to detect and display the fetal signs (heart rate, respiration, blood gases, pH balance) during the delivery and birth process. In invasive fetal monitoring, electrodes are inserted through the vagina and cervix and attached to the fetus. This procedure deprives the mother of opportunity for movement. In a less invasive form, the mother may wear a belt around her abdomen. Invasive fetal monitoring is controversial because it restricts the mother, often requires additional drugs for pain control, and carries a risk of infection for both mother and baby. Experts suggest that fetal monitoring should only be used in high-risk deliveries (Freeman, 1990; Shy et al., 1990). The American College of Obstetrics and Gynecology does not consider fetal monitoring

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**Figure 4.2 Birth Process: Stage 1 and Part of Stage 2**

(a) End of the first stage of labor; the baby’s head is moving through the cervix. (b) Transition; the baby’s head is moving through the birth canal, the vagina. (c–e) The second stage of labor; the baby’s head is moving through the opening of the vagina (c) it emerges completely (d) The head is then turned so that the rest of the body slides out (e).

part of standard care for childbirth. Furthermore, research shows that fetal monitoring does not produce healthier infants with fewer complications (Birth, 1988). Ultrasound can also be used to determine the position and behavior of the fetus prior to birth.

**Forceps** are instruments, usually made of metal or plastic, that are shaped to fit around the newborn’s head and used to pull the infant through the birth canal. The use of forceps is declining in favor of cesarean section and spontaneous vaginal delivery because they may cause brain and spinal cord injuries if used during early phases of labor (high forceps). The effect of forceps used at the very end of delivery (low forceps) has not been studied. It seems generally safe, although bruises may be left on the head in some cases. With **vacuum extraction**, a cup connected to a suction device is placed on the baby’s head. Research shows that the risks of vacuum extraction are lower than with cesarean section or high forceps (Meyer et al., 1987; Nagan et al., 1990). These mechanical methods are used more frequently in the United States than in Europe (Korte & Scaer, 1990).

Vaginal deliveries occurred in about 71% of all births in the United States in 2004; the remainder were done by cesarean section. In a **cesarean section**, an incision is made in the mother’s abdomen and uterus while she is under a local or general anesthetic. Then the baby and placenta are both removed. Cesarean sections, also called C-sections, are used in the case of breech or transverse presentations. C-sections are also recommended in multiple births (twins, triplets, etc.), when the baby’s head is too large for the mother’s pelvis, when the fetus becomes dangerously entangled in the umbilical cord, and in the case of fetal distress. Some diseases that infect the mother’s vagina, such as syphilis, her-
pes simplex, and AIDS, can be transmitted to the infant during delivery, and a C-section birth helps to prevent the transmission of this infection to the infant. A new drug, nevirapine, can reduce the risk of transmitting AIDS to the newborn. It is inexpensive and can be used in African countries where AIDS has reached epidemic levels.

**Fetal distress** is a sudden loss of oxygen or a change in the heart rate or respiration of the fetus, usually determined by fetal monitoring. Severe fetal distress can cause serious complications. For example, too much pressure on the fetal head during delivery can cause excess blood pressure and possibly bleeding inside the scalp, called *intraventricular* hemorrhage. Loss of oxygen, which sometimes occurs in long and difficult labors, can lead to fetal brain damage. Using a fetal monitor, a physician can decide if the risk to the infant requires an emergency C-section.

C-sections have saved the lives and health of many mothers and infants. They are not without risk to the mother, however. Because a C-section is a surgical procedure, the mother is at greater risk of infection and postoperative stress. In the past, it was thought that once a woman had a C-section, she could not have vaginal deliveries in the future. This belief is changing as an increasing number of C-section mothers are having vaginal deliveries of later-born children.

The number of C-sections performed in the United States has increased over the past 30 years, which is hard to account for since the proportion of breech and difficult labors has not changed. In some countries, C-sections are done in over 40% of births. Some people have complained that obstetricians are too quick to perform C-sections in an attempt to avoid lawsuits against them if the baby or mother suffers during a vaginal delivery or in an effort to make more money by doing surgery compared to a routine delivery. It is difficult to prove these claims, however. Other explanations for the increase in C-sections are better nutrition and therefore larger babies and more accurate fetal monitoring that allows a more sensitive and early detection of fetal distress. More recently, however, a growing number of mothers are choosing to have C-sections rather than vaginal births, perhaps because they can be planned in advance and seem easier for the mother.

There is little evidence that a C-section has any lasting negative side effects on mothers or on infants, even in long-term follow-up studies, although it is not associated with any benefits either (Entwisle & Alexander, 1987; Field & Widmayer, 1980; Hollenbeck, Gewirtz, Seloris, & Scanlon, 1984; Whyte et al., 2004). Fathers may be more involved with C-section infants because the mother receives more medication and takes longer to recover than with a vaginal delivery. In sum, although C-sections carry some increased risk for the mother due to complications of surgery, if the mother or infant is at risk, the health benefits justify the procedure. On the other hand, if there is no health risk, mothers should think twice. While it may seem more convenient and less painful, the fact is that it takes much longer for the mother to recover from major abdominal surgery than from vaginal childbirth.

*Drugs and delivery.* In either a vaginal or a cesarean delivery, many mothers are given some type of medication to control pain and/or to regulate the course of labor. According to Judeo-Christian tradition, women are supposed to suffer during childbirth as punish-
ment for Eve’s sins: “In sorrow thou shall bring forth children” (Genesis 3:16). This belief persisted until 1847, when a Scottish obstetrician, James Young Simpson, gave ether to a delivering mother to ease her pain. In his fight to use pain relievers during childbirth, Simpson had to combat both medical practice and religious values. He argued that the Hebrew word previously translated as “sorrow” should have been translated as “work” or “labor.” Furthermore, he cited the “deep sleep” that God imposed on Adam when Eve was “delivered” from one of his ribs. Painless childbirth rapidly became popular and was encouraged by the use of chloroform during two of Queen Victoria’s childbirths (Brackbill, 1979).

Today, the science of drug use during labor and delivery is complex. Perhaps because obstetricians who delivered babies were less concerned with the infant than with the mother, the development of anesthésia (loss of sensation) and analgesia (pain relief) proceeded without much concern for the welfare of the infant, although this has recently been changing.

In most industrialized nations, the method most used for pain control is drugs. Although drugs are medically controlled and have been proved safe for the mother, it is now well established that most general anesthetics administered to the mother cross the placenta during labor and delivery. Unfortunately for the neonate, those organ systems that are the most susceptible to chemical insult (primarily the central nervous system) and those that would be the most effective for drug clearance (the liver and kidneys) are the least well developed. Other organs of the newborn, such as the heart and lungs, are better developed, but these systems have little or nothing to do with helping the system get rid of the drugs.

How long the drugs remain in the newborn’s system depends on the type of drug, the time during labor at which it was given, and the dosage given to the mother (Golub, 1996). In general, newborns of women who took analgesia during childbirth were slower to respond to breast feeding, had higher temperatures, and cried more (Ransjö-Arvidson et al., 2001).

One should not conclude from this review that most drugs are without impact. Even though no effects can be shown overall, some infants and mothers may show extreme but short-term reactions. Some drugs may impair a mother’s ability to participate in her delivery by paralyzing muscles normally used to push the baby out, while others may make her drowsy. Many women seem to suffer from gaps in their memories of the childbirth experience. In one study (Affonso, 1977), 86% of the women interviewed could not remember some of the events of their childbirth and wanted to know more. They asked the doctor and nurses; they had bad dreams and felt somewhat frustrated. Some mothers asked the same questions over and over. This problem seems to occur when labor is either extremely long or extremely short, in high-risk conditions, or when the level of medication is high.

**Epidurals** are a local anesthetic administered in the lower (lumbar) spine that block pain sensation in the pelvic area but allow the mother to remain awake and aware. Epidurals have been shown to cause fevers during childbirth in about 15% of women. Although there is no measurable effect on the newborn, some doctors may react to the ma-
ternal fever by preventive treatment of the newborn for infection (Lieberman et al., 1997). Epidurals also increase the risk for postpartum depression (see the Family and Society section in this chapter). Before electing them, women should discuss the use of epidurals with their doctors or midwives.

On the other hand, for some mothers anxiety and pain increase dramatically prior to and during labor and delivery (Westbrook, 1978). Research shows that women who choose epidurals, compared to natural childbirth, are more likely to be fearful of childbirth and to take a relatively passive role, preferring to turn over the management of the birth process to professionals (Heinze & Sleign, 2003). Drugs serve to calm these mothers and reduce their discomfort, making them better able to enjoy the birth of their infant (Field & Widmayer, 1980; Shnider, 1981). Prenatal preparation for childbirth is important in order for the doctor and the parents to understand all the different options available for pain control and to choose the one that is best for mother and infant. In the next section, we turn to different types of childbirth practices, including methods for the behavioral and psychological control of pain.

The Management of Childbirth

Most childbirths in North America and Northern Europe today take place in hospital settings. From a medical perspective, the hospital environment allows a large staff to assist in labor, delivery, and the care of the newborn. Hospitals also provide access to emergency medical care in the event of fetal distress or complications with labor.

At the beginning of the twentieth century, most childbirths took place in the home. Once it became accepted practice to give birth in the hospital, however, the experience of childbirth for women and their families changed. In the home, the mother could be surrounded by familiar sights and sounds and have the support of other family members. In the early days of hospital births, mothers were left in sparsely furnished rooms for labor, and birth took place in a sterile operating chamber. Family members were prohibited from accompanying the mother. The babies were separated from the mothers for several days, bottle feeding was encouraged, and hospitals stays could last up to a week for normal deliveries.

**Birthing centers.** Today, childbirth in hospitals has become more humane. There is a growing recognition of the need to treat childbirth less like a disease and more like a normal event. Birthing centers are alternatives to standard hospital deliveries. They are based on the idea that most births are natural and nonmedical and should take place in a comfortable, homelike environment. Birthing centers are typically located in hospitals, but they keep medical technology to a minimum and provide comfortable furnishings, quiet, and privacy. Thus, they combine the relative comfort and privacy of a home birth with the availability of medical assistance if it is required.

Parents find birthing centers very rewarding and enriching for their childbirth experience (Eakins, 1986; Waldenström, 1999); such centers are a safe and effective alternative to
traditional hospital deliveries for low-risk pregnancies (Rooks et al., 1989). Birthing centers are especially effective for low-income mothers, who benefit from the additional social support and long-term care (Lubic, 1999). Low-income mothers who used a birthing center in New York City tell about the effectiveness of the birthing center in their own words:

If you have given birth, you have given life, and if you have given life then you can do anything—you can get a job and you can go to school and you can do anything you want as long as you put your mind to it.

That's the best thing about the birth center concept. It empowers women, and in turn, they empower their families, and families empower the community and it just grows and grows.

(Lubic, 1999, p. 21)

In one study of 8,677 childbirths in the United Kingdom, compared to conventional hospital rooms, birthing centers reduced the need for medical interventions and increased maternal satisfaction. Women who gave birth in birthing centers required less analgesia and anesthesia, were more likely to have a vaginal compared to a caesarian birth, had fewer episiotomies (surgical cutting of the labia thought to prevent severe tearing during delivery), and were more likely to initiate breast feeding (Hodnett et al., 2005). Because of a new awareness about the psychological benefits of early mother-infant and father-infant contact (see the section on parent-infant bonding in Chapter 5), babies are separated from parents only in the case of a medical complication. Otherwise, early and frequent contact is desirable.

Every hospital has different practices, however. Parents who desire the presence of fathers during delivery, rooming in (allowing the newborn to sleep in the mother’s room rather than in the hospital nursery), or natural childbirth need to consult their health care providers and inquire about hospital practices. It helps if the parents make their desires known and act assertively to get their personal needs met. Hospitals, like all large institutions, have rules of standard practice, but sometimes these can be tailored to fit the individual and family, if their needs are made known to the hospital staff.

Early discharge. In the case of normal deliveries, hospital stays can last from 1 to 3 days. Some hospitals allow discharge within 3 hours after the birth if the mother receives no analgesia or anesthesia and the infant is in good health. Under these conditions, there is no increased risk associated with early discharge (Mehl, Peterson, Sokolsky, & Whitt, 1976). More recently, early discharge has been allowed on demand in consultation with the physician.

Women who elect early discharge feel that the home is a better and more supportive environment for comfort, recovery, and early adaptation to their babies. Early-discharge mothers report more social support in the home (availability of relatives and friends) and are more confident in their ability to manage on their own (Lemmer, 1987). On the other hand, early discharge limits the ability of the hospital staff to provide parent education and to detect feeding problems and other abnormalities (Kiely, Drum, & Kessel, 1998). It may also deprive women of some needed rest to recover from the delivery. Women should try to evaluate their preferences and discuss them with staff.
Behavioral pain control and childbirth preparation. While drugs offer the advantages that they can be administered in controlled doses and are effective, a number of behavioral and psychological alternatives to speed labor and relieve pain are available. Many diverse kinds of pain-relieving methods have been used throughout human history. One common practice, used by the Laotians, the Navaho, and the Cuna of Panama, among others, is the use of music during labor. Among the Comanche and Tewa Indian tribes, heat is applied to the abdomen (M. Mead & Newton, 1967).

Some groups believe that pain and ease of delivery are functions of the mother’s body position during labor and delivery. Many cultures encourage women to give birth in a sitting position, usually held from behind by another woman. The Taureg of the Sahara insist that the laboring mother walk up and down small hills to allow the infant to become properly placed to facilitate delivery. Taureg women usually deliver from a kneeling position. In fact, most obstetrics textbooks in the United States at the turn of the century advocated an upright position during labor (M. Mead & Newton, 1967).

For some peoples, prevention is the best cure. The Ainu of Japan believe that maternal exercise will make the fetus small and encourage a shorter labor. This belief is actually supported by recent research (see Chapter 3; Campbell & Mottola, 2001; Clapp et al., 2002) although lower birthweight may be a risk factor in some cases. The Japanese value smaller newborns and are not pleased with multiple births, which they consider too animal-like. In a number of other cultures, including the Hopi of the American Southwest, women are encouraged to exercise during pregnancy (M. Mead & Newton, 1967).

Nonchemical pain control during labor in developed Western countries today is sometimes achieved using the Lamaze method. Working in France, Frederick Lamaze developed a system of exercise, breathing, and massage that was based on a theory of pain during labor developed by Grantly Dick-Read in Great Britain (Dick-Read, 1933/1972). According to Dick-Read, women become afraid during childbirth due to the pain that develops when muscles are contracted. He suggested that if women were to employ some commonly known methods of relaxation, their experience of pain would be lessened. Female animals naturally fall into panting and breathing patterns. Using these observations and the work of Dick-Read, Lamaze based his method on the use of rhythmic breathing as a mental distraction from pain and on relaxation methods to prevent it (Karmel, 1959). Dick-Read believed that natural methods, those that had been used over many human generations, were the best choice for many women (Mascucci, 2003).

Mother’s reports of higher pain during childbirth has also been associated with negative attitudes toward pregnancy and childbirth (Nettlebladt, Fagerstrom, & Udderberg, 1976) and with a lack of support from the husband. Women whose husbands were present during the labor and delivery, as well as those whose husbands stayed with them for longer periods, perceived childbirth as less painful (Davenport-Slack & Boylan, 1974; Nettlebladt et al., 1976). It could be, however, that women who were more likely to view childbirth as less painful were those who requested their husband’s presence for longer periods during the delivery. In addition, people who choose such approaches are a self-
selected group whose positive attitudes about labor and delivery might help them, even under adverse conditions.

There is some debate, though little concrete data, on how childbirth preparation affects women (Wideman & Singer, 1984). Some suggest that the effect is due to education and the ability to anticipate fearful events. Some think it is due to the relaxation techniques and/or the social support provided by the Lamaze approach, while others think the effect is related to positive images about the childbirth experience (Nichols & Humenick, 1988). Here are some examples of imagery techniques that have been used (C. Jones, 1987):

Imagine that you and your baby are breathing in harmony. Now imagine that you are inside the womb, face-to-face with your unborn child, who is comfortable and secure in a private sea of crystal-clear water. (p. 87)

Imagine yourself opening. Envision the baby’s head against the cervix and the cervix widening to let it pass. At that time, mentally say yes to the contractions as they come and fade away. (p. 145)

Some research has shown, however, that relaxation techniques may be superior to this approach since these images tend to be transitory, whereas breathing and massage can be sustained for longer periods (Markman & Kadushin, 1986). Lamaze-trained mothers, especially if they are accompanied by the father and receive professional support during the delivery, require less pain medication and fewer episiotomies (Copstick, Taylor, Hayes, & Morris, 1986; Hodnett & Osborn, 1989).

The enhancement of relaxation to control pain is also at the heart of the somatic awareness methods reviewed under the clinical theories in Chapter 2. The Rosen method, the Feldenkrais method, Watsu, and bodymind centering all rely on helping clients to relax and easing chronic tension and stress. Although these methods are probably not useful during childbirth, they may be helpful in childbirth preparation and recovery. Acupuncture and acupressure, massage, hypnosis, relaxation techniques, yoga, warm baths, walking, and music have all been shown to help ease labor pain. Somatic education helps a mother to be more in touch with her body. This reduces anxiety and pain and gives mothers greater confidence in their decisions to use or not to use drugs during delivery. Home-like hospital rooms and relaxation contribute to maternal well-being, lower the need for drugs, and reduce episiotomies. The latter have been shown to lead to longer post-birth recovery times for the mother compared to the stitching of small tears that may occur naturally during vaginal childbirth (Fleming et al., 2003; Hartmann et al., 2005).

Upright postures. During traditional hospital labors and deliveries, women had been confined almost the entire time to a supine position. There is a growing recognition that upright postures may be beneficial to both mother and infant. Anatomically, when a mother is upright, her pelvis widens, access to the birth canal is easier for the fetus, and pushing is more effective because of the assistance of gravity. Upright postures also improve the blood circulation to the mother’s abdominal muscles and increase the oxygen supply to the fetus, reduce the need for forceps, lower the rate of episiotomies, and reduce pain (Cottrell & Shannahan, 1987; de Jonge et al., 2004). Some studies find beneficial effects such as fewer
birth complications, shortening of labor, less backache pain, and easier pushing (Gardosi, Hutson, & Lynch, 1989; Holland & Smith, 1989; Lupe & Gross, 1986).

Upright postures can be achieved in a number of ways. During labor, some women find it helpful to get up and walk around, stand, or squat. Hospital beds can be tilted so that the mother is sitting. Some hospitals have birthing balls, large inflated exercise balls on which a mother can sit or lean. In other places a birthing bar is used. The bar is suspended about two feet above the bed. It allows the mother to pull herself upright any time during labor. Just changing positions sometimes relieves discomfort.

Midwives and doulas. A midwife is a practitioner who has been trained to assist women who are giving birth. Lay midwives receive informal and formal training, while nurse midwives are registered nurses who receive their training as part of their nursing education. Midwives often work alongside doctors and assist the mother as long as the labor is without complications. They are trained to recognize which complications require the attention of a physician. Midwives are usually less costly to parents than physicians, and they also provide both prenatal and postnatal care for the family. Midwives help families understand the various birthing options and the risks and benefits of drugs and surgical procedures, and they work with the family to enhance the healthy development of parents and baby. Midwives assist in the delivery of 80% of births worldwide.

Doula is an ancient Greek word meaning “an experienced woman who guides and assists a new mother in her infant-care tasks.” A doula works alongside doctors or midwives to provide emotional support during labor and delivery. Doulas are trained to recognize birth as a key life experience that the mother will remember all her life. Doulas serve as advocates and supporters of the parents in preparing for and carrying out their plans for the birth. Doulas attend the birth, provide emotional support and physical comfort measures, and help the mother and her partner communicate with the hospital staff. Randomized clinical trials using low-income first-time mothers found that doula-assisted delivery shortened the labor, reduced the number of forceps and cesarian deliveries, and increased satisfaction with the childbirth experience. Doula-assisted mothers also were more likely to initiate and maintain breast-feeding (Glink, 1998).

Doulas can be used by any woman who would like support and advocacy at an important and sensitive time in her life. If women have a close relationship to their physician or midwife, and if they believe they can obtain the kind of delivery they desire, a doula may not be necessary. On the other hand, even in the best of circumstances, physicians and midwives will have relatively little time to spend with each individual patient. Doulas take the perspective of the mother and serve as her support and advocate. When the clinician is too busy with assisting the actual delivery, the doula remains by the mother’s side, explains what is happening, and helps her to make decisions if she becomes confused or disoriented. Finding the right doula can alleviate a lot of anxiety for the mother and father, who can then concentrate their energies on preparing themselves physically and emotionally for the birth.
Home births. An alternative to hospital delivery is the modern practice of birth at home. Home births are standard practice in some countries, such as the Netherlands and most of Scandinavia. These births are assisted by professional midwives, and the incidence of infant mortality is lower in these countries than in the United States. On closer examination, though, this effect is due not to home birth itself but to other factors. These countries have a relatively high level of education and a low incidence of poverty. In addition, women who are at risk are not allowed to have home births. These women include very young or very old mothers, unmarried women, low-income women, and those with medical risks (Rosenblith & Sims-Knight, 1985). With a trained professional in attendance, screening for risk, and a nearby hospital in case of emergency, home births in the United States are no more risky than hospital births (R. Cohen, 1981; Hazell, 1975; Howe, 1988).

The Leboyer method: Birth without violence. Frederick Leboyer (1975) suggested that some of the hospital routines used in the 1970s were traumatic for the infant: holding the infant upside down in the cold air, placing the baby on a cold metal scale, putting silver nitrate in his or her eyes, separating the infant from the mother, putting the baby under bright lights, exposing him or her to loud sounds, and prematurely cutting the umbilical cord. With the Leboyer method, the delivery room is quiet and dimly lit, and the infant is placed on the mother’s warm abdomen right after birth until the umbilical cord stops pulsing. After the cord is cut, the infant is placed in a warm-water bath. Leboyer reports that infants so treated tend to be more relaxed and alert than other infants. This method has many similarities to Watsu (see Chapter 2).

Leboyer’s claims that such procedures increase the newborn’s alertness have not been verified scientifically. Most studies reporting positive effects were biased by the observer’s preference for the method and the lack of a control group (e.g., Rappoport, 1976). One well-controlled study (Nelson et al., 1980) found no difference in alertness between Leboyer and non-Leboyer babies, nor were there any differences in developmental test scores between the two groups at 8 months. Furthermore, half of the Leboyer babies reacted to the warm-water bath following birth with irritated crying. As with upright postures and childbirth preparation classes, it is difficult to establish a conclusive effect for these practices. On the positive side, most of the practices discussed here cannot be shown to have any harmful side effects, and they may be effective for many of the people who use them. LeBoyer’s work, however, did have an effect on the formation of birthing centers, which reduce stress on both mother and newborn.

Regardless of whether a mother chooses a physician, midwife, or doula, it is a good idea to make a birth plan in which the mother, her partner, and her care provider discuss what they would like to happen during labor and delivery. Several Internet sites are also available to help mothers understand their options and to construct a birth plan that suits their needs. The next section covers the physical characteristics of the normal newborn infant as well as newborns who are at risk.
THE BABY AT BIRTH: HEALTH AND RISK

The transition from an essentially aquatic existence to a world of air, light, and gravity is one of the most abrupt and remarkable developmental shifts in the human life span. Much of what we can observe in the human newborn is the result of making this adaptation to extrauterine life. Some of the souvenirs of their prior home will stay with the infants as they make this change.

As you might imagine, the newborn’s lungs are filled with mucus and amniotic fluid, making its initial attempts at breathing difficult. As the mucus gradually drains over the first few weeks of life, the infant’s breathing becomes more regular and quieter. Just about any kind of stimulation can induce respiration, even the mere exposure to air. Breathing can also be stimulated by a sneeze, cough, yawn, or cry. Some alternative birthing methods use massage or dip the infant into warm water as a stimulus to start breathing. Slapping the baby is not necessary.

Another major adaptation of the newborn to extrauterine existence is the loss of the umbilical connection to the mother. Immediately after birth, the infant’s abdominal muscles surrounding the umbilical vessels contract to inhibit the circulation of blood in the cord. Once the cord has been cut, the navel opening usually heals within a week, and the dried remains of the cord fall off in another few days. The umbilical cord contains cells that assist in the manufacture of new blood cells, much as the cells in bone marrow do. For this reason, physicians have begun to collect umbilical cords for use in the treatment of blood and immune disorders, such as leukemia and AIDS, in children (C. Thompson, 1995).

Once the umbilical cord has been severed and respiration has begun, it takes about 30 hours for the oxygen level of the blood to reach nearly normal levels. The blood pH balance needs about 1 week to become established, and blood pressure takes about 10 days to reach normal levels.

Just after birth, infants are wet with amniotic fluid, and their skin may still be coated with the white, cheesy vernix caseosa. The color of the skin may be pale to pink, or it may be slightly yellowish due to normal physiological jaundice. Jaundice is caused by unbalanced liver function. It can be treated by placing the baby under special lamps.

Almost all babies are born with smoky blue eyes, which do not develop their true color until later in the first year. Even neonates from parents of color may have light skin and blue eyes for the first few days of life, since eye and skin pigments depend on white light for further development.

At birth, the newborn retains some of the physical characteristics of the fetus. The newborn’s head is about one-fourth its total length, the legs about one-third. A newborn has virtually no voluntary control over his or her head, although if the head is cradled, the infant can turn it from side to side. The newborn has somewhat bowed legs, with the feet bent inward at the ankles so that the soles of the feet are almost parallel. The typical “baby face” includes a very short neck, no chin, and a flattened nose. Newborns’ heads are often temporarily misshapen from the pressures of the birth process. This gradually disappears by the end of the second week of life. Some fetal hair may remain on the infant’s head,
eyebrows, and back (the lanugo). This hair usually is replaced by more permanent hair within the first few months.

Newborns have six soft spots on the top of their heads, called fontanels. These openings provide some room for the various bones of the skull to move during the birth process, called molding. The fontanels also allow for the growth of the brain during the first years of life. They do not fully close until about 18 months. The initial shifting of the fontanels after birth is shown in Figure 4.3. The time of fontanel closure is unrelated to infant sex, race, birth measurements, or later growth measurements; slowly closing fontanels are not a sign of abnormal development (Kataria, Frutiger, Lanford, & Swanson, 1988).

At birth, virtually all the nerve cells in the brain are present, but they have not developed very far. During the first year, the brain doubles in size (from 350 to 750 cubic centimeters), and it doubles again by the sixth year. Most of the postnatal brain growth is accounted for by the increase in myelination, the development of a protective sheath around the nerve pathways, as well as by an increase in the volume and density of dendritic connections between the cells. Dendrites are the branchlike filaments that connect the nerve cells and transmit nerve impulses between the cells.

While these processes of brain development are occurring, the cells that receive fewer inputs and connections will eventually die. Thus, postnatal experience tends to actively select certain areas and cells in the brain for further development. Those areas and cells that are not used will eventually be lost (Greenough, Black, & Wallace, 1987). A more detailed discussion of brain development is in Chapter 5.

Other important changes are occurring in other parts of the newborn’s body. At birth, the newborn’s genitals appear large and prominent. Both sexes may have slightly enlarged breasts that may excrete a white, milk-like substance, and females may have a brief
“menstrual flow.” These phenomena are caused by the massive infusion of maternal hormones during the birth process, and the effects disappear quickly. Newborns may also look withered because they have very little body fat except in the cheeks, where it is needed for sucking. This withered look is even worse for premature infants, since the fat pads in their cheeks are underdeveloped.

Each baby’s body has a characteristic muscle tone and response to tactile stimulation. Some babies are cuddly; they will mold into the arms of the caregiver and curl up when held. Others are tense and tight; some squirm and some sprawl. An adult can almost hold the entire infant in one hand.

Taking in food through the mouth is not an entirely new experience to a newborn, since babies suck amniotic fluid in the uterus. Nevertheless, one of the major prenatal-to-postnatal transitions involves the handling of nutrients. Before birth, nutrient intake and waste matter both pass through the umbilical cord. After birth, the newborn’s digestive system must take over those functions. The intestines of the newborn are filled with a greenish-black substance called meconium, which consists of digested bits of mucus, amniotic fluid, shed skin, and hair that was ingested prenatally. Due to the excretion of meconium and also because the mother’s milk does not develop before the first few days, the infant typically experiences weight loss during the first week, but the weight is rapidly regained. The fluid that is excreted by the mother’s breasts in the first few days is called the colostrum (see the section on feeding in this chapter).

The process of keeping physiological signs at a steady level is known as homeostasis. At birth, temperature homeostasis is not fully functioning, and infants can easily become chilled if not wrapped. Infants can also become easily overheated if they are too heavily clothed. Infants should not be overdressed; as a general rule, they should wear the same number of layers of clothing as the adults in the same room. Infants need to be exposed to cold as well as warmth to help them develop the capacity to regulate their body temperature. This capability will not fully develop until after 1 month of age, when the sweat glands become more fully functional.

Assessing the Infant’s Status at Birth

Once a baby is born, a series of assessments may be done to determine whether there are any complications or whether the infant is in need of special attention. Assessments are divided into three basic groups. Screening assessments give an indication of the newborn’s ability to survive and whether there are any immediate medical needs. Neurological assessments test for problems in the newborn’s central and peripheral nervous system, such as major brain, spinal cord, or sensory damage. Behavioral assessments are used to rate the presence and strength of behavioral responses to stimulation and spontaneous activity. Some of the more common newborn assessment procedures are listed in Table 4.2.

One of the most widely used newborn screening tests was developed by Virginia Apgar (1953) and is known as the Apgar score. The test is relatively easy to do and takes
only a few seconds. The rating usually is made at 1 minute and again at 5 minutes after birth. Table 4.3 shows the categories of the Apgar rating and the possible score an infant may receive in each of five areas: respiration, heart rate, muscle tone, color, and reflex irritability. The infant’s total score is summed over each of the five areas. A total score of 7 or greater usually indicates that the infant is in no immediate danger, whereas a rating of less than 7 indicates some kind of severe risk to life. If the rating is less than 4, the infant is in critical condition.

The reason for making two ratings is to encourage hospital staff to continue to monitor the newborn over several minutes. Often staff members are distracted by other events and may miss the possible deterioration of the infant’s condition. In addition to the Apgar, the infant can be screened on the basis of its physical appearance, color, and the presence of any obvious deformities (Judd, 1985; Olds, London, & Ladewig, 1984; Sardana, 1985). Apgar scores have been found to relate to a variety of prenatal and birth complications. The scores are less likely to predict later outcomes of the infant, however, probably because low scores indicate the need for immediate treatment that may alleviate the problem (Francis, Self, & Horowitz, 1987). On the other hand, low Apgar scores are strongly correlated with infant mortality, especially if the scores decrease between the two testings.

Although the Apgar score is useful for determining the infant’s viability, it is a relatively crude assessment scale. It tells us little about actual complications the infant may have. Accordingly, pediatricians and developmentalists require an assessment procedure that aids early identification of childhood behavioral and functional disorders. If such problems can be detected in the newborn, medicine and psychology could more effectively concentrate their efforts on prevention, rather than simply treating problems after they appear. A number of neurological and behavioral examinations of the newborn infant can be used for specific diagnoses (see Table 4.2). Each of these examinations has its specific limitations and range of usefulness (Self & Horowitz, 1979).

### Table 4.2 Newborn Assessment Tests

<table>
<thead>
<tr>
<th>Type of Test</th>
<th>Name of Test</th>
<th>Description of Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening</td>
<td>Apgar</td>
<td>Heart rate, respiration, and other vital signs</td>
</tr>
<tr>
<td>Neurological</td>
<td>Dubowitz assessment of gestational age</td>
<td>Differentiation of small-for-date infants from infants with appropriate weight for gestational age.</td>
</tr>
<tr>
<td></td>
<td>Neurological examination of Prechtl &amp; Beintema</td>
<td>Tests of reflexes, posture, and motor development</td>
</tr>
<tr>
<td>Behavioral</td>
<td>Graham-Rosenblith tests</td>
<td>Responses to physical objects, strength of grasp, and response to covering the nose and mouth.</td>
</tr>
<tr>
<td></td>
<td>Brazelton neonatal assessment</td>
<td>Reflexes, responses to social and physical stimuli, response to covering nose and mouth, time spent in different states, and number of changes between states.</td>
</tr>
</tbody>
</table>

Among the neurological tests, the Dubowitz scale tests for the gestational age of the infant at birth. The gestational age is the number of weeks since conception. (Gestation is another word for pregnancy.) To check the gestational age, raters use the infant’s muscular control, physical size measurements, skin texture and color, amount of lanugo, and the size and development of the ears, breasts, and genitals. The Dubowitz scale can predict the gestational age to within a few days (Dubowitz, Dubowitz, & Goldberg, 1970; Jaroszewicz & Boyd, 1973). The neurological test of Prechtl and Beintema examines all of the newborn’s basic reflexes. It is related to the short-term status of the newborn, but like the Apgar, it is less clearly related to long-term outcomes (Francis et al., 1987).

The Graham-Rosenblith test and the Brazelton behavioral assessments use similar types of procedures. For example, the infant’s head is placed face down on a mattress. Most normal infants will turn their heads to one side to free the nasal passages. In a similar test, a cloth is placed gently over the face. In another test, the infant is pulled by the arms into a sitting position to check for head control and muscle tone. A flashlight and a bell are moved from side to side to see if the infant can localize the stimulus by turning his or her head. Faces and voices are also used in the Brazelton test. In addition, observations are made about the infant’s ability to control distress and maintain an awake state.

Because the Brazelton test involves a larger range of newborn behavior, it is the most frequently used. The Brazelton test has been studied extensively. It relates well to other newborn tests, such as the Prechtl and Beintema test. The test finds reliable individual differences between normal infants and can also be used to diagnose the behavioral difficulties of high-risk infants (Brazelton, Nugent, & Lester, 1987; Francis et al., 1987).

Another use of the Brazelton test is as an intervention. Research has found that mothers and fathers increased their knowledge of and responsivity to the baby if they observed their baby while it was undergoing the Brazelton test, especially if the examiner ex-

### TABLE 4.3 The Apgar Rating Scale

<table>
<thead>
<tr>
<th>Area</th>
<th>Score</th>
<th>Score</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Heart rate</td>
<td>Absent</td>
<td>Slow (&lt;100)</td>
<td>Rapid (&gt;100)</td>
</tr>
<tr>
<td>Respiration</td>
<td>Absent</td>
<td>Irregular</td>
<td>Good, infant crying</td>
</tr>
<tr>
<td>Muscle tone</td>
<td>Flaccid</td>
<td>Weak</td>
<td>Strong, well flexed</td>
</tr>
<tr>
<td>Color</td>
<td>Blue, pale</td>
<td>Body pink, extremities blue</td>
<td>All pink</td>
</tr>
</tbody>
</table>

**Reflex irritability**

<table>
<thead>
<tr>
<th>Area</th>
<th>Score</th>
<th>Score</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasal tickle</td>
<td>No response</td>
<td>Grimace</td>
<td>Cough, sneeze</td>
</tr>
<tr>
<td>Heel prick</td>
<td>No response</td>
<td>Mild response</td>
<td>Foot withdrawal, cry</td>
</tr>
</tbody>
</table>

plained the test and responded to the parents’ questions (Liptak, Keller, Feldman, & Chamberlain, 1983; Myers, 1982; Worobey & Belsky, 1982).

The field of newborn assessment is rapidly improving as researchers determine the most reliable indicators of long-term problems. Improved scoring procedures and statistics and a large number of longitudinal follow-up studies have also contributed to the development of better assessments. The hope of predicting many childhood disorders from newborn assessments, however, has not been realized. In the last chapter of this book, the findings on the possible long-term persistence into childhood and adulthood of individual differences between infants will be discussed.

Birth Complications

The infant’s early history is usually divided into three main phases: the prenatal, the perinatal (the period from 1 month before birth to about 1 month after), and the neonatal (the newborn until the age of 4 to 6 weeks). Although the leading cause of severe impairment stems from prenatal problems (Kopp & Parmelee, 1979), most of these problems do not show up until the perinatal period. In addition, a number of complications of the perinatal period are due to the birth process itself. Between 3 and 5 children in 1,000 show severe developmental problems before entering school, and about 85% of these problems can be attributed to prenatal and perinatal causes. Compared with the effect of prenatal and perinatal causes on later development, the contribution of neonatal problems—illness, disease, and accidents—is relatively small (Kopp & Parmelee, 1979).

Perinatal problems usually derive from disorders of delivery, perinatal infections, asphyxia, hypoglycemia (low blood sugar levels), prematurity, and cardiac and respiratory difficulties. Several of these problems appear to be caused by prenatal factors, many of which we discussed in the last chapter. There is considerable evidence that a number of the complications of the perinatal period can be overcome if the infant is exposed to a supportive social and physical environment. Infants who are raised in inadequate social and economic conditions are more likely to develop permanent deficits as a result of a perinatal complication (Kopp & Parmelee, 1979; Sameroff & Chandler, 1975). We will discuss the developmental outcomes of early deficits in Chapter 12.

One birth complication, prematurity, has received a good deal of attention from psychologists, parents, and physicians. Much of this interest has to do with modern improvements in neonatal intensive care that have permitted more premature infants to survive.

What Is Prematurity?

Some confusion surrounds the labeling of various classes of premature infants. In general, a number of factors can vary in the determination of an infant’s status. These are the birthweight, the gestational age, and the relationship between the two. Table 4.4 lists some of these classifications.
In the previous chapter, we looked at a variety of genetic, chromosomal, and teratogenic agents that may lead to premature birth. Although they are not the only causes, lower birthweight often results from such factors as smoking and alcohol use and poor maternal health or nutrition. Indeed, cigarette smoking during pregnancy is the largest single preventable cause of low birthweight, accounting for 20 to 30% of low-birthweight cases (Ogunyemi, Hullett, Leeper, & Risk, 1998). Exceptional stress and persistent family discord during the pregnancy period have also been associated with low birthweight (Chomitz, Cheung, & Lieberman, 1995; Ramsey, Abell, & Baker, 1986; Reeb, Graham, Zyzanski, & Kitson, 1987; A. Stein, Campbell, Day, McPherson, & Cooper, 1987). Infertility treatments that produce multiple births and low maternal weight gain also contribute to the incidence of low birthweight (Ogunyemi et al., 1998). A small percentage of infants are low birthweight even if the pregnancy had no risk factors.

The incidence of low birthweight and infant mortality varies by ethnicity (see Table 4.5). There is also a strong correlation between low birthweight and mortality. Note, however, that the mortality rates are only one-tenth as high as the rates of low birthweight. Typically, low birthweight and mortality increase as the availability of good prenatal health care and nutrition declines. It is therefore curious that the rates of mortality and low birthweight for African Americans exceed those of all other groups in industrialized countries. On the average, African American mothers have less education, are less likely to be married, are more likely to give birth during their teenage years, and have more general health problems than do other ethnic groups in the United States. These differences, however, are not enough to account for the fact that rates of low birthweight and mortality in African Americans are nearly double those in other ethnic groups, so more research is needed (Chomitz et al., 1995). One thing is clear: poor, young, African American women are at special risk for birth complications and should be the focus of national efforts to prevent low birthweight (see below).

**TABLE 4.4 Forms of Prematurity**

<table>
<thead>
<tr>
<th>Classification Factor</th>
<th>Premature Category</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Birthweight:</strong></td>
<td></td>
</tr>
<tr>
<td>Less than 1,000 grams</td>
<td>Extremely low birthweight (ELBW)</td>
</tr>
<tr>
<td>Between 1,000 and 1,500 grams</td>
<td>Very low birthweight (VLBW)</td>
</tr>
<tr>
<td>Between 1,500 and 2,500 grams</td>
<td>Low birthweight (LBW)</td>
</tr>
<tr>
<td>More than 2,500 grams</td>
<td>Normal birthweight</td>
</tr>
<tr>
<td><strong>Gestational age:</strong></td>
<td></td>
</tr>
<tr>
<td>Less than 37 weeks</td>
<td>Premature birth</td>
</tr>
<tr>
<td>More than 37 weeks</td>
<td>Full-term birth</td>
</tr>
<tr>
<td>Weight less than expected for gestational age</td>
<td>Intrauterine growth retardation</td>
</tr>
<tr>
<td>Weight appropriate for gestational age</td>
<td>See weight and term classifications above</td>
</tr>
</tbody>
</table>

In the previous chapter, we looked at a variety of genetic, chromosomal, and teratogenic agents that may lead to premature birth. Although they are not the only causes, lower birthweight often results from such factors as smoking and alcohol use and poor maternal health or nutrition. Indeed, cigarette smoking during pregnancy is the largest single preventable cause of low birthweight, accounting for 20 to 30% of low-birthweight cases (Ogunyemi, Hullett, Leeper, & Risk, 1998). Exceptional stress and persistent family discord during the pregnancy period have also been associated with low birthweight (Chomitz, Cheung, & Lieberman, 1995; Ramsey, Abell, & Baker, 1986; Reeb, Graham, Zyzanski, & Kitson, 1987; A. Stein, Campbell, Day, McPherson, & Cooper, 1987). Infertility treatments that produce multiple births and low maternal weight gain also contribute to the incidence of low birthweight (Ogunyemi et al., 1998). A small percentage of infants are low birthweight even if the pregnancy had no risk factors.

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Problems and Prospects for Premature and Low-Birthweight Babies and Their Families

In 1975, about 40% of premature infants developed serious intellectual and neurological deficits. Due to improvements in medical technology and knowledge about the premature infant, the percentage of later deficits continues to decrease. Infants who would have been severely handicapped a generation ago, had they even survived, have a better prognosis for developing normally.

The youngest and smallest babies still run the most risk of complications and death. Babies under 1,000 grams (extremely low birthweight, or ELBW) or of less than 32 weeks’ gestational age are currently considered to be at the most risk. Although more of these babies are saved each year, it increases the chances that babies with handicaps will survive from this group (Hack, Klein, & Taylor, 1995). Infants under 1,000 grams (ELBW) show the least improvements in outcomes.

Recent research shows that a large proportion of infants born prematurely, regardless of weight, may have more health, motor, and intellectual problems than full-term infants, both in the short term and in the long term. The short- and long-term consequences of premature birth will now be covered, followed by a review of the research on improvements in neonatal intensive care.

**Short-term effects.** Because of their early birth and/or low birthweight, premature babies are often at a disadvantage in getting a good start on adaptation to the real world. They suffer more from a lack of oxygen during the birth process (respiratory distress), they are more likely to have jaundice and to suffer physical and mental impairments as a result of the birth process, and many of them will die, depending upon the severity of their complications and birthweight. Two-thirds of premies under 1,000 grams were likely to die in 2000; about 15% of those between 1,000 and 1,500 grams died, but less than 5% died if they weighed between 1,500 and 2,500 grams (Matthews et al., 2002).

Generalizing about the abilities of premature infants is difficult because they vary widely in weight and gestational age, because prematurity has many different causes, and because the quality of neonatal care is highly variable. Researchers today categorize infants into experimental groups on the basis of weight, gestational age, and whether they...
have medical complications in addition to the prematurity. In follow-up studies of the effects of prematurity, researchers compare normal infants with premature infants of the same gestational age, rather than comparing infants of the same natal age. For example, a 3-month-old normal infant might be compared with a 4-month-old premature infant, both of whom were conceived about the same time.

Using gestational age rather than birth age is based on the ideas of Gesell (see Chapter 1), who charted the ages at which the average infant reached developmental milestones. In many cases, gestational age is the best indicator of developmental status. Many premature infants cannot suck from a bottle successfully until they have reached a gestational age of 35 weeks, about the age of a full-term newborn (Brake, Fifer, Alfasi, & Fleischman, 1988). Typical patterns of sleep and waking displayed by full-term babies do not begin until 34 weeks’ gestational age; until then, premature infants spend considerably more time sleeping than waking (Korner et al., 1988). Thirty-four weeks appears to be the age at which premature infants show a marked increase in their ability to respond appropriately to external stimulation. Before that age, it takes a considerable effort on the part of an adult to keep the baby still and alert in the presence of a new tactile, auditory, or
visual stimulus (Als, Duffy, & McAnulty, 1988). The problem with using gestational age is that it is based on averages and thus may not fit the developmental abilities of any particular infant.

**Long-term effects.** The long-term effects of any particular event or risk factor in early infancy are particularly difficult to assess. In Chapter 12, we return to the general problem of how to determine the effects of early experiences. For now, you should keep in mind that the effects of prematurity independent of other factors cannot be completely determined. This is because many premature infants have other complications, and we cannot assign infants randomly to experimental groups based on prematurity and health status. In addition, many premature and sick infants receive a variety of short-term and long-term interventions—including special attention from their families—that may alleviate their conditions. It would be unethical to withhold intervention or family support just so we can observe how a baby would develop without these resources.

Individuals who were born prematurely are shorter and smaller on average than people who were full term at birth. The difference is greatest during the first 2 years of life, during which babies who are small at birth often show some catch-up growth if they receive appropriate care and nutrition (Peña, Teburg, & Hoppenbrouwers, 1987). **Catch-up growth** refers to a more rapid growth rate than for normal infants early in life and a more normal growth rate once the infant reaches a weight that is appropriate for his or her gestational age. For most prematures, catch-up growth is the most rapid during the first year of life (Peña et al., 1987). Catch-up growth may occur at any point in childhood if the individual suffers a deprivation, accident, or illness and is later restored to normal functioning (Barrett, Radke-Yarrow, & Klein, 1982; Tanner, 1970). Catch-up growth does not mean that the individual will eventually enter the normal range, but rather that he or she will grow faster than normal following the trauma.

The effects of prematurity on intelligence, motor skills, perceptual skills, and emotion are often compounded by health factors. In one study, a group of premature infants was classified according to health status at birth: high-, moderate-, and low-risk groups were formed according to respiratory problems in the hospital. At 12 and 18 months of age, the high-risk premature infants had considerably more difficulty coping with stressful situations, and once they became distressed, they were more difficult to soothe (Stiefel, Plunket, & Meisels, 1987). This study shows that health risk, when added to prematurity, has a significantly greater impact on emotional regulation than prematurity alone.

In another study, infants who experienced intraventricular hemorrhage (IVH) were assessed on motor and behavioral measures at 1 and 2 years (Sostek, Smith, Katz, & Grant, 1987). The infants were grouped according to severity of IVH and birthweight. Birthweight and IVH had a minor correlation with outcome at 1 year and no relationship at age 2. More recent research, on the other hand, finds that IVH is one of the most important predictors of long-term motor and health deficits (Messinger, Dolcourt, King, Bodnar, & Beck, 1996). Many, but not all, infants who have IVH will suffer from deficits. Those who have a difficult temperament and who come from low-income single-parent
families with high parenting stress were more likely to show long-term deficits in social
skills (Miller et al., 2001; Saylor et al., 2003). Many IVH children who are not otherwise
at risk are able to recover although it may take several years. This pattern of recovery is
called self-righting and is comparable to catch-up growth.

For factors related to the parent-infant relationship, we find in some cases no differ-
ences between full-term and very-low-birthweight infants (less than 1,500 grams) in
mother- and father-infant attachment at 1 year when the comparison is made at equivalent
gestational ages (Easterbrooks, 1989). Other research shows that parents of premature in-
fants are more active and stimulating than parents of full-term babies, at least during the
first year. Premature infants receive more holding, vocalizing, and caretaking during the
first year, even though these infants are less attentive and less likely to play and vocalize
than full-term babies. These compensatory parenting behaviors contribute directly to
self-righting in the more healthy premature infants (Weiss et al., 2004). As the more
healthy premature babies catch up with the full terms, their parents also show more normal lev-
els of behavior toward them (Barratt, Roach, & Leavitt, 1996; Branchfeld, Goldberg, &
Sloman, 1980; Crawford, 1982). It may be that these additional parental actions are used
to compensate for a less active infant, and they may actually help the infant to recover.

For some parents, however, dealing with a premature infant can have short-term ef-
effects and may lead to lasting difficulties in the relationship. Parents experience additional
stress, depression, and emotional trauma just by the fact of having their baby in a hospital
for a long period of time (Conner & Nelson, 1999; Cronin, Shapiro, Casiro, & Cheang,
1995; Hughes, McCollum, Shefriel, & Sanchez, 1994; Nagata et al., 2004; L. T. Singer,
Salvator, Guo, Collin, Lilien, & Baley, 1999). In early infancy, premature babies become easily
overwhelmed with stimulation, smiling less and fussing more, and parents may experience
them as unrewarding (Eckerman, Hsu, Molitor, Leung, & Goldstein, 1999). Some
parents experience burnout in their role (Barnard, Bee, & Hammond, 1984), and there is a
higher than expected percentage of premature infants among children who are later
abused or neglected (R. S. Hunter, Kilstrom, Kraybill, & Loda, 1978). In general, the
quality of the home and school environments can have an effect on alleviating long-term
effects of prematurity (Dittrichová et al., 1996; Kalmar, 1996; Sansavini, Rizzardi,
Alessandroni, & Giovanelli, 1996).

Many premature, especially those who were very low birthweight (VLBW), have defi-
cits that last until middle childhood and adolescence and perhaps even longer. These defi-
cits are in such areas as attention, behavior problems and emotional maturity, language
skill, memory, intelligence and educational performance, perceptual and motor function,
serious illnesses, and mental retardation (Blackman, Lindgren, Hein, & Harper, 1987; Bot-
ting, Powls, Cooke, & Marlow, 1998; Grigoroiu-Serbanescu, 1981; Hack et al., 1995;
Lefebvre, Bard, Veilleux, & Martel, 1988; Miller et al., 2001; Rieck, Arad, & Netzer, 1996;
Robson & Cline, 1998; Vicari et al., 2004). In general, researchers have discovered
long-term effects of perinatal risk only for the most extreme cases of illness or very low
birthweight or for families who suffer the most stress (such as low income and lack of edu-
cation). More subtle and as yet unmeasured effects of prematurity may last a lifetime.
Remember also that even when there are few differences between premature and full-term infants in later life, it does not mean that life has been normal or easy for the prematures and their families. Their improved status in later life may have been the result of persistent, difficult, and costly interventions on the part of parents and professionals (Lewit, Baker, Corman, & Shiono, 1995). In the next section, early intervention procedures will be covered.

**Interventions for Premature Infants**

Improvements in neonatal intensive care have saved many lives and improved the health of many premature babies (Battin, Ling, Whitfield, MacKinnon, & Effer, 1998; Richardson et al., 1998). Better ways have been found to manage the hospital care for these infants, and new methods have been developed to help parents once the infants have come home. Only about 5% of newborns require intensive care; most of these are due to low birthweight. Most infants in intensive care will require between 15 and 50 days (Hack et al., 1995).

**Medical procedures in the hospital.** In a modern neonatal intensive care unit (NICU), an increasing number of procedures are adapted to the special needs of premature infants. The smallest infants need high levels of oxygen, warm temperatures, bedding that does not bruise their thin and delicate skin, and nutrients. In the past, providing these needs produced more complications for the infants, who were exposed to dangerously high levels of noise and light inside incubator boxes, bruised from touch, and scarred from needle pricks. Blindness resulted from too much oxygen and deafness from too much noise.

Research has demonstrated that late-term fetuses, premature infants, and full-term newborns feel pain. Repeated experience of untreated pain has the effect of making infants hypervigilant during social interaction and causing them to exhibit increased tension in response to tactile stimulation. In addition, preemies may suffer from the stress of separation from their mothers and long-term isolation due to hospitalization (Karns, 2000).

Today, premature infants are on open beds in a nursery that has higher concentrations of oxygen in the air. They are warmed with low-intensity lights, and their bedding is extremely soft. Some hospitals use sheepskins or water beds. The babies are touched gently and as little as possible, sound and light are kept at moderate levels, and the oxygen content of the blood is monitored continuously by a probe attached to the skin surface, reducing the need for blood sampling. Pain control is managed by drugs, pacifier sucking, giving sucrose, and providing soothing sounds (Furdon, Pfeil, & Snow, 1998; Kawakami, Takai-Kawakami, Kurihara, Shimizu, & Yanaihara, 1996; Korner, 1987; Sell, Hill-Mangan, & Holberg, 1992; Stevens et al., 1999).

**Behavioral procedures in the hospital.** A variety of approaches have been used either to compensate for missing intrauterine experiences or to try to enhance catch-up growth. One important form of stimulation that a premature lacks is whole-body movement, called **vestibular-proprioceptive stimulation**. Premature infants have received
rocking stimulation from adults, in hammocks, from a breathing teddy bear, and from oscillating waterbeds. This rhythmic stimulation has been designed to be similar to the kinds of movements and breathing rhythms that a full-term infant would feel inside the mother during the last weeks of pregnancy. If these natural rhythms are attuned to the needs of individual infants so as not to overstimulate them, the infants increase weight gain, improve sleeping and other physiological indicators, and can be discharged earlier from the hospital (Gatt, Wallace, Glasscock, McKee, & Cohen, 1994; Ingersoll & Thoman, 1994; Korner, 1987; E. B. Thoman, 1993).

Although preterms, especially the smallest ones, cannot ingest fluids, they can suck readily on a pacifier; this is called **nonnutritive sucking** (NNS). Fetuses of the same gestational age inside the uterus also suck regularly. In several studies, premature infants who were provided with pacifiers on a regular basis required fewer tube feedings, started bottle feeding earlier, slept better, gained more weight, and were discharged earlier from the hospital (G. C. Anderson, Burroughs, & Measel, 1983; T. Field et al., 1982; Woodson, Drinkwin, & Hamilton, 1985). NNS reduces the infant’s average heart rate, thus allowing the infant the opportunity to use its energy resources for growth instead of life maintenance (Woodson & Hamilton, 1988).

Another form of behavioral intervention is stroking and handling. It appears that for very-low-birthweight infants (less than 1,500 grams), stroking can actually be detrimental due to the extreme sensitivity of the infant’s skin. In studies of this group of infants, talking helped to bring the infants into an attentive state, while talking plus touching caused the infant to withdraw (Eckerman, Oehler, Medvin, & Hannan, 1994; Oehler & Eckerman, 1988; Weiss, 2005).

For babies between 1,500 and 2,500 grams, stroking in the form of back massage, neck rubbing, and movement of arms and legs had remarkable effects. Massage for 15 minutes per day over 10 to 15 days can increase weight 31 to 47% compared to preterms who did not receive stroking and also reduce birth complications (Field, 2001). Studies of animal infants have shown that touch stimulates hormones that regulate the action and development of the brain and body function, including decreases in cortisol and increases in growth hormone and oxytocin. The latter hormone is associated with feelings of well-being and interpersonal attraction (Dieter et al., 2003; Field, 2001; Schanberg, Bartolome, & Kuhn, 1987). These studies clearly show that the overall amount of stimulation is not important. Rather, some specific forms of stimulation work better than others, and the most effective stimulation will depend on the infant’s gestational age and weight. Music in the form of male and female singing voices, for example, leads to earlier discharge, improved respiration, and more weight gain (Cassidy & Standley, 1995; Coleman et al., 1997; Weiss, 2005).

Another approach that emphasizes touch and handling is known as kangaroo care. In **kangaroo care**, the infant, wearing only a diaper, is placed on the parent’s chest. The infant’s head is turned to the side so the baby’s ear is against the parent’s heart. Any tubes or wires are taped to the parent’s clothing. Kangaroo care originated in Bogotá, Colombia, in 1983 because electrical power often failed and expensive equipment did not often
work. Infant mortality was reduced significantly. Since then, many studies have been conducted showing positive effects on preterm infants and their families. Preterms who get kangaroo care cry less, sleep for longer periods, gain more weight, have more coordinated breathing and heartbeat patterns, are more attentive and interact better with their parents, have lower cortisol levels, and need less supplemental oxygen. Both mothers and fathers also feel closer to their babies and to each other, experience less stress and less depression, and increase in their confidence that they can take care of the babies at home (G. C. Anderson, 1999; Feldman, Eidelman, Sirot, & Weller, 2002; Feldman, Weller, Sirot, & Eidelman, 2002; Feldman et al., 2003; Gitau et al., 2002; Ludington-Hoe, Ferreira, & Goldsten, 1998; Ludington-Hoe & Swinth, 1996; Messmer et al., 1999; Tallandini & Scalembra, 2006). Kangaroo care’s close skin-to-skin contact is probably a good way to handle all babies. Because babies live in a world of touch and warmth, they respond best when these ingredients are provided. A behavior ecology theorist would not be surprised to hear about kangaroo care; it has been around for millions of years.

Finally, interventions can be made with the parents to educate them about the special needs of the premature infant. Parental visitation to the NICU gives the infant more opportunities for stimulation and aids in the parents’ positive perceptions of their infant. Both mothers and fathers benefit from frequent visitations (Levy-Shiff, Sharir, & Mogilner, 1989), and infants who are visited more frequently by parents are released sooner from the hospital (Zeskind & Iacino, 1984). Since many mothers of prematures are low-income teenagers, educational interventions directed at making mothers more aware of their responsibilities and setting more realistic goals are effective in improving the outcomes for their babies (Field, Widmayer, Stringer, & Ignatoff, 1980; Pridham, 1998; Zeskind & Iacino, 1987).

Parents may have difficulty communicating with a premature infant because they fear that the child may be vulnerable, and indeed premature infants are more passive and slower to respond to adult social contacts. Premature infants often show a pattern of having either rigid or floppy body posture, and their facial expressions and crying may be different from those of normal babies. Parents need to understand that these differences are normal and will eventually disappear with sensitive handling (van Beek & Samson, 1994).

Even though low-birthweight and premature infants make up only 9% of births, they account for 35% of the medical costs devoted to infants. In 1988 dollars, a normal birth costs about $2,000–$3,000 depending upon the length of hospital stay. Low-birthweight infants as a group average about $6,000 per birth, while the cost for a very-low-birthweight infant is $26,000. Neonatal intensive care is very expensive, at least $100,000 per infant depending on the length of the hospital stay (Rogowski, 1998, 1999). Low-birthweight infants require additional medical treatment during childhood, amounting to an extra $1,200 per year more than normal children. Because many of the families who have low-birthweight children are poor, these costs are borne by government assistance programs such as Medicaid and by increased health insurance premiums for everyone. In addition, prematurity may lead to other long-term costs, such as the prosecution and incarceration of persons who exhibit criminal and delin-
quent behavior that may result from early brain damage and later deprivation. Thus, it is essential that governments devote funding to study the causes and preventions of prematurity (Lewit et al., 1995).

Prevention costs considerably less. Good prenatal care for low-income women could reduce prematurity and complications radically and cost less than $1,000 per child. Simple hospital interventions such as those described here also have long-term benefits to society. The percentage of hospitals using the various techniques mentioned in this section are shown in Table 4.6. Unfortunately, low-income women find it difficult to obtain good prenatal care, Medicaid places limits on the number of allowable prenatal visits, and it takes a long time to process claims. Ultimately, the prevention of birth defects will require radical changes in our society, including the elimination of poverty and prejudice (Alexander & Korenbrot, 1995).

What Can We Learn about Fetal Psychology from Premature Infants?

Infants born prematurely are the same age as late-term fetuses and have the same behavioral, sensory, and neurological abilities. Because premies have experienced the birth process, and because they had to adapt to life outside the uterus, they may have acquired abilities that the fetus does not possess. On the other hand, the NICU behavioral interventions that are most successful seem to offer clues to the characteristics of the prenatal environment that are most conducive to fetal psychological development.

In Chapter 3, we learned that in the third fetal period, the fetus was responsive to movement, touch, and sound, and that it could suck. Because of the success of interventions involving these modalities with premies, it is reasonable to conclude that fetuses require vestibular-proprrioceptive, tactile, and auditory stimulation, as well as opportunities for sucking. The prenatal environment is uniquely suited to provide these

### Table 4.6 Uses of Neonatal Stimulation in Hospitals in the United States

<table>
<thead>
<tr>
<th>Type of stimulation</th>
<th>Percentage of Hospitals in the United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doulas during childbirth</td>
<td>30</td>
</tr>
<tr>
<td>Maternal massage during childbirth</td>
<td>30</td>
</tr>
<tr>
<td>Mother-baby skin-to-skin contact following birth</td>
<td>83</td>
</tr>
<tr>
<td>Music in the NICU</td>
<td>72</td>
</tr>
<tr>
<td>Rocking in the NICU</td>
<td>85</td>
</tr>
<tr>
<td>Kangaroo care in the NICU</td>
<td>98</td>
</tr>
<tr>
<td>Nonnutritive sucking in the NICU</td>
<td>96</td>
</tr>
<tr>
<td>Breast-feeding in the NICU</td>
<td>98</td>
</tr>
<tr>
<td>Infant massage in the NICU</td>
<td>38</td>
</tr>
</tbody>
</table>

requirements for growth. Vestibular-proprioceptive stimulation comes from maternal movements. Tactile stimulation is provided in terms of the soft feeling, warm temperature, and constant flow of the amniotic fluid over the fetus’s body. Auditory stimulation is provided by the mother’s heartbeat and voice.

These forms of stimulation are apparently necessary to sustain normal fetal development. They probably are related to feelings of pleasure, comfort, and security. It is also possible that the fetus has a sense of an emergent self (see Chapters 2 and 5), as these various sensory modalities are experienced in an integrated way that provides a sense of completeness.

PERINATAL MORTALITY

Like prematurity and health risk, infant mortality is greatest in groups who have low incomes and inadequate health care. Most of the causes of perinatal death can be found in poor prenatal care, ill health, or malnutrition of the mother during pregnancy. Current statistics for infant mortality are shown in Table 4.7. Although infants are more likely to die than mothers, those countries and ethnicities that have high infant mortality also have high maternal mortality (United Nations Department of Economic and Social Affairs, 1986). The causes of maternal mortality are very different from the causes of infant mortality, however. The leading causes of maternal death in the United States are pregnancy-induced high blood pressure, hemorrhage (excessive bleeding following childbirth), and respiratory failure (Grimes, 1994).

Apparently, a trend over time toward decreasing mortality has been going on since records began to be kept in 1750. Balog (1976) traced the changes in mortality over the last 200 years in the United States and found no obvious dips in the rate after major medical advances, such as drugs and sterilization procedures. He concluded that changes in mortality rates reflect trends in general economic growth, a higher standard of living, and better education—in short, social and economic factors.

The one place in the world where maternal mortality has been increasing over the past 30 years is sub-Saharan Africa. There are several explanations for this extraordinarily high incidence of maternal deaths in Africa. The deteriorating economic, political, and social conditions that lead to starvation and deprivation for all people are a factor. Another is the high rate of sexism and violence against women. Women are expected to have as many children as possible, even in the worst of circumstances. Many of these countries also practice female genital mutilation, a widespread procedure in which a young girl’s clitoris is removed to prevent her from experiencing sexual pleasure. Thus, the African situation is complicated by cultural factors over and above the usual social and economic factors that cause maternal death (WIN News, 1992).

In the United States, even though mortality has fallen for ethnic groups, African American infants are still twice as likely to die as Caucasian Americans. This difference has existed for at least half a century. What could be the cause? Homicides, birth injuries, and congenital abnormalities are nearly the same in all ethnic groups in the United States, so these are not factors. Hispanic infants are also less likely to die than African American in-
fants. In general, infant mortality comes from a combination of factors including poverty, poor prenatal nutrition and care, teen pregnancy, family stress, obesity, and prematurity.

Research shows that for African American mothers, the stress of racism adds to these other factors to increase infant mortality. Black women describe the lasting effects of their own childhood experiences of racism from teachers and others, and as adults from employers and the community. Poor black women have to make stressful choices about what to eat (e.g., nutritionally poor fast food that is cheap) and where to live (in neighborhoods with high crime rates and poor schools). Because we know that stress impacts fetal development (Chapter 3), the newborns of these mothers are starting life with compromises to their physical functioning (Lu & Lu, 2007).

The most common causes of neonatal mortality among the poor in the United States and in developing nations are respiratory problems and diarrhea. They derive from the immature system’s inability to cope with normal bacterial infections and physical insults and stem largely from deficits—like stress from the mother—acquired prenatally. Studies have shown, for example, that adequate nutritional supplementation during pregnancy can cut the infant death rate by as much as half (Werner, 1979). In the United States, only a very small percentage of infant or maternal deaths can be attributed to ineffective hospital care during and after birth (Escobar et al., 1998).

Apparently, malnutrition, poverty, racism, and ill health act as a system: one condition feeds upon another to worsen or maintain high death and disease rates. In many countries, people who cannot make a living on farms move into the cities to join the growing poor population in the inner city. Forced to live in slums with poor sanitation, they have little food and no money. Urban employment places special burdens on mothers who must travel away from home, and there are seldom adequate child-care facilities. Lack of energy from malnutrition contributes to the inability to cope with these enormous problems.

### TABLE 4.7 Rates of Infant Mortality by Country per 1,000 Live Births (2006)

<table>
<thead>
<tr>
<th>Country</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>2.8</td>
</tr>
<tr>
<td>Sweden</td>
<td>2.4</td>
</tr>
<tr>
<td>France</td>
<td>3.6</td>
</tr>
<tr>
<td>Denmark</td>
<td>4.4</td>
</tr>
<tr>
<td>Australia</td>
<td>4.9</td>
</tr>
<tr>
<td>Italy</td>
<td>4.1</td>
</tr>
<tr>
<td>Canada</td>
<td>5.3</td>
</tr>
<tr>
<td>USA</td>
<td>6.7</td>
</tr>
<tr>
<td>Mexico</td>
<td>21.0</td>
</tr>
<tr>
<td>Less-developed countries</td>
<td>57.0</td>
</tr>
</tbody>
</table>

Source: Population Reference Bureau: [www.prb.org/pdf06/06worlddatashee.pdf](http://www.prb.org/pdf06/06worlddatashee.pdf)
The prevention and elimination of these problems depend on intervention in the cycle of poverty, racism, and ill health. Community-based clinics providing medical care during pregnancy, simple disease-screening procedures, immunizations, nutrition education, fertility advice, upgrading of parental competence, improved sanitation, and the effective management of diarrhea already are being implemented in many less developed countries (Puffer & Serrano, 1973; WIN News, 1992; World Health Organization, 1976).

Supplemental nutrition given to mothers has a greater effect on infant mortality than on infant birthweight. In a study done in Bogotá, Colombia, supplemental food for malnourished mothers increased birthweight by only 77 grams but decreased the neonatal death rate from 42 to 23 per 1,000 births. Food availability for pregnant mothers in developing countries can be increased by larger contributions from rich nations. This assistance will reduce pressures to use land for cash crops (such as coffee and cocoa) and allow local farmers to grow their own food. Supporting local health care and breast-feeding will also help to reduce infant mortality (Falkner, 1985).

The United Nations has developed and tested a successful health education program called GOBI, which stands for Growth charts, Oral rehydration, Breast-feeding, and Immunization (Werner, 1986). By comparing their own infant’s development to standard growth charts, parents can detect growth retardation and conditions such as failure-to-thrive. Failure-to-thrive is a condition in which infants fail to respond to the environment and continue to deteriorate even when intervention is available and even when parents do everything possible. Failure-to-thrive has unknown causes, but intervention can help in some cases even though failure-to-thrive children may permanently lag behind others in language, intelligence, and emotional maturity.

Oral rehydration—providing fluids—is the primary treatment for infantile diarrhea. Breast-feeding provides adequate and sanitary nourishment as well as natural immunization (see the section on breast-feeding in this chapter). Immunization protects children from many infectious diseases.

An alternative explanation for the reduction in infant mortality is that it may be associated with the decrease in the number of pregnancies a woman will have. In the 1700s, a woman might expect to carry 10 to 15 conceptions to term, which would mean an increased probability of mortality for each infant. The age of the mother, the spacing between pregnancies, and the number of pregnancies all account for a portion of the risk of infant death.

Age and sex are also important factors in determining the probability of infant death. The highest probability of death is when an infant is less than 24 hours old. In fact, if a baby survives beyond the first day, the odds of mortality are extremely low, about 1 per 1,000 or less. With regard to sex, males tend to have a higher death rate all through their life spans. More males are conceived, but more are miscarried or spontaneously aborted.

These raw statistics are sobering, but they do little to make us aware that each time an infant dies, the family feels a major loss. The next section will try to give you insight into the human element behind the mortality tables.
How Does the Family Respond to the Death of an Infant?

The loss parents feel when a newborn dies may not be the same feeling as when an older child or some other close relative dies, but neonatal death can deeply affect parents (Helmrath & Steinitz, 1978). If parents are encouraged to mourn the loss and deal successfully with the painful feelings and memories, the bereavement process may lead to more adaptive parenting with later children. Social supports, hospice services, and religious traditions for dealing with death and loss can be extremely comforting for parents. Older children in the family also need support and counseling to understand the loss and their parent’s grief (Drotar & Irvin, 1979; Hass & Walter, 2006–2007; Hesse & van Ijzendoorn, 1998; O’Leary, 2007).

The normal sequence of emotions parents experience after neonatal death is similar to other kinds of grief reactions. Upon hearing the news that their baby has died or will soon die, parents experience shock and denial. They think a mistake has been made and wonder if it can be corrected. The next phase is feelings of sadness and loss mixed with anger. This anger may be directed at others, such as the obstetrician, or it may be directed at themselves in the form of self-blame. Gradually, parents come to accept the death and readjust the reality to their lives. This can often take several years. Having healthy children later on helps this process, but parents continue to fear that something will go wrong with the next child and wonder what their lost child might have been like (Abboud & Liamputtong, 2005).

A number of practitioners have argued that the loss of the newborn should be treated like any other death in the family. Some hospitals simply dispose of the body without allowing the parents any option to view it. Parents often are concerned about the actual disposition of the infant’s body. They may have painful and frightening fantasies: perhaps the infant did not die naturally but was used for some strange experiment; perhaps the child’s body is on display in a jar for medical students to look at; was the infant cremated or just thrown away? As unlikely as these fantasies are, they are quite common among such parents (L. Cohen, Zilkha, Middleton, & O’Donnohue, 1978).

In one program (L. Cohen et al., 1978), parents are offered the option of viewing the body. If they elect to do this, a nurse brings the infant wrapped in a blanket. The blanket is tucked to hide any abnormalities. At the sight of the deceased infant, mothers are less afraid than expected. In all cases in this program, infants are given appropriate religious services and burials. In the United Kingdom, hospitals follow the “Sands Guidelines” that follow the parents’ needs and wishes about whether or not to view the body, to have an autopsy, and to have a burial or cremation (Schott & Henley, 2007).

Some hospitals take photographs of sick infants at birth. Because parents are distressed to hear that their infant is ill and may die, the hospital photo may be the only one that is taken. Many states now have support groups for parents following perinatal death. Similar grief reactions are seen in cases of miscarriage, especially in instances of repeated miscarriage, and in sudden infant death syndrome, in which death occurs unexpectedly between 1 and 6 months of age (see Chapter 6). In all cases, factual and frank discussions with medical
personnel, the availability of the autopsy report, and a funeral service may help the parents cope (Dyregrov & Matthiesen, 1987; Kotch & Cohen, 1986).

Between life and death, there are some gray areas. Infants may be born viable but suffer from gross deformities or other conditions that would impair later functioning. The issues faced by parents and doctors in these situations are not unlike those faced by the families of persons in comas or with terminal and painful diseases or by those close to the elderly and infirm. Euthanasia is the act of causing a painless death or of letting someone die naturally without trying to prolong life with “heroic” medical procedures. As you can imagine, the idea of euthanasia involves some serious and difficult religious, ethical, legal, medical, and personal issues that are not easily resolved. With the advent of sophisticated neonatal intensive care, parents and pediatricians are facing these issues more and more (see the Applications section in this chapter).

FAMILY AND SOCIETY

What Are the Attitudes and Emotions of Women and Men following Childbirth?

The perinatal period is unique in the life course. It is a major developmental transition for the family as the pregnancy ends and a new person is born. Parents, especially first-time parents, must learn new roles and take on important new demands and pleasures. Perhaps the transition is not as crucial for the infant. Although the baby must learn to breathe and live in an atmospheric as opposed to an aquatic environment, the ability to breathe, feel, suck, hear, and move had already been established in the last months of gestation.

Childbirth itself is an event full of powerful human emotions. Parents are filled with excitement and fear when the baby first appears. These emotions can turn suddenly into overwhelming joy with a normal baby or crushing despair and sadness if the baby has birth defects or suffers from a perinatal trauma or prematurity. With the exception of parents whose own poor health, malnutrition, drug addiction, or mental illness keeps them from appreciating the full impact of childbirth, the emotions of childbirth can be life-changing events that fix the experience indelibly within the person.

As with every other major event in life, we would expect childbirth to have a lasting impact on the individual and to be the source of a good deal of psychological adjustment in the days and weeks that follow. Westbrook (1978) asked women to remember their feelings during pregnancy, labor, and the hospital stay and upon returning home. Of the 200 women interviewed in Sydney, Australia, most reported high levels of positive feelings all the way through. In discussing their anxieties and worries, however, they noted changes depending on the stage the woman was at in the process. For example, women experienced the highest levels of total anxiety, fears of death, and fears of mutilation during pregnancy and labor. Most of these severe anxieties declined right after the birth.
One emotional change that can occur after birth is *postpartum blues*, which seem to occur in some form in about two-thirds of all women after childbirth (O’Hara, Schlechte, Lewis, & Varner, 1991; Yalom, 1968). These “blues” usually take the form of brief episodes of crying, mood swings, confusion, or mild depression that seems to begin and end suddenly and without warning. Postpartum blues lasts only a few hours or a few days. During this period, mothers may seem withdrawn and provide less affectionate care for their newborns (Ferber, 2004). The “blues” are probably part of the normal psychological and physiological recovery from pregnancy and childbirth.

Postpartum blues should be distinguished from the more serious occurrence of clinical postpartum depression. *Postpartum depression* is characterized by dysphoric mood, disturbances of sleep or appetite, fatigue, feelings of guilt, and suicidal thoughts. It occurs in between 8% and 15% of women following childbirth (O’Hara, 1997). One mother reported:

> Although I’ve got a routine with the kids, I’ve lost my own routine... It’s a terrible thing to admit but I went for two days without even washing. I sat down and had a good cry and I said to Mark “This just isn’t on because I’m really going to go down if I’m not careful.” And you think at the back of your mind “Oh God, am I suffering from depression?” (S. E. Lewis & Nicolson, 1998, p. 189)

Postpartum depression has been linked with prenatal factors such as life stresses, a perceived lack of social and financial support, poor marital adjustment, depressed mood, and a history of psychiatric illness (Berthiaume, David, Saucier, & Borgeat, 1998; J. M. Green, 1998; Loh & Vostanis, 2004; O’Hara et al., 1991; Seimyr et al., 2004; Whiffen, 1988). Following childbirth, women with postpartum depression report having the need for greater emotional support from their partners and lower levels of marital satisfaction compared to nondepressed women (Mauthner, 1998; O’Brian, Asay, & McCluskey-Fawcett, 1999; Stuchbery, Matthey, & Barnett, 1998). A small percentage of men also show symptoms of postpartum depression, especially if they are stepfathers or if their wives are depressed (Areias, Kumar, Barros, & Figueiredo, 1996).

Between 2 and 10% of mothers may experience childbirth as traumatic and suffer from *post-traumatic stress disorder (PTSD)*, characterized by intrusive thoughts, fears, nightmares, and heightened arousal (White et al., 2006). The causes of PTSD are different from those of postpartum depression. They include feelings of loss of control, fear of harm to self or infant during labor and delivery, having an induced labor, and having epidural anesthesia (S. Allen, 1998; Lyons, 1998). Other research has shown, however, that these effects are similar to those of any traumatic surgical event and are not specific to childbirth (Mandy, Gard, Ross, & Valentine, 1998). In most cases, women recover from these feelings after several weeks, but if they are in unsupportive or stressful environments, symptoms may continue for a year or more (White et al., 2006).

If there is a predisposition to other forms of mental illness, such symptoms may appear in the post-partum period, especially for first-time mothers who are at greater risk for being hospitalized for schizophrenia, bipolar disorder, and depression. The greatest risk is...
between 10 and 19 days after birth. Hospitalization for mental illness during this particular important period of the mother-infant relationship can have consequences not only for mother and baby, but also for the rest of the family, who must step in to provide interim care (Munk-Olsen et al., 2006).

In general, the moods of men and women after childbirth are relatively stable and positive (Murai, Murai, & Takahashi, 1978; O’Hara, 1998). In a sample of 129 women in Australia, only 16 were severely depressed, and only 15 showed no mood changes following childbirth. The rest of the sample experienced one or more brief episodes of crying (Meares, Grimwalde, & Wood, 1976). Most fathers maintain positive attitudes and show a desire to be involved in the nurture of the newborn. Just thinking about their babies or looking at pictures of their own compared to other babies increases maternal positive mood. Seeing their baby’s picture compared to pictures of other babies also activates the prefrontal cortex (see Chapter 5), the part of the brain that regulates emotions (Nitschke et al., 2004).

In many cases, due to fetal ultrasound (see Chapter 3), parents typically know if their baby is a boy or a girl long before birth. In North America, does it matter to parents whether they have a boy or a girl? One would think and hope that every baby is welcome regardless of gender. One would also think that sex-role socialization, the training of boys and girls about behavior and manners appropriate to their gender, does not begin until the age of 2 or 3 years. In a study done in Canada, researchers examined 386 birth announcements published in newspapers between 2002 and 2004. Announcements for males more often used the words “pride” and “proud,” while those for females were more likely to use words expressing “happiness” (Gonzales & Koestner, 2005). This study suggests that subtle differences in parents’ attitudes about boys or girls may alter their responses to each individual child regardless of that child’s actual behavior or preferences.

How childbirth is experienced, however, is dictated in large measure by the cultural beliefs of the society. In a country like China, where there is a one child per family policy and a strong preference for boys, girls are often either aborted or treated as unwanted (see Chapter 3). We now turn to other cultural differences.

What Are Some Cultural Differences in Childbirth and Infant Care Practices?

Not all societies greet the event of birth in the same way. Some peoples consider it an illness or an abnormality, whereas others view it as part of the fabric of everyday affairs. The Cuna of Panama consider birth to be a secret event. In the United States, birth is considered a private affair, with only medical personnel and a few family members in attendance. Some cultures on the extreme end of the privacy dimension consider birth to be defiling and insist that women give birth in a separate area, which often is reserved for such things as childbirth, menstruation, and excrement (M. Mead & Newton, 1967).
At the other extreme, the Jahara of South America give birth under a shelter in full view of everyone in the village—even small children. A number of Pacific Island communities also regard the birth of a child as an event of interest to the entire community.

To illustrate the cultural influences on childbirth and child-care practices in the newborn period, a portrait of three cultures from widely different parts of the globe will be presented: Zinancantecan Indians from Mexico, originally of Mayan descent; villagers from the south of Italy; and the Japanese.

No drugs are used during labor among the Zinancantecans. The mother is supported and encouraged by an ever-present midwife. After birth, the newborn is placed naked before a fire. The midwife, who is still in attendance, begins to say prayers asking the gods to look kindly upon this child. A long skirt made of heavy fabric is brought out and put on the infant. Extending beyond the feet, the skirt is worn by both males and females throughout the first year of life. For fear of losing parts of the soul, the newborn is wrapped snugly in several layers of blankets; even the face is covered, except during feedings. This practice is believed to ward off evil spirits and illnesses during the first few months of life (Brazelton, 1977).

On the other side of the Atlantic, birth in a small village in southern Italy usually takes place in a hospital, attended by a midwife. Just after the birth, as in Mexico, the newborn is dressed in clothing and ceremonial linens the family has provided. When the infant is dressed, usually within about 10 minutes of the birth, the midwife goes into the hall, where the mother’s entire immediate and extended family has been waiting. They all accompany the midwife back to the mother’s room, where everyone takes a turn congratulating, kissing, and fondling both the mother and the baby.

The family then provides a party of pastries and liqueurs to share with one another and with those who attended the birth. During the labor, the mother was never left alone, and she will continue to be supported by rituals like this one. The mother will be visited by many of her friends and relatives for some time after the birth. These visits have the effect of recognizing the contribution the mother has made to the community. This social support system is embodied in the role of the mother-in-law. From a few days before until about 1 month after the birth, she feeds the mother ritual foods of broth, marsala, and fresh cheeses. All mothers breast-feed their infants, and the infant usually sleeps in the same bed as the mother or in a nearby cradle (Schreiber, 1977).

Finally, in traditional Japanese society, interdependent relationships between people are viewed as extremely important. Children are valued and loved, and their development is celebrated by a number of community rituals. These rituals start during the fifth month of pregnancy, when the woman begins to wear a special belt (called an iwata-obi) around her abdomen under the kimono. This ritual is believed to establish the child’s first tie to the community. After birth, the umbilical cord is dried and saved in an ornamental box, reminding the mother and child of their once-close physical bond. From birth until late childhood, children sleep with their parents, since it is believed that sleeping alone breaks the family psychological bonds.
On the day of the birth and on the third and seventh day of the infant’s life, elaborate feasts are celebrated among all the relatives. Since these early days are thought to be critical to the infant’s survival, the feasts ensure health for the baby. A special naming ceremony is performed on the seventh day, and at 1 month, the baby is taken to the Shinto shrine for blessing. At the age of 100 days, the infant is given a grain of rice as its first token solid food (Kojima, 1986). Although some of these traditional practices are changing due to the urbanization of Japan, the basic commitment to the infant’s value remains.

Newborn Feeding Practices

In the United States, breast-feeding was the general practice until the beginning of the twentieth century. In 1900, only 38% of mothers breast-fed, and this percentage declined until only 18% were breast-feeding in 1966. The number of women breast-feeding took a major turn upward in the 1970s, so that by 1976, about half of all mothers were breast-feeding at the time of discharge from the hospital. The incidence of breast-feeding in the United States varies with class and education. The rate of breast-feeding in the United States is highest among higher-income, college-educated women who are more than 30 years old and live in the Mountain and Pacific regions of the country. In 2003, more than 72% of mothers in the United States reported breast-feeding their infants at

Each culture has different rituals for childbirth and newborn care. In most places, newborns are immediately integrated into family life. This family is from Morocco.

Photo by Owen Franken
birth, with the rate declining to 52%, 38%, and 16% at 3, 6, and 12 months, respectively (Singh et al., 2007). This is a significant increase from 61% of mothers who initiated breast-feeding at birth in 1996 (American Academy of Pediatrics, 1997).

Because breast-feeding is being encouraged as a way to prevent infant death in developing countries, the reduced quantity of milk from malnourished mothers presents a dilemma for the mother who is undernourished. The World Health Organization recommends teaching mothers when and how to supplement the diets of breast-fed babies with foods prepared from locally available products (World Health Organization, 1985).

The evidence suggests that mothers automatically produce milk after birth. Milk will be produced even under conditions of maternal malnutrition. In such cases, the milk will be made in less quantity, but it will have the same nutrient quality as that of well-nourished mothers (Guthrie, 1979; Kloebelen-Tarver et al., 2002; Rempel & Rempel, 2004). This quality is usually maintained at the expense of the mother’s reserve stores of nutrients.

Some women can even breast-feed without having given birth, as reports from around the world show. In one study of mothers who nursed adopted babies, the sample consisted of 18 women who had never been pregnant, 7 who had been pregnant but had never lactated, and 40 who had previously lactated. All were able to nurse their adopted infants. Their success seemed to depend on factors such as the support of the husband and family, preparation by either hand-pumping the breast or nursing another infant at least 1 month in advance, having an infant as young as possible, and nursing a great deal at first. Appar-
ently, sucking stimulation is more effective than hormone treatments in inducing lactation (Hormann, 1977).

Sucking stimulation can maintain the supply of breast milk even if the infant is feeding only once a day. This kind of minimal breast-feeding is often used by mothers who work outside the home, who are weaning a baby from the breast, or who are using breast-feeding for “comfort” nursing for older infants. It is not necessary to mechanically express milk to maintain the supply during periods of minimal breast-feeding (Michaelson et al., 1988).

The nutritive demands of the lactating mother are far in excess of the demands made during prenatal life because of the accelerated weight gain of the infant just after birth. The milk secreted in just 1 month represents more calories than the net energy cost of pregnancy (Guthrie, 1979). The mother can meet this increased nutrient need by eating the equivalent of an additional meal of 500 kilocalories each day.

The composition of human milk not only differs from cow’s milk-based infant formulas, but breast milk composition changes over time and according to the infant’s nutritional needs (see Table 4.8). Colostrum, the clear, yellowish liquid that is secreted from the breast in the first few days, is relatively high in protein. It also has enzymes that inhibit the growth of bacteria, microorganisms \((Lactobacillus bifidus)\) that depress the growth of pathogens, and large “eating” cells (microphages) that enhance the immune system against bacteria and some viruses (American Academy of Pediatrics, 1997; Bocci et al., 1993; Guthrie, 1979).

To make cow’s milk used for most commercial infant formulas more similar in composition to human milk, it is usually modified. The protein content is lowered, and the milk is treated to make it more easily digested (the whey protein of human milk is easier to digest than that of cow’s milk). Vitamins A, D, and C, and sometimes iron are added to fortify the formula as well as fatty acids that are known to stimulate brain development. But all the necessary nutrients for brain and body development are the most balanced in breast milk. Formulas can also be tailored to infants with special needs, such as soy formulas for infants with allergies. Today, formula and breast milk have similar nutrient values, but human milk is more nutritionally matched to infants, changes over time to match the infant’s needs, and contains other important substances that promote immunization.

Human milk has a sweet taste. It also takes on some of the flavors found in the maternal diet. Amniotic fluid is also flavored with the mother’s foods, suggesting that there is an acculturation toward local foods that begins prenatally (Mennella, 1997). Human milk is also low in sodium, and breast-fed infants have less of a preference for salt than bottle-fed infants (Karns, 2000).

The Effects of Breast- and Bottle-Feeding on Mother and Infant

Breast-feeding has important health benefits for both the mother and the infant. One advantage of breast-feeding is that it serves as a natural way to help mothers recover from childbirth. The sucking stimulation from the infant triggers the release of several maternal hormones, in particular oxytocin and prolactin. Oxytocin, as you may recall, is used
as a drug to speed up contractions during labor. It is essential following the third stage of labor, since continued uterine contractions are necessary to shrink the uterus to normal size and prevent uterine hemorrhage. The oxytocin released by sucking does this naturally. If mothers do not breast-feed, they must be given oxytocin. Oxytocin also stimulates the breast to deliver milk only when sucking occurs and not otherwise. Prolactin stimulates the mammary glands to produce more milk.

There is some evidence that breast-feeding has a long-term effect on mothers’s health, in particular, the partial prevention of ovarian and breast cancer. Women who breast-fed their first-born infants longer than 1 month had a significantly lower risk of developing breast cancer, at least during the period before the onset of menopause (American Academy of Pediatrics, 1997; Byers, Graham, & Rzepka, 1985; Siskind, Schofield, Rice, & Bain, 1989). Breast-feeding also helps women return faster to their pre-pregnancy weight. These two factors—prevention of breast cancer and weight control—were cited as the primary reasons why women chose to breast-feed their babies (Charrol et al., 2004). Breast-feeding also lowers the risk of hip fractures in the postmenopausal period, helps women retain minerals in their bones, and lowers the risk of arthritis especially if women breast-feed for over 15 months (Karlson et al., 2004).

### TABLE 4.8 Components of Breast Milk Compared with Formula

<table>
<thead>
<tr>
<th>Nutrient Factor</th>
<th>Breast Milk Contains</th>
<th>Formula Contains</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fats</strong></td>
<td>Omega 3 fatty acids</td>
<td>Low in omega 3s</td>
</tr>
<tr>
<td></td>
<td>Automatically adjusts to infant’s needs; levels decline as baby gets older</td>
<td>Doesn’t adjust to infant’s needs</td>
</tr>
<tr>
<td></td>
<td>Rich in cholesterol</td>
<td>No cholesterol</td>
</tr>
<tr>
<td></td>
<td>Nearly completely absorbed</td>
<td>Not completely absorbed</td>
</tr>
<tr>
<td></td>
<td>Contains fat-digesting enzyme, lipase</td>
<td>No lipase</td>
</tr>
<tr>
<td><strong>Protein</strong></td>
<td>Soft, easily-digestible whey</td>
<td>Harder-to-digest casein curds</td>
</tr>
<tr>
<td></td>
<td>Lysozyme, an antimicrobial</td>
<td>No lysozyme</td>
</tr>
<tr>
<td></td>
<td>Rich in protein components</td>
<td>Deficient or low in some proteins</td>
</tr>
<tr>
<td></td>
<td>Rich in growth factors</td>
<td>Deficient in growth factors</td>
</tr>
<tr>
<td></td>
<td>Contains sleep-inducing proteins</td>
<td>Does not contain as many sleep-inducing proteins.</td>
</tr>
<tr>
<td></td>
<td>Infants aren’t allergic to human milk protein.</td>
<td>May cause allergies</td>
</tr>
<tr>
<td><strong>Immune Boosters</strong></td>
<td>Rich in living white blood cells, millions per feeding</td>
<td>No live white blood cells—or any other cells. Dead food has less immunological benefit.</td>
</tr>
<tr>
<td></td>
<td>Rich in immunoglobulins</td>
<td>Few immunoglobulins and most are the wrong kind</td>
</tr>
<tr>
<td><strong>Enzymes and Hormones</strong></td>
<td>Rich in digestive enzymes, such as lipase and amylase</td>
<td>Processing kills digestive enzymes</td>
</tr>
<tr>
<td></td>
<td>Rich in many hormones: thyroid, prolactin, oxytocin, and more than fifteen others</td>
<td>Processing kills hormones, which are not human to begin with</td>
</tr>
<tr>
<td></td>
<td>Varies with mother’s diet</td>
<td>Always tastes the same</td>
</tr>
</tbody>
</table>

*Source: www.askdrsears.com/html/2/t021600.asp; © Copyright 2006 AskDrSears.com. All rights reserved.*
There are also health benefits to the infant. Mother’s milk contains immunizing agents that protect against a variety of infections, such as respiratory infection, asthma, ear infection, bacterial meningitis, and urinary tract infection. Breast-feeding may also reduce the risk of sudden infant death syndrome (SIDS; see Chapter 6), diabetes, allergic diseases, and digestive diseases. Finally, there is some evidence that breast-feeding may enhance motor development and state regulation during infancy, and reduce the risk of obesity in later life (American Academy of Pediatrics, 1997, 2005; Feldman & Eidelman, 2002; Hart et al., 2003; Jelliffe & Jelliffe, 1988; Stettler et al., 2005). Some claims have been made that breast-feeding also enhances cognitive development, but more research is needed to sufficiently justify such claims (Soliday, 2007).

Breast-feeding for more than 6 months significantly reduces the risk of developing childhood cancer, especially lymphomas. Non-breast-fed children are five times more likely to get lymphoma, a form of cancer that is higher in children with immune deficiencies (American Academy of Pediatrics, 1997; Smigel, 1988).

The immunologic effect of human milk derives from the protein called secretory IgA, or SIgA. This protein coats the inner lining of the baby’s intestines, acting to trap and kill harmful bacteria. SIgA also enters the lungs and breathing passages whenever the infant gurgles and blows milk bubbles and thus may protect against respiratory diseases. If a mother has a bacterial infection, her milk contains higher levels of SIgA, which helps to further protect the infant from catching the mother’s infection (Pollitt, Garza, & Leib, 1984).

If breast milk protects the infant against disorders of the immune system, what happens if the mother has an immune system disorder such as AIDS? There is some controversy about whether infants can acquire AIDS from their mothers by breast-feeding. If a mother is infected with AIDS, HIV is typically present in her breast milk. The chance of an infant’s acquiring AIDS from its mother is about 15%, but part of this transmission may occur either prenatally or during the birth process (see Chapter 3). It is difficult to determine which of these routes is most likely to infect the infant.

Medical agencies have come up with conflicting recommendations about whether an AIDS-infected mother should breast-feed. It is thought that SIgA may neutralize the AIDS virus and that the risk of an infant acquiring other diseases because of a lack of breast milk SIgA may be just as high as the risk of getting AIDS from breast milk, especially in poor countries where the incidence of AIDS and other diseases is high. Others believe that the chance of acquiring AIDS from breast milk is not worth the risk of spreading the disease and therefore recommend against breast-feeding. Infected women should consult their physician before making the choice to breast-feed (American Academy of Pediatrics, 1997; D. T. Dunn, Newell, Ades, & Peckham, 1992; Goldfarb, 1993; Kennedy et al., 1990; Peckham, 1993; Porcher, 1992; Van de Perre et al., 1993). Breast-feeding is also not recommended if the mother uses illegal drugs or is receiving chemotherapy for cancer.

Behavioral differences between breast- and bottle-fed infants have been found. A study of 100 healthy, full-term, vaginally delivered newborns found that breast-fed in-
fants are more irritably fussy than bottle-fed infants (DiPietro, Larson, & Porges, 1987). This irritability, however, was associated with a more optimal physiological functioning, such as a slower heart rate, compared to bottle-fed infants. The physiological functioning of breast-fed infants is more energy-efficient, as judged by differences in the patterns of heart rate, breathing, and sleeping of bottle- and breast-fed infants (Zeskind, Marshall, & Goff, 1992). The higher irritability of breast-fed infants is not due to a less optimal mother-infant interaction. Some research has shown, on the contrary, that breast-fed infants get talked to, smiled at, touched, looked at, and rocked more by their mothers (J. Dunn, 1975; Lavelli & Poli, 1998) during feeding, although no long-term behavioral differences have been found. Nor is the effect due to the fact that breast-fed babies get hungrier than bottle-fed infants (DiPietro et al., 1987).

Rather, DiPietro and associates (1987) propose that “the irritability of breast-fed neonates be regarded as the norm of neonatal behavior. Formula may have a depressant effect on behavior” (p. 472). This may be due to the differences in the specific types of proteins and sugars that constitute the two types of milk. If more irritability is the norm, these authors argue that it serves two purposes. First, it enhances physiological functioning by giving the infant experience with varying degrees of arousal. Second, crying may serve to stimulate more mother-infant interaction and provide more opportunities for feeding (Hunziker & Barr, 1986).

Taken together, the benefits of breast-feeding appear to be immunological, physiological, behavioral, and psychological. Because of the growing number of research studies supporting the superiority of breast milk and breast-feeding for both mother and infant, the American Academy of Pediatrics (AAP), the Canadian Paediatric Society, and the American Dietetic Association all strongly encourage breast-feeding (American Academy of Pediatrics, 1997; 2005; Karns, 2000). The AAP recommends:

Exclusive breast-feeding is ideal nutrition and sufficient to support optimal growth and development for approximately the first 6 months after birth. Infants weaned before 12 months of age should not receive cow’s milk feedings but should receive iron-fortified infant formula. Gradual introduction of iron-enriched solid foods in the second half of the first year should complement the breast milk diet. It is recommended that breast feeding continue for at least 12 months, and thereafter for as long as mutually desired. (American Academy of Pediatrics, 1997, p. 4)

Although breast-feeding is recommended, personal preferences, illness, family and social support, and cultural norms may influence the choice of feeding method. Most mothers in the United States either stop breast-feeding altogether before 6 months, or they begin supplementing with formula too early (Li et al., 2003). The major factor for predicting success in breast-feeding is the desire of the mother to do so and the support of her partner. Some fathers have feelings of jealousy, uselessness, and sexual frustration associated with their mate’s breast-feeding. Some men may also experience feelings of ambivalence about the breast: Who does it “belong” to? Who and what is it for? Research shows that these feelings can be alleviated somewhat by enhancing the fa-
ther’s participation in the birth experience and by improving father-mother communication on such issues as infant care and sexual fulfillment (Karns, 2000; Teitler, 2001; Waletzky, 1979).

An effort is being made in the United States to encourage health-care professionals to promote breast-feeding. Mothers can also receive information and support from local hospitals, clinics, and breast-feeding advocacy groups. These supports are necessary to counteract the effects of cultural beliefs against breast-feeding, embarrassment, lack of self-confidence, and family attitudes (Karns, 2000).

Applications: The Case of Baby Doe

On April 9, 1982, a baby was born in Bloomington, Indiana, who was given little chance to survive. The baby had Down’s syndrome and multiple complications, including a blocked esophagus and an enlarged heart. In this case, the physicians agreed that surgery would not be worthwhile because it had a limited chance of success and would only prolong the infant’s life for a few weeks, increasing the suffering of both the infant and family.

The medical decision, to which the parents agreed, was to withhold treatment for the infant. Because of the infant’s state of health, this decision was an act of euthanasia: keeping the infant comfortable and well fed while waiting for an inevitable death.

This baby continued to live longer than the doctors expected, and the case caught the attention of the county prosecutor, who charged the parents and physicians with criminal neglect. Two county judges agreed with the parents’ decision, but the prosecutor eventually asked the Indiana Supreme Court to issue an order to provide treatment for the infant, who later became known as Baby Doe.

The issues in the Baby Doe case are similar to the issues in the abortion debate. On the one side are those who feel that newborns should have a constitutional right to treatment even without the consent of their parents, and on the other side are those who argue for the newborn’s right to die peacefully in cases where the low quality of life is considered to outweigh the need to preserve life.

Because of Baby Doe and other similar cases, in 1984 the U.S. Senate amended the 1974 Child Abuse and Prevention Act. The amendment states that “withholding of medically indicated treatment from disabled infants with life-threatening conditions” could be considered a form of child abuse and neglect. However, the amendment lists three exceptions to this rule, which specify when euthanasia is permitted:

1. The infant is chronically ill and irreversibly comatose.
2. The provision of such treatment would merely prolong dying and would not be effective in ameliorating or correcting the infant’s life-threatening condition.
3. The provision of such treatment would be virtually futile in terms of the survival of the infant, and the treatment under such circumstances would be inhumane.

While many accepted this legislation, the American Medical Association did not
endorse it because the amendment does not mention issues related to the quality of life. Suppose, for example, that the infant would survive with an appropriate medical intervention. The law clearly states that such an intervention must be provided. But what if the infants who survive are so deformed, sick, or handicapped that their lives would involve constant pain, discomfort, and severe restriction of movement? It is this quality-of-life issue that doctors would like to have the freedom to consider in making recommendations to parents.

The Baby Doe case raises important questions about how society is to decide what is in the best interests of children. Is life worth preserving at any cost? Is the best intervention in some cases not to intervene? How should quality of life and stress—emotional and financial—on the family be weighed in decisions about the rights of children? As our technology advances, we can do extraordinary things, such as save the life of an extremely fragile or extremely low birthweight newborn. Unfortunately, individuals and governments are not able to cope with the complex ethical and legal issues that this technology raises.

Some examples illustrate the strong emotions and conflicting values involved in such cases. In 1994, Gregory Messenger of Michigan removed his extremely low birthweight (ELBW) son from life support and was later charged with manslaughter. In 1989, Rudy Linares of Illinois unhooked a respirator from his 15-month-old son while holding a gun on the hospital staff. The child had been comatose for 9 months after swallowing a balloon. Linares was not charged with a crime. A mother in Virginia, on the other hand, fought a hospital's decision to end life support for her 2-year-old, who was born without most of her brain. Meanwhile, the number of parents—often poor, on drugs, or mentally ill—who abandon their infants in the hospital is increasing. There were 22,000 such infants in 1991. Who should take care of these babies, and what is to be done if they are at risk for major disorders?

To help resolve these difficult problems, professionals in the field of medical ethics are beginning to create a philosophical standard to guide doctors, nurses, parents, lawyers, and hospital administrators. Many hospitals today employ medical ethicists as consultants.

### EXPERIENTIAL EXERCISES

**Feeling Helpless**
*(By Alan Fogel)*

What would it be like to be a helpless newborn infant, someone who does not know anything about the world and who needs someone else to provide for all needs? Also, you don’t have any words to communicate your needs, and you lack the basic skills necessary for making gestures. About all you’ve got are some facial expressions, body movements, and vocalizations like crying, fussing, burping, and grunting. It is actually very difficult for adults to simulate a newborn’s experience, but you can try the following exercise.

Find a friend or relative with a good sense of humor and ask them to feed you with a spoon and give you a drink from a cup or glass. The food can be anything soft or liquid that you like. Of course, newborns don’t eat or drink this way, but you can try out your repertoire of nonverbal and nongestural communication skills (fuss, cry, make faces, wiggle, turn toward or away) in order to communicate to your partner what
you want or don’t want, or like or do not like, about the way he or she is feeding you.

Receiving and Giving Touch
by Alan Fogel, based on Rosen Method Bodywork (see Chapter 2)

This exercise is about creating the type of touch that parents use with young infants. This is a listening touch that is accepting and receptive but not demanding. It is also the type of touch used in Rosen Method Bodywork, as explained in Chapter 2. Choose a partner and find one chair. Introduce yourselves and talk for a few minutes. One person sits and the other stands behind. The following instruction is provided.

1. Everyone please close your eyes. Notice your breathing. Notice your contact with the chair and/or the floor. Notice comfort levels and emotions. Notice sounds in the room.

2. Those of you who are sitting, please keep your eyes closed and monitor your ongoing experience. Those of you who are standing, please open your eyes and look at the person sitting in front of you. Ask yourself: Who is this person? Let your gaze be soft and curious but uncritical.

3. Place your hands gently on your partner’s shoulders, not too softly and not too firmly, but in a way that lets that person know you are there and present. Notice your feelings as you are doing this. Without doing anything, and without moving your hands, use your hands and your eyes to notice the person. Do they feel relaxed or tense? Can you feel the movement of their breath? Can you feel a change as a result of your touching? (at least 2 minutes).

4. Get a sense of a part of your partner’s shoulders, upper back, or neck that calls to you to be touched, and gently move your hands there. Once you find the spot, settle in with a contact that meets the person and let your hands be soft and receptive. Notice changes in yourself and your partner: breathing, temperature, color (2 minutes).

5. In that same place or a different one, let your grip go very loose, so that you are making only superficial contact. What do you notice? Now make your grip more intense, like you really want to take hold of the person (but without inflicting pain). What do you notice? Now return to the middle ground, the place where you feel you can meet and notice the other person (they know you are there, but you are just being present and not demanding).

6. Use your hands in a way that says “goodbye” to your partner, and then place your hands at your sides and close your eyes. Again, notice how you feel.

7. Change roles silently and repeat.

8. Discuss in pairs.

SUMMARY

The Childbirth Experience

- The overall birthrate in first-world nations has been declining, but the rate of multiple births has been increasing.
- Labor occurs in three stages: the opening of the cervix, the passage of the infant through the vagina, and the birth of the placenta.
- Both risks and benefits are associated with medical technologies such as fetal monitoring, forceps, and vacuum extraction.
- About 16% of births are done by cesarean section. There seem to be no ill effects of C-sections compared to vaginal deliveries.
- Drugs are used to speed labor and ease pain. Drugs can be safe if used sparingly. Short-term
effects are common, but few long-term effects can be demonstrated.

- Conventional hospital childbirth was compared with a number of alternatives, including early discharge, Lamaze childbirth, upright postures, midwives, birthing centers, home births, and the Leboyer technique. If implemented properly, these practices are all effective and safe for those who choose to use them.

The Baby at Birth: Health and Risk

- The newborn has unique physical characteristics, most of which disappear after a few weeks of life. These characteristics are the remnants of prenatal life and the effects of the birth process.
- The art of newborn assessment is rapidly improving. Reliable and valid tests exist for determining the newborn’s risk in terms of survival, neurological problems, gestational age, and behavioral status.
- Perinatal problems account for a large proportion of later deficits.
- Prematurity is the largest single category of birth complication and seems to be caused by a variety of prenatal factors.
- Premature infants are likely to be smaller and sicker and to lag behaviorally, compared to full-term infants.
- The most severe long-term deficits occur primarily for very-low-birthweight infants, under 1,500 grams. Most infants between 1,500 and 2,500 grams tend to recover eventually and lead normal lives, but many will show mild to severe effects of prematurity.
- The type of intervention that improves the long-term outcome for premature infants depends on the infant’s gestational age and health. Medical interventions are improving and becoming less invasive. Behavioral procedures are extremely effective in improving health and weight gain at low cost. Parent education is also an effective strategy.
- The research on preterm infants suggests that late-term fetuses require movement, touch, sound, and sucking in order to continue their development, all forms of stimulation uniquely found in the prenatal environment.

Perinatal Mortality

- Poverty and disease are the biggest causes of infant mortality worldwide.
- Supplemental maternal and infant nutrition, breast-feeding, growth monitoring, rehydration, and immunization can prevent many perinatal deaths.
- Parents who lose an infant can be expected to grieve in the usual manner and thus should be helped through this process by medical personnel and family.
- Euthanasia for newborns is a controversial topic that involves social, psychological, legal, and moral issues.

Family and Society

- Most women adjust to the birth of their children rapidly and without long-term psychological effects. A small percentage of women suffer from postpartum depression.
- Each society has its own unique way of welcoming newborns into the world. This involves a variety of rituals that ensure the health of the newborn and mother and carry a blessing for a happy life.
- Breast milk is superior to other forms of infant feeding. Infants should be breast-fed until twelve months and for as long after as mutually convenient for mother, infant, and family. Solid foods should be supplemented after 6 months.

Applications: The Case of Baby Doe

- Euthanasia for newborns is practiced under conditions in which the infant is likely to die or in which the treatment would unnecessarily prolong suffering.
- Parents and physicians need to consider a number of ethical issues in making decisions about euthanasia for newborns, including quality of life in the future for the child and family.
www.dona.com  This is the home page of Doulas of North America (DONA). It gives information about doulas and what it is that they do. It also helps you find a doula near you and provides links to certification information, membership, and bookstores, as well as other birth-related links.

www.lalecheleague.org  La Leche League International is dedicated to providing education, information, support, and encouragement to women who want to breast-feed. Through this web page you can contact a La Leche League member in your area to answer any questions you may have regarding breast-feeding.

www.breastfeeding.com  Gives support for breast-feeding and a national directory of lactation consultants.

www.chss.iup.edu/postpartum  Postpartum Support International’s web page provides detailed information for parents, students, and researchers. It includes an APA-style paper on the topic, a searchable research database, prevention helps, information on increasing social support both before and after childbirth, a list of sites and support groups including sites specific to fathers, mothers, and professionals, self-assessments, information on reducing anxiety and stress, and more.

www.sbpep.org  This website for Postpartum Education for Parents includes a self-assessment questionnaire, a suggested reading list, advice for fathers, families, and friends, and support contacts by region, as well as information on symptoms and general information.