Child Growth and Development

Chapter 5: Birth and the Newborn Baby

Prepared by Debbie Laffranchini
From Papalia, Olds, and Feldman
Childbirth and Culture: How Birthing Has Changed
Maternity Ward, Machakos, Kenya
How Birthing Has Changed

• Before 1900s, childbirth in Europe and US was a female social ritual
  – Woman surrounded by female relatives and neighbors
  – Sat up in bed or draped in a sheet
  – Doctor present for wealthy women after 1400s if complications arose
  – Midwife no formal training
    • Offered advice, massage, potions, irrigations, talismans
  – Mother cries considered natural
  – Peasant women back to work within hours or days
  – Affluent or noble women rested for several weeks
Reducing the Risks of Childbirth

- **1600s/1700s** France woman had 1 in 10 chance of dying during or shortly following birth
  - Thousands of babies stillborn
  - 1 in 4 babies born alive died during first year
- **1900s** professionalization of childbirth, science of obstetrics
  - Most deliveries still at home
  - Midwives trained
  - Male physician usually in charge with surgical instruments in event of problems
  - Obstetrics manuals available
- **Dramatic reductions in risks for pregnancy and childbirth in past 50 years** largely result of availability of antibiotics, blood transfusions, safe anesthesia, improved hygiene, and drugs for inducing labor when necessary
Contemporary Settings for Childbirth

- Medicalization of childbirth has had social and emotional costs
  - Childbirth is a surgical act
  - Woman hooked up to monitors
  - Feet in stirrups looking up at strangers
- Home births attended by midwife with medical resources nearby
- Freestanding Birthing centers
  - Safe, less expensive
  - For low risk
  - Hospital birthing centers
- Rooming in
Birth Process

• Parturition: changes in uterus, cervix
  – Brought on by changes in protein produces by placenta
    • Protein promotes fetal lung maturation

• Braxton-Hicks contractions: false labor
  – Begins in 2\textsuperscript{nd} trimester, tightens for 30 – 60 seconds up to 2 minutes
  – Changes if you change your activity
    • If you are lying down, stand and move
    • If you are moving, sit down
  – Tones the uterine muscles promotes blood to the placenta
Stages of Childbirth

• Three overlapping stages

  1. Dilation of cervix
     • Longest stage, about 12 – 14 hours for first child, shorter for subsequent births
     • Increasingly frequent contractions 15 – 20 minutes apart, moving to 2 – 5 minutes apart
     • When cervix is 10 centimeters, baby can now move down the birthing canal

  2. Descent and emergence of baby
     • 1 – 2 hours
       – If more than two hours, signals baby may need help
         » Forceps, vacuum
     • Episiotomy, controversial, should not be done routinely

  3. Expulsion of placenta
Electronic fetal Monitoring

- Monitors fetal heartbeat during labor and delivery
  - Indicates response to stress
  - Detects problems
  - External
  - Internal
    - More accurate
    - Can only be used when cervix is open
    - Risk of infection
  - Used more and more with inductions
    - Rate of inductions doubled since 1990
      - More than 21% of live births induced in 2004

- Drawbacks:
  - Expensive
  - Restricts mother’s movements
  - Extremely high false-positive rate
    - Suggests fetus is in trouble when they are not
    - Prompts more cesarean deliveries
Difficult Labor
Delivery
Afterbirth
High Risk
Vaginal versus Cesarean Delivery

• In 2004 nearly 1/3 of births in US were cesarean delivery
  – Record high
  – 41% increase since 1996
  – Among the highest in the world

• Cesarean needed
  – Breech position
  – Transverse position (lying crosswise in uterus)
  – Too big to pass through pelvis

• Cesarean more likely with first baby, large baby, older mother, or previous cesarean
  – Increase in cesarean may be due to rise in birth weight, trend toward later childbirth

• Cesarean riskier to mother
  – Bleeding
  – Infections
  – Bowel injury

• VBAC risky
  – Rupture of uterus
  – Brain damage to fetus
  – Infant death during delivery
    • Scottish study found 11 times more likely to have infant die during delivery with VBAC
Medicated versus Nonmedicated Delivery

• Queen Victoria first woman in history to be sedated during delivery of her 8\textsuperscript{th} child in mid 1800’s
  – Sedation now commonplace
• Natural, prepared childbirth
  – Minimizes or eliminates use of drugs
  – Childbirth without Fear method (Dr. Dick-Read)
  – Lamaze (French obstetrician) 1950’s
    • Teaches mother to work actively with her body through controlled breathing
    • Concentration on other sensations to ease perception of pain
    • Relaxation of muscles as a conditioned response to voice of coach
    • Mental imagery
  – Massage, deep breathing, gentle pushing
  – Submersion
  – Bradley
    • No medical intervention
Medicated versus Nonmedicated Delivery (cont)

- General anesthesia rarely used
  - Risk to mother and baby
- Local anesthesia (vaginal)
  - Pedunual block
    - Used during second stage of labor or with forceps
- Analgesic (pain killer)
  - Slows labor
  - Can cause maternal complications
  - Makes baby less alert following birth
- 60% of US women use regional anesthesia (epidural or spinal)
  - Epidural given early can shorten labor with no added risk of cesarean
- Drugs pass through the placenta and pose some danger to baby
- Social and cultural attitudes and customs play a part in birth/medication
- Doula
  - Coach, mentor, helper
  - Does not participate in delivery
  - Supports mother
  - Shorter labors, less anesthesia, fewer forceps and fewer cesareans
  - 5000 doulas in US
Newborn Baby
Newborn Baby

- Neonate: First four weeks of life
- Average newborn 20 inches, 7.5 pounds
  - Range is 18 – 22 inches, 5.5 pounds – 10 pounds
  - Boys slightly longer and heavier than girls
  - Firstborn likely to weigh less than laterborns
- Lose 10% of weight
  - Begin gaining weight about fifth day
- Large head, red skin, molding
  - Soft spots, fontanels, not yet fused until about 18 months
- Skin very thin
- Lanugo (fuzzy prenatal hair on shoulders, back, forehead, cheeks)
- Vernix caseosa (cheesy varnish)
  - Protects against infection
  - Absorbed into skin after birth
- Witch’s milk
  - Boys and girls
  - From high levels of estrogen in mother
- Females may have whitish or blood-tinged vaginal discharge
  - From high levels of estrogen in mother
Vernix Caseosa

Lanugo

Milia

Mottling
Body Systems

- Anoxia: lack of oxygen
  - Can cause brain damage if longer than 5 minutes
  - Hypoxia: reduced oxygen supply
    - Anoxia and hypoxia may result from repeated compression of placenta and umbilical cord with each contraction
      - Rare
- Birth trauma can result in mental retardation, behavior problems, death
- Newborn has 10% air sacs as adults
  - Susceptible to respiratory problems
- Meconium: stringy, greenish-black waste matter formed in fetal intestinal tract
- Neonatal jaundice
  - Caused by immature liver
  - Usually not serious
  - May go undetected and that can lead to complications
    - Most serious: brain damage
Medical and Behavioral Assessment

The Apgar score rates:
- Respiration, crying
- Reflexes, irritability
- Pulse, heart rate
- Skin color of body and extremities
- Muscle tone

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>Pale or blue</td>
<td>Pink body, blue extremities</td>
<td>Pink body and extremities</td>
</tr>
<tr>
<td>Heart Rate</td>
<td>Absent</td>
<td>Less than 100 beats per minute</td>
<td>Greater than 100 beats per minute</td>
</tr>
<tr>
<td>Respiration</td>
<td>Absent</td>
<td>Slow and irregular</td>
<td>Good breathing with crying</td>
</tr>
<tr>
<td>Reflex Response</td>
<td>Absent</td>
<td>Grimace or noticeable facial movement</td>
<td>Coughs, sneezes or pulls away</td>
</tr>
<tr>
<td>Muscle Tone</td>
<td>Absent</td>
<td>Some flexion of extremities</td>
<td>Active and spontaneous movement of limbs</td>
</tr>
</tbody>
</table>

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Apgar Scale
Assessing Neurological Status: The Brazelton Scale

- Suitable for infants up to 2 months old
- Assesses:
  - Motor organization
    - Activity level
    - Ability to bring hand to mouth
  - Reflexes
  - State changes
    - Irritability
    - Excitability
    - Ability to quiet after upset

- Attention
- Interactive capacities
  - Alertness
  - Response to visual and auditory stimuli
- Central Nervous System
  - Habituation
Neonatal Screening for Medical Conditions

• PKU
  – Phenylketonuria
  – 1 in 15,000 births
  – Will become mentally retarded unless special diet beginning in first 3 to 6 weeks of life
  – Can generate false-positive results

• Hypothyroidism
  – 1 in 3,600 – 5,000

• Galactosemia
  – 1 in 60,000 – 80,000
## States of Arousal in Infancy

<table>
<thead>
<tr>
<th>State</th>
<th>Eyes</th>
<th>Breathing</th>
<th>Movements</th>
<th>Responsiveness</th>
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<tbody>
<tr>
<td>Regular sleep</td>
<td>Closed; no eye movement</td>
<td>Regular and slow</td>
<td>None, except for sudden, generalized startles</td>
<td>Cannot be aroused by mild stimuli.</td>
</tr>
<tr>
<td>Irregular sleep</td>
<td>Closed; occasional rapid eye movements</td>
<td>Irregular</td>
<td>Muscles twitch, but no major movements</td>
<td>Sounds or light bring smiles or grimaces in sleep.</td>
</tr>
<tr>
<td>Drowsiness</td>
<td>Open or closed</td>
<td>Irregular</td>
<td>Somewhat active</td>
<td>May smile, startle, suck, or have erections in response to stimuli.</td>
</tr>
<tr>
<td>Alert inactivity</td>
<td>Open</td>
<td>Even</td>
<td>Quiet; may move head, limbs, and trunk while looking around</td>
<td>An interesting environment (with people or things to watch) may initiate or maintain this state.</td>
</tr>
<tr>
<td>Waking activity and crying</td>
<td>Open</td>
<td>Irregular</td>
<td>Much activity</td>
<td>External stimuli (such as hunger, cold, pain, being restrained, or being laid down) bring about more activity, perhaps starting with soft whimpering and gentle movements and turning into a rhythmic crescendo of crying or kicking, or perhaps beginning and enduring as uncoordinated thrashing and spasmodic screeching.</td>
</tr>
</tbody>
</table>

Source: Adapted from Prechtl & Beintema, 1964; P. H. Wolff, 1966.
States of Arousal and Activity Levels

- **States of arousal**
  - Internal clock that regulates daily cycles of eating, sleeping, elimination
- **Most new babies spend about 75% of their time (up to 18 hours a day) asleep**
  - Wake up every 3 – 4 hours to feed
  - Sleep alternates between quiet and active
    - Active sleep appears rhythmically in cycles of about 1 hour
    - Rapid eye movement
    - Less than 30% of daily sleep by age 3 and decreases steadily
- **Nighttime sleep lengthen during first month**
- **By 6 months, infant typically sleeps 6 straight hours at night**
- **2-year-old sleeps about 13 hours a day, including a single nap**
- **Sleep varies across cultures**
States of Arousal & Activity Levels
Complications of Childbirth

- Full-term normal birth weight: 78.8%
- Postmature: 6%
- Low birth weight: 8.1%
- Small-for-date: 2.7%
- LBW and preterm: 5.4%
- Preterm but not LBW: 7.1%
Global Low Birth Weight

**INFANTS WITH LOW BIRTHWEIGHT**

Map of the percentage of infants per country who are born with low birthweight.

Data and definitions from UNICEF.

- Green: 0 - 5%
- Beige: 6 - 10%
- Yellow: 11 - 15%
- Light Brown: 16 - 20%
- Red: 21 - 25%
- Dark Red: > 25%
<table>
<thead>
<tr>
<th>Region</th>
<th>% Low-Birth-Weight Infants</th>
</tr>
</thead>
<tbody>
<tr>
<td>WORLD</td>
<td>15.5</td>
</tr>
<tr>
<td>More developed countries</td>
<td>7.0</td>
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<tr>
<td>Less developed countries</td>
<td>16.5</td>
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<tr>
<td>Least developed countries</td>
<td>18.6</td>
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<td>AFRICA</td>
<td>14.3</td>
</tr>
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<td>Eastern Africa</td>
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<td>Middle Africa</td>
<td>12.3</td>
</tr>
<tr>
<td>Northern Africa</td>
<td>15.3</td>
</tr>
<tr>
<td>Southern Africa</td>
<td>14.6</td>
</tr>
<tr>
<td>Western Africa</td>
<td>15.4</td>
</tr>
<tr>
<td>ASIA**</td>
<td>18.3</td>
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<tr>
<td>Eastern Asia**</td>
<td>5.9</td>
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<td>South-central Asia</td>
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<tr>
<td>South-eastern Asia</td>
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<td>Western Asia</td>
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<tr>
<td>EUROPE</td>
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<tr>
<td>Eastern Europe</td>
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<td>Northern Europe</td>
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<tr>
<td>Southern Europe</td>
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<tr>
<td>Western Europe</td>
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<tr>
<td>LATIN AMERICA AND CARIBBEAN</td>
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<tr>
<td>Caribbean</td>
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<td>Central America</td>
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<td>NORTHERN AMERICA</td>
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<td>OCEANIA**</td>
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<td>Australia/New Zealand</td>
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<td>Melanesia</td>
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<td>Polynesia</td>
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</tbody>
</table>

*The latest available estimates by country and territory, on which these global and regional estimates are calculated, may refer to an earlier or a more recent year than 2000. However, considering that low-birth-weight rates are changing only slowly, the latest rates available have been taken to also refer to the year 2000 for the calculation of these global and regional estimates.

**Australia, Japan, and New Zealand have been excluded from the regional estimates, but are included in the total for developed countries.

Low Birth Weight by Age of Mother

Percent of Babies Born at Low Birthweight and Very Low Birthweight by Mother’s Age, 2006

Source: Kentucky Cabinet for Health and Family Services, processed by Kentucky Population Research at the University of Louisville Urban Studies Institute.
LBW by Race

[Graph showing the percentage of low birth weight (LBW) by race for different years: 1990, 2006, and 2007.]
Low Birth Weight

• Preterm
  – Before 37\textsuperscript{th} week of gestation

• Small-for-date
  – Weighs less than 90\% of babies of same gestational age
    • Usually result of inadequate prenatal nutrition

• Prematurity and LBW goes together
  – Second leading cause of death in infancy in US after birth defects
  – Leading cause of death during neonatal cause
  – ^Recent statistics state 13 million children born premature yearly
    • Over 1 million of them will die in first year (AP 2009)
Preterm Babies in US

- In 2004 12.5% of US infants born preterm
  - 18% increase since 1990
  - 33% more than 1981
  - Might reflect rise in multiple births
  - Might reflect inductions
  - Might reflect cesarean deliveries

- Preterm birth accounts for nearly half of all neurological birth defects
  - Cerebral palsy
  - More than 2/3 of infant deaths
LBW

• In 2004 8.1% US babies LBW
  – Less than 2,500 grams (5.5 pounds)
• VLBW: less than 1,500 grams (3.5 pounds)
  – More than 100 times more likely to die during first year of life
  – ELBW: less than 1,000 grams (2.5 pounds)
Who is Likely to have LBW?

- Demographic and socioeconomic factors
  - African American
  - Under age 17
  - Over age 40
  - Poor
  - Unmarried
  - Undereducated
  - Being born in certain regions
    - Southern and plains states
- Medical factors predating pregnancy
  - No children, more than four children, short stature, thin, previous LBW, multiple miscarriages, LBW herself, chronic hypertension, genital or urinary abnormalities
- Prenatal behavioral and environmental factors
  - Poor nutrition, inadequate prenatal care, smoking, use of alcohol or other drugs, exposure to stress, high altitude, toxic substances
- Medical conditions associated with the pregnancy
  - Vaginal bleeding, infections, high or low blood pressure, anemia, too little weight gain, last birth less than 6 months or more than 5 years before
- Depression risk factor
- High LBW in African-American population is major reason high mortality rates of black babies
  - Genetic variant may account for high rates of prematurity
  - Health behaviors and SES, higher levels of stress, impact of racism exacerbating stress
Immediate Treatment and Outcomes

• Most pressing concern for very small babies is death in infancy
  – Immature immune systems
    • Vulnerable to infection
    • Nervous systems too immature to perform basic survival functions
      – Mother’s milk can help prevent infection
  – Less fat, difficult to stay warm
  – Low Apgar scores are strong indication of need for intensive care

• Isolette: sensory impoverishment
  – Parents and staff encouraged to do gentle massage
    • Fosters growth, weight gain, motor activity, alertness, behavioral organization
    • Shorten hospital stay
Long-Term Outcomes for LBW

• Increased risk of adult-onset diabetes
• SGA increased risk of cardiovascular disease
• ELBW more likely to have neurological, sensory, cognitive, educational, and behavioral problems
• Finland study demonstrated only 26% of ELBW showed normal development at age 5
Postmaturity

- 6% of pregnant US women have not gone into labor after 42 weeks
- Infant born long, thin
- Insufficient blood supply toward the end of gestation
- Placenta is aged and less efficient
- Less oxygen
- Greater size complicates labor
- Risk of brain damage and death
Stillbirth

- Stillbirth: death of a fetus at or after the 20th week of gestation
  - Accounts for more than half of perinatal deaths (deaths during or within 24 hours after childbirth)
  - 4 babies in 1,000 born dead in US
  - Boys more likely to be stillborn
  - Cause of stillbirth not clearly understood
  - Many stillborn infants are SGA, indicating malnourishment in the womb
- Third trimester stillbirths dropped substantially in US in past 20 years
  - 33% drop among African American women
  - 46% among white women
  - Rates of stillbirth still twice as high among black women as white women
- Women over 35 more likely to have stillborn infant
- Drop in stillbirths may be result of electronic fetal monitoring and ultrasound
Can a Supportive Environment Overcome Effects of Birth Complications?

- Early intervention:
  - Improvements in cognitive and social measures for 3-year-olds in intervention groups
  - Light intervention/heavy intervention groups
    - Heavier intervention groups held edge longer
  - All groups had substantially below-average IQs and vocabulary scores at age 8
  - By 18 years, modestly higher math achievement and reading than control group
  - Performed below age norms by 18 years
    - Importance of what goes on in the home
Can a Supportive Environment Overcome Effects of Birth Complications? (cont)

• Kauai Study
  – Longitudinal study (50 years)
    • 1 year, 2 years, 10 years
  – 698 children born in 1955
  – LBW and other complications of birth seriously impaired only when the children grew up in persistently poor environmental circumstances
  – Children with birth-related problems and later stressful experiences had worst health and most retarded development
  – 276 children by 2 years identified as having four or more risk factors – chronic poverty, family discord, divorce, parents mentally ill – 2/3 developed serious learning or behavior problems by 10 or by 18 years were pregnant, in trouble with the law, or were emotionally disturbed
    • By 30 years, 1/3 of highly at-risk children were competent, confident, caring adults
Can a Supportive Environment Overcome Effects of Birth Complications? (cont)

• Kauai Study (cont)
  – Protective factors for at risk children
    • Individual attributes that may be largely genetic
      – Energy, sociability, intelligence
    • Affectionate ties with at least one supportive family member
    • Rewards at school, work, or place of worship that provide a sense of meaning and control over one’s life
Childbirth and Bonding

- **Imprinting**
  - Instinctive learning during a critical period
  - Animals form attachments for first moving object it sees
- **Humans do not have a critical period for bonding**
- **Fathers and mothers form close bonds with their babies**
What Do Newborns Need from Their Mothers?
The Father’s Role

• Father involvement cultural
  – China: Stern, aloof, educated fathers interact more with children, more intimate relationships
    • One Child Policy leads parents to be more deeply involved with their only child
  – Central Africa: more nurturing and emotionally supportive
  – US: increased since 1970 as result of more mothers working outside home
Infant Care: A Cross-Cultural View

• Patterns of interaction vary greatly around the world
  – Bali: Infants are ancestors or gods in human form, treated with dignity and respect
  – West Africa: young babies understand all languages
  – Micronesia: babies can’t understand language so adults don’t speak to them
A new baby is like the beginning of all things - wonder, hope, a dream of possibilities.

- Eda J. Le Shan