CHAPTER 3
Prenatal Development

CHAPTER LEARNING OBJECTIVES

1. Describe the events that occur during the germinal stage of prenatal development.
2. Explain the developmental processes that occur during the embryonic stage of prenatal development.
3. Characterize the growth and actions of the fetus in the fetal stage of prenatal development.
4. Discuss how maternal health, weight, and nutrition can affect the developing fetus
5. Describe the potential effects of substances that can cross the placental barrier on the embryo and fetus.
6. Describe the impact of maternal stress on the fetus.

CHAPTER OVERVIEW

This chapter describes prenatal development from conception to the ninth month of pregnancy. The first sections cover the developmental milestones of the growing individual, with detailed information about the physical changes occurring in the germinal, embryonic, and fetal stages. The differentiation of the embryo into a male or a female is explained, and the functions of the amniotic sac and placenta examined. The expanding sensory and motor capacities of the fetus are overviewed. The second section looks more closely at environmental influences on prenatal development, including nutrition, the effects of teratogens and health problems of the mother, drugs taken by both the mother and father, environmental hazards, maternal stress, and parental age.

CHAPTER OUTLINE

3.1. The Germinal Stage: Wanderings

A. Conception to Implantation in Two Weeks

1. The zygote develops into a **blastocyst** a few days after conception. The inner part (**embryonic disk**) will eventually develop into the embryo, and the outer membrane (**trophoblast)** differentiates into membranes that will protect and nourish the embryo.

B. Without Visible Means of Support?

1. Prior to implantation, the dividing cells are nourished by the yolk of the original egg, so there is no gain in mass. Once implanted, nourishment is obtained from the mother.
2. Implantation is sometimes accompanied by bleeding.
3. Nearly 1 in 3 pregnancies ends in miscarriage, typically due to developmental abnormalities during the first three months. Some women miscarry before realizing they had conceived.

3.2. The Embryonic Stage

A. Implantation and the Following 6 Weeks

1. Major organs develop and follow the **cephalocaudal** (head to tail) and **proximodistal** (central axis to outer appendages) patterns.
2. The outer layer of the embryonic disk, the **ectoderm**, develops into the nervous system, including the neural tube, the sensory organs, hair, nails, teeth, and skin.
3. The middle layer of the embryonic disk, the **mesoderm,** develops into the excretory, reproductive, and circulatory systems, as well as the muscles and skeleton.
4. The inner layer of the embryonic disk, the **endoderm**, develops into the respiratory system, liver, and pancreas.
5. By the 4th week of gestation, the heart begins to beat and arm and leg buds appear. By the 8th week, the limbs are elongating, facial features become distinct, teeth buds appear, and the kidneys and liver are working.
6. By the 5th week of gestation, neurons form the cerebral hemispheres, and during the 2nd month, the cells in the nervous system begin firing, albeit their firing is most likely random at this point.
7. A Closer Look – Real Life: Selecting an Obstetrician. Many mothers learn about obstetricians from friends and family; however, there are several questions expectant mothers should know the answers to before choosing an obstetrician.

B. Sexual Differentiation: How Do Some Babies Develop into Girls and Others into Boys?

1. Nondescript sex organs, which resemble primitive female structures, are formed about 5 to 6 weeks into pregnancy. Around the 7th week, the presence of a Y chromosome causes testes to differentiate, and the absence of a Y chromosome causes ovaries to differentiate. External genital structures are not identifiable as male or female until 4 months after conception (in the fetal stage).
2. Hormones play a critical role in prenatal sex differentiation.
    a. In males, once testes develop, they begin to produce **androgens: testosterone** differentiates male duct system (Wolffian), DHT (dihydrotestosterone) triggers development of male external genital organs, and MIS (Mullerian inhibiting substance) prevents the development of female ducts.
    b. In females, only small amounts of androgens are produced, which eventually play a role in secondary sexual characteristics in adolescence. Prenatally however, Wolffian ducts degenerate and Mullerian ducts develop into Fallopian tubes, uterus, and inner part of the vagina.

C. Why Is the Amniotic Sac Called a "Shock Absorber"?

1. The **amniotic sac** is filled with **amniotic fluid**, which protects the embryo/fetus within the uterus and provides an even temperature.

D. What Are the Functions of the Placenta?

1. The placenta is a mass of tissue grown by both the mother and the embryo that allows for the exchange of nutrients and waste between the two.
2. The placenta is attached to the mother by a network of blood vessels in the uterine wall and to the baby via the umbilical cord.
3. The placenta acts as a filter allowing carbon dioxide and waste to pass to the mother and oxygen (and possibly germs and drugs) to the baby.

4. The placenta also secretes hormones to maintain the pregnancy, prepare breasts for nursing, and stimulating the uterine contractions for childbirth. After the child is born, the placenta passes from the women's body.

3.3. The Fetal Stage

A. From the Beginning of the Third Month until Birth

1. This stage is characterized by maturing of organs and gains in height and weight.
2. By the end of the second trimester, the fetus opens and shuts his/her eyes, sucks his/her thumb, alternates between sleep and wakefulness, and responds to light and sound.
3. During the third trimester, the heart and lungs become capable of sustaining independent life and there are dramatic gains in weight and length, resulting in the average newborn weight of between 7 and 7.5 pounds.
4. During the 7th month, the fetus normally turns upside down so delivery will be head first.
5. Chances of survival increase from about 50% at 22-25 weeks of gestation to 90% by the end of the 7th month.
6. The first fetal movements are typically felt by the mother in the middle of the 4th month.
7. By the end of the second trimester, the fetus moves vigorously and can turn somersaults.
8. As the fetus grows, movements become restricted.

B. A Closer Look – Research: On Fetal Perception: Bach at Breakfast and Beethoven at Brunch?

1. By the 13th week of gestation, the fetus responds to sound waves and can discriminate pitch during the third trimester.
2. DeCasper and Fifer's classic *The Cat in the Hat* study showed that newborns chose to hear this story read by their mothers (as opposed to a story with a different cadence) using a special pacifier when mothers read *The Cat in the Hat* twice daily the during final six weeks of pregnancy.
3. Newborns also prefer the sound of their mother's voice to that of an unfamiliar woman's voice.

C. A Closer Look – Diversity: Birth Rates around the World

1. Data showing fertility rates from many countries is presented. Mothers in wealthier nations are not having more children than women in poor, developing countries. Several factors may contribute to this fact.

3.4. Environmental Influences on Prenatal Development

B. How Does Maternal Nutrition Affect Prenatal Development?

1. A common misconception is that the developing baby will take the nutrition it needs from the mother.
2. Expectant mothers needs to monitor their diet throughout pregnancy. Malnutrition in a mother (especially during last trimester) has been linked to low birth weight, prematurity, stunted growth, retardation of brain development, cognitive deficiencies, and behavioral problems. However, an enriched supportive environment may allow a child to overcome these effects.
3. Maternal obesity leads to a higher risk of **stillbirth** and neural tube defects.
4. Pregnant women should consume foods containing calories, protein, vitamins A, B, C, D, E, iron, zinc, cobalt, and folic acid (to reduce the risk of neural tube deficits).
5. Most doctors recommend vitamin supplements to pregnant women, but it is not necessary for those who eat a well-rounded diet.
6. The weight women should gain during pregnancy depends on weight prior to pregnancy. Women who have low BMIs are advised to gain between 28 and 40 pounds; women with normal BMIs 25-35 pounds, women with high BMIs are advised to gain between 15 and 25 pounds, and women with very high BMIs should gain between 11 and 20 pounds.

C. What Are Teratogens? Does It Matter When, During Pregnancy, a Woman Is Exposed to Them?

1. **Teratogens** are environmental agents that can harm the embryo or fetus, and include alcohol, drugs, antibodies, metals, excessive quantities of hormones, radiation, and pathogens.
2. Teratogens are most harmful during **critical periods,** especially during the embryonic stage when the organ systems are developing.
3. Closer Look – Real Life: Advice for Expectant Fathers. Provides answers to seven common concerns of First-time fathers, such as "Will she love the baby more than me?"
4. **Syphilis** can cause miscarriage, stillbirth, or **congenital** syphilis, although the fetus will probably not contract syphilis if the mother is treated with antibiotics before the 4th month of pregnancy.
5. About 1 in 4 babies of **HIV/AIDS-**infected mothers will be infected themselves, either through the exchange of blood and fluids during childbirth or from breast milk.
6. **Flu** (influenza) is suspected to cause fetal brain abnormalities and may lead to problems such as autism and schizophrenia. These effects are most likely to involve the mother's inflammatory response.
7. **Rubella** infections during the first 5 months of pregnancy and is associated with 20% chance of having a child with a birth defect. Inoculations have made this a rare occurrence in the U.S.
8. **Preecalampsia** (toxemia) is characterized by high blood pressure and may be linked to malnutrition. It can cause **premature** or undersized babies as well as maternal death.
9. A Closer Look – Real Life: Preventing One's Baby from Being Infected with HIV. The use of HAART (highly active antiretroviral therapy), C-section, and formula-feeding have reduced the mother-to-infant transmission of HIV from about 25% to only 1-2%.
10. **Rh incompatibility** occurs when an Rh-negative mother has developed Rh antibodies from exchanging blood with a previous Rh-positive fetus. These antibodies can then enter the bloodstream of her current Rh-positive newborn during delivery, resulting in brain damage or death. An injection of Rh immunoglobulin within 72 hours after the birth of an Rh-positive baby can prevent the formation of Rh antibodies in a mother's bloodstream.

D. What Are the Effects of Drugs Taken by the Mother on Prenatal Development?

1. Accutane, a treatment for acne, may cause fetal abnormalities during the first trimester of pregnancy, affecting the eyes and ears, brain, heart, and immune system.
2. **Thalidomide,** an anti-nausea and insomnia medicine used in the 1960s, is now known to cause missing or stunted limbs when taken in the second month of pregnancy.
3. Several antibiotics, such as tetracycline, can be harmful to the fetus.
4. Women at risk for miscarriages were often prescribed hormones to help maintain the pregnancy, but **progestin** can masculinize external sex organs of female embryo, and **DES** (diethylstilbestrol) can cause the offspring to develop cervical and testicular cancer later in life.
5. High doses of vitamins A and D are associated with central nervous system damage, small head size, and heart defects.
6. Maternal addiction to heroin or methadone is linked to low birth weight, prematurity, and toxemia. Further, the baby may be born addicted and suffer from delays in motor and language development.
7. Maternal use of marijuana (directly or through second-hand exposure) increases the risk of low birth weight and immature development of nervous system. Some studies show that children of mothers who smoked marijuana during pregnancy had long-term cognitive deficits and hyperactivity, and were more likely to become dependent on opiates.

8. Maternal use of cocaine increases risk of stillbirth, low birth weight, and birth defects. Correlational human studies and experimental animal studies suggest that in utero exposure results in problems throughout childhood.

9. Alcohol passes through the placenta and thus affects the fetus. Children of heavy drinkers may develop **fetal alcohol syndrome (FAS)**, which causes distinct facial features as well as physical and psychological defects. A less severe form of deficits (**fetal alcohol effect, FAE)** can be caused by only moderate drinking.

10. The current evidence on the effects of caffeine on a fetus is unclear, but some studies in the past have indicated increased risks of miscarriage and low birth weight are associated with caffeine consumption.

11. The nicotine and carbon monoxide from cigarette smoke can pass through the placenta. Maternal smoking is associated with low birth weight and an increased risk of infant death, as well as long-term effects in childhood such as short attention span, hyperactivity, and lower cognitive and language scores. Men who smoke are more likely to produce abnormal sperm than those who do not smoke.

E. What Are the Effects of Environmental Hazards During Pregnancy?

1. Prenatal exposure to lead, mercury, PCBs, and other metals may cause lower levels of cognitive functioning.

2. Prenatal exposure to radiation may lead to physical and cognitive deficits.

3. A father's exposure to heavy metals and radiation may also cause abnormalities in his baby.

F. What Are the Apparent Effects of Maternal Stress on the Child?

1. Maternal stress affects the embryo/ fetus via the secretion of hormones, such as adrenaline and corticosteroids, which pass through the placenta.

G. Closer Look – Diversity: The Effects of Parents' Age on Children—Do Men Really Have All the Time in the World?

1. Biologically, the 20s are the ideal age for women to bear children. Teenagers have higher incidence of infant mortality and low-birth-weight children, and are less likely to obtain prenatal care. Women beyond their mid-30s may have passed the point at which their reproductive systems function most effectively and experience increasing risk of chromosomal abnormalities, stillborn, or preterm babies.

2. Older fathers are more likely to produce abnormal sperm. The older the father is at conception, the lower a child's score may be on tests of reading skills, reasoning, memory, and concentration. Biologically, the 20s are also the ideal age for men to father children.

ANSWER KEY: *TRUTH OR FICTION?*

1. Newly fertilized egg cells survive without any nourishment from the mother for more than a week.
   TRUE. They are nourished by the yolk of the ovum until they implant in the wall of the uterus.

2. Your heart started beating when you were only one-fourth of an inch and weighed a fraction of an ounce.
   TRUE. It is true that your heart started beating when you were only one-fourth of an inch long and weighed a fraction of an ounce.

3. If it were not for the secretion of male sex hormones a few weeks after conception, we would all develop external sex organs that look like those of females.

TRUE. The male sex hormones, androgens, are critical in the development of male genital organs. Without androgens, all people – whether genetically male or female – would develop external sex organs that look like those of females.

4. Fetuses suck their thumbs and hiccup, sometimes for hours on end.
   TRUE. Just ask a weary pregnant woman! By the end or the second trimester, the fetus sucks its thumb, and there are sharp spasms of the diaphragm, or fetal hiccups, which may last for hours.
5. Parents in wealthy nations have more children.
   FALSE. Table 3.1 shows that in countries such as Spain, Greece, Italy, Japan, Canada, Russia, and the United Kingdom, parents are not coming close to reproducing themselves.
6. The same disease organism or chemical agent that can seriously damage to a 6-week-old embryo may have no effect on a 4-month-old fetus.
   TRUE. Exposure to particular teratogens is most harmful during critical periods that correspond to the times when organs are developing.
7. Babies can be born addicted to narcotics and other drugs.
   TRUE. Narcotics readily cross the placental membrane, and the fetuses of women who use narcotics regularly can become addicted.
8. It is harmless to the embryo and fetus for a pregnant woman to have a couple glasses of wine in the evening.
   FALSE. It cannot be guaranteed that one glass of wine a day is harmless to the embryo and fetus. Research suggests that even moderate drinkers place their offspring at increased risk.

IDEAS FOR INSTRUCTION

3.1. The Germinal Stage: Wanderings

A. Key Terms

germinal stage	embryonic disk	umbilical cord
blastocyst	trophoblast	placenta

B. Lecture Expanders

Early Home Pregnancy Tests

Most women relying on home pregnancy tests, which can be quite accurate, do not know they are pregnant during the germinal stage. Home pregnancy tests work by detecting the presence of the human chorionic gonadotropin (hCG) hormone, often called the pregnancy hormone, in a pregnant mother's urine. hCG is made by a woman's body once the fertilized egg implants in the uterine wall. Because the germinal stage ends with implantation, home pregnancy tests will not detect pregnancy during this stage.
http://www.womenshealth.gov/publications/our-publications/fact-sheet/pregnancy-tests.cfm

C. Classroom Activities and Demonstrations

Miscarriage: A Common Event

The text presents the statistic that nearly one-third of all pregnancies result in miscarriage, most of them occurring in the first 3 months. First, have 1/3 of your class stand up to create a visual illustration of this statistic. This will help students both truly appreciate the miracle of life and understand the commonness of experiencing miscarriage. Now, poll students as to when their friends and family members announced that they were pregnant: was it before or after the first trimester? How does this relate to the statistics on miscarriage? Note that miscarriages often result in grief and that a woman's quality and quantity of ties with her social networks may be affected. Have students research the causes, symptoms, and other effects of miscarriage using the American Pregnancy Association fact sheet.
http://www.americanpregnancy.org/pregnancyloss/mcsurvivingemotionally.html

Video Suggestions
Prenatal Development (2001, Films for the Humanities and Social Sciences, 21 minutes). Presents the milestones of prenatal development and emphasizes the importance of prenatal care by examining relations between maternal health and nutrition and normal development.

Cells: Baby and Child (no year, Films for the Humanities and Social Sciences, 51 minutes). The first segment of this video shows the use of microscopic imaging techniques to examine cells as the "building blocks of life" in prenatal development.

D. Student Projects

Maternity/ Paternity Leave Policy
The "Closer Look" in this section discussed possible social influences on the falling birth rate in industrialized nations. Have students expand on this by exploring maternity leave policies and family-friendly climates in local places of employment. Have students complete Handout 3.1 comparing a local company they would consider working for (or one they currently work for!) with their ideal standards. You may also consider adding a component to this project that has students write a short paper outlining findings in the literature regarding the link between mother's early return to full-time work and child's health and behavioral outcomes. This will emphasize to students the need to address the issue of maternity leave on a broad level.

3.2. The Embryonic Stage

A. Key Terms

embryonic stage	neural tube	testosterone
cephalocaudal	endoderm	amniotic sac
proximodistal	mesoderm	amniotic fluid
ectoderm	androgens	

B. Lecture Expanders

Intersex Infants
This chapter touched on the complexities of genetics and prenatal hormone exposure in determining whether a child develops as a male or a female. However, there are many conditions that may result in the birth of baby having external genitalia that is neither clearly male nor clearly female. Many have referred to these children as intersex babies, but recently some have suggested referring to these infants as having a DSD (disorder of sex development) (Lee et al., 2006). Two common conditions resulting in the birth of intersex individuals are congenital adrenal hyperplasia (CAH) and androgen insensitivity syndrome (AIS). In CAH, XX children may be born with masculinized genitalia due to a malfunction in an enzyme involved in making steroid hormones. In AIS, XY children may be born with highly feminized genitalia since the body did not respond to androgens in utero. Estimates of the frequency of intersex births hover around 1.7% of all births (Fausto-Sterling, 2000). The birth of an intersex child can be unsettling and stressful for parents who are expecting to hear "It's a boy!" or "It's a girl!" In the past, many doctors rushed to assign a gender and do surgery on infants to make their external genitalia conform to this assignment. Today, improved understanding of the many genetic, hormonal, and psychosocial influences on gender, as well as the advocacy of adult intersex individuals, have slowed this practice. In 2006, a large group of pediatricians recommended the following standards of care for intersex individuals: "(1) gender assignment must be avoided before expert evaluation in newborns; (2) evaluation and long-term management must be performed at a center with an experienced multidisciplinary team; (3) all individuals should receive a gender assignment; (4) open communication with patients and families is essential, and participation in decision-making is encouraged; and (5) patient and family concerns should be respected and addressed in strict confidence" (Lee et al., 2006, p.490). The advocacy of groups like the Intersex Society of North America has led to many of these policy changes. Cheryl Chase, who founded this society objected to genital surgery for infants on the grounds that surgery implies their condition is socially unacceptable, it may damage sexual sensitivity, and the surgery may produce a physical appearance that is discordant with the mental state of the individual (i.e., make them the "wrong" sex)

(Chase, 2001). A discussion of intersex individuals is often fascinating to students. Have them consider the physical causes of the conditions, the perspectives of parents and children, the social stigma, and the legal ramifications (i.e., some states will not allow the sex on a birth certificate to be changed and will not allow same-sex marriage).

Chase, C. (2003). What is the agenda of the intersex patient advocacy movement? *Endocrinologist, 13(3),* 240-242.

Fausto-Sterling, A. (2000). *Sexing the Body*. New York, NY: Basic Books.

Lee, P.A., Houk, C. P., Ahmen, S. F., Hughes, I. A., & International Consensus Conference on Intersex organized by the Lawson Wilkins Pediatric Endocrine Society and the European Society for Pediatric Endocrinology (2006). Consensus statement on management of intersex disorders. *Pediatrics, 118(2),* 488-500.

C. Classroom Activities and Demonstrations

The Visible Embryo

Have students visit the following website: http://www.visembryo.com.

This is an interactive online tutorial on human development produced by Mouse Works and sponsored by the National Institutes of Child Health and Human Development. The site is a comprehensive resource of information on human development from conception to birth, presented in a weekly format. The Visible Embryo provides a detailed pictorial account of normal and abnormal development and can be used in several different formats for individual or group work

3.3. The Fetal Stage

A. Key Terms

fetal stage

B. Lecture Expanders

Power of the Placenta

Consistent with the views of Western biomedicine, most hospitals in the U.S. discard a woman's placenta after birth. Placentas may be deemed "pathological waste" and regulated by tight laws governing disposal of such waste. However, many cultures assign significant meaning to the placenta. In these cultures, rituals for burial or eating of the placenta are performed to ensure the well-being of the infant and/or mother. Birdsong (1998) describes one such tradition:

In the Hmong culture of Southeast Asia, the woman may deliver her baby without assistance, but the father disposes of the placenta. If the child delivered is a girl, the placenta is buried under her parent's bed; if the child is a boy, the placenta is buried near the base of the central wooden pillar supporting the house. (The latter is a place of great honor, which reinforces the social stratification of gender roles.) "Placenta" can be translated as "jacket" in the Hmong language and is considered the first and finest clothing of the infant. The Hmong believe that after death, the soul must retrace the journeys undertaken in life until it reaches the burial place of its placental jacket. Only by putting on this protective covering can the soul safely complete the dangerous journey to be reunited with its ancestors and its eventual rebirth. The geographic site of placental burial defines the ancestral home for the clan (p.191).

As the U.S. population becomes more diverse, these beliefs may influence hospital policy on releasing the placenta. In April 2006, Hawaii became the first state to pass a law allowing mothers who give birth in a hospital to take their placenta home with them, as long as the placenta does not carry an infectious disease (Law allows, 2006). Thus, Hawaiian mothers can now perform the ritual of burying their child's placenta under a newly planted tree. It is thought that by observing the growth of the tree, the child's psychological and spiritual changes may be better understood (Law allows, 2006).

Birdsong, W. (1998). The placenta and cultural values. *Western Journal of Medicine, 168*(3), 190-192.

Law allows placenta to be given to mothers. (2006, April 22). *Honolulu Star Bulletin, 11(112).* http://starbulletin.com/2006/04/22/news/story12.html.

C. Classroom Activities and Demonstrations

Protecting Fetuses from Noise Pollution

Research has shown that fetuses respond to sound waves as early as 13 weeks into gestation, and that hearing continues to develop throughout pregnancy. An article published in *Pediatrics* reported that exposure to excessive noise during pregnancy may result in high-frequency hearing loss in newborns (American Academy of Pediatric, 1997). Although no formal recommendations have been made for pregnant women, a 2003 newsletter published by Michigan State University's division of Occupational & Environmental Medicine stated that several countries, "forbid pregnant women to work in surroundings with a high noise level (80 dB continuous noise and/or rapid impulse noise changes of 40 dB" (p.2). Using these guidelines, have your students make a list of occupational or living environments where women should be concerned about impacts on fetal hearing (i.e., near airports). Typical noise levels are widely available on the internet.

American Academy of Pediatrics (1997). Noise: A hazard for the fetus and newborn. *Pediatrics, 100*, 724-727.

Noise and the pregnant woman. (2003, Fall). *Now Hear This…, 6(3),* 1-2.

Video Suggestions

Invasion of the Embryo (no year, Films for the Humanities and Social Sciences, 25 minutes). Discovery Channel Production from Body Story series that follows prenatal development from a fertilized egg to the newborn as a couple conceives a child and experience pregnancy and childbirth.

Sex Hormones and Sexual Destiny (no year, Films for the Humanities and Social Sciences, 26 minutes). Examines effects of hormone levels on gender-specific behaviors.

D. Student Projects

Pregnancy Advice to a Friend

After learning about the three stages of prenatal development, have students write out a list of 10 pieces of advice about pregnancy to a friend who has just learned she is pregnant. These can include information about what to expect during the pregnancy, what might enhance or detract from prenatal development, what questions to make sure to ask the obstetrician, etc.

3.4. Environmental Influences on Prenatal Development

A. Key Words

stillbirth
teratogens
critical period
syphilis
congenital
HIV/AIDS
rubella
pre-eclampsia
premature
Rh incompatibility
thalidomide
progestin
DES
fetal alcohol syndrome (FAS)
fetal alcohol effect (FAE)

B. Lecture Expanders

Alcohol and Culture

Many doctors in the U.S., along with the Centers for Disease Control and the U.S. Surgeon General, state that no amount of alcohol is safe for developing fetuses and recommend complete abstinence from drinking during pregnancy. Several countries agree with this policy recommend abstinence alone. In contrast, other countries have policies that recommend abstinence as the safest choice but also indicate that small amounts of alcohol are unlikely to cause harm, and still others recommend that a low alcohol intake poses a low risk to the fetus. This variation in policies stems from the lack of clarity in the research

literature about the relationship between low levels of alcohol consumption and fetal effects. (It is clear that high levels cause fetal alcohol syndrome!)

Have students consider various policies available online that present varying viewpoints by examining the International Guidelines on Drinking and Pregnancy:
http://www.icap.org/table/InternationalDrinkingGuidelines.html

What, if any, differences do the students detect in these policies?

C. Classroom Activities and Demonstrations

Before You Get Pregnant

Although many of the recommendations made in this chapter involve things to do once you are pregnant, many women in today's world plan on becoming pregnant. Have students make a list of things they should do BEFORE becoming pregnant (i.e., make sure the woman's rubella vaccine is up to date, stop taking certain medications, etc.).

Everyday Exposure to Terotogens

Have students list all of the teratogens listed in this section that they have been in contact with in the last week. (i.e., cigarette smoke, alcohol, mercury from certain fish, radiation from dental X-rays, etc.) It is surprising how common many of them are!

D. Student Projects

Illegal Drug Use during Pregnancy

There have been some recent cases where mothers have been held in custody to prevent them from using illegal drugs or drinking during pregnancy on the grounds that the court has some responsibility for protecting the unborn infant. Have students search the web to find more information about these cases and, after learning about some of the specifics, have them write a paragraph on whether or not they think this is a useful strategy. Also have them consider the questions about whether or not drug use during pregnancy should be considered child abuse and therefore be punishable under the law. What kind of punishment would be appropriate? Should individuals who sell or serve alcohol to a pregnant woman be held accountable?

Pregnant and Poor

This section discusses the importance of good prenatal care for maintenance of good health and adequate nutrition for the mother. Have students search the internet for sources of prenatal care in the form of access to medical care and food for mothers who live in poverty.

What about the Fathers?

The physical, emotional and social changes experienced by pregnant women are mostly obvious. However, what about expectant fathers? What changes do they experience? Have students interview expectant or new fathers and have them reflect on what concerns or questions they had during their partner's pregnancy and what changes they experienced as they prepared to become fathers. Compare these concerns and questions to the ones listed in your text. Were there common concerns, or were there some surprising or unique ones?

Handout 3.1: Maternity/ Paternity Leave Policy

Take time to think about the ideal company to work for if you are new parent. Justify why you have chosen these ideal policies. Then, compare your ideal company with the profile of a real company in your area. You may even choose to investigate policies at the university or college you attend. You can often gather this information via company websites or through in interviewing an employee.

	Ideal Company	**Local company**
Workforce Profile (Gender composition, age composition)		
Compensation		
Childcare (Is there on-site childcare?)		
Flexibility (Hours? Work from home?)		
Time off and Leaves (Paid parental leave?)		
Family-Friendly Programs (Family picnics)		
Company Culture (Attitudes)		