

**PRE-NATAL**

**DEVELOPMENT**

# INTRODUCTION

All the developmental theories which we lengthily discussed dwelt on the developmental process after birth. None of them was concerned with the development went on before birth. To make the description of human development complete, it may be good to understand the beginnings of the child and the adolescent. In Unit I, Module I you met Naschielle and Kenn. You were asked what they were before they have become what they are at present. This is the concern of this Unit and Module – pre – natal or antenatal development.

# Life Before Birth

## The development of the unborn child

*The development of human life in the womb was once a mystery, but science and medicine have changed that. Abortion advocates still try to dehumanize the developing baby in the womb by speaking of the child as “a blob of tissue” or uterine contents.” But ultrasounds images, prenatal surgery and other advances in obstetrics are shattering the blob-of-tissue myth.*

*Dr. Paul Rockwell, a New York physician, made these profound observations after his amazing encounter with a tiny unborn baby boy: “Eleven years ago while I was giving an anesthetic for a ruptured ectopic pregnancy (at two months gestation), I was handed what I believe ever seen. The embryo sac was intact and transparent. Within the sac was a tiny human male swimming extremely vigorously in the amniotic fluid, while attached to the wall by the umbilical cord.*

# ABSTRACTION

## Human life begins at conception

That which is in the mother's womb is indeed developing human being. An unborn baby of eight (8) weeks is not essentially different from one of eighteen (18) weeks or twenty-eight (28) weeks. From conception the zygote, the embryo and the fetus are undeniably human life.

Human life begins from the moment of conception. All that we have and all that we are have been there at the moment of conception! The fact that you have brown eyes and black, straight or curly hair and the fact that you will turn bald at age 50 have been there already at the moment of conception. What was added in the process of development is nutrition.

# **The Stages of Pre-natal Development**

It may be good to watch the video on High Tech Photographs of Fetal Development/Pro-life Anti-Abortion Video at YouTube before you read these notes on stage of pre-natal development.

Pre-natal development is divided into three (3) periods- germinal, embryonic and fetal.



**1. Germinal Period (First 2 weeks after conception) – This includes the a) creation of zygote. b) continued cell division and c) the attachment of the zygote to the uterine wall.**

The following are the details of development during this period:

- a) 24 to 30 hours after fertilization-the male (sperm) and the female (egg) chromosome unite.
- b) 36 hours-the fertilized ovum, zygote. divides into two (2) cells.
- c) 48 hours (2days) – 2 cells become 4 cells
- d) 72 hours (3days) – 4 cells become a small compact ball of 16-32 cells

- f) 96 hours (4days) – hollow ball of 64-128 cells
- g) 4-5 days – inner cell mass (blastocyst) still free in the uterus
- h) 6-7 days – blastocyst attaches to the wall of uterus
- i) 11-15 days – blastocyst invades into uterine wall and becomes implanted in it (implantation)

The **Blastocyst**, the inner layer of cells that develops during the germinal period, develops later into the embryo. The *trophoblast*, the outer layer of cells that develops also during the germinal period, later provides nutrition and support for the embryo (Nelson. Textbook of Pediatrics, 17<sup>th</sup> ed., 2004).

**2. Embryonic Period (2-8 weeks after conception)** – In this stage, the name of the mass cells. **Zygote**, become embryo. The following developments take place:

*a) Cell differentiation intensifies*

*b) Life-support system for the embryo develop and*

*c) Organs appear*

The embryo's **endoderm**, the inner layer of cells develops into the digestive and respiratory systems. The outer layer of cells is divided into two parts – the **ectoderm** and the **mesoderm**. The ectoderm is the outermost layer which becomes the nervous system, sensory receptors (eyes, ears, nose) and skin parts (nails, hair).

The **mesoderm** is the middle layer which becomes circulatory, skeletal, muscular, excretory and reproductive systems. This process of organ formation during the first two months of pre-natal development is called *organogenesis*.

**3. Fetal Period (2 to 7 months after conception) – Growth and development continue dramatically during this period. The details of the developmental process are as follows (Santrock, 2002):**



- a. 3 months after conception – fetus is about 3 inches long and weighs about 1 ounce; fetus has become active, moves its arms and legs, opens and closes its mouth, and moves its head; the face, forehead, eyelids. Nose and chin can now be distinguished and also the upper arms, lower arms, hands and lower limbs; the genital can now be identified as male or female.
- b. 4 months after conception – fetus is about 6 inches long and weighs 4 – 7 ounces; growth spurt occurs in the body's lower parts; pre-natal reflexes are stronger, mother feels arm and leg movements for the first time.

- c. 5 months after conception – fetus is about 12 inches long and weighs close to a pound; structures of the skin (fingernails, toenails) have formed; fetus is more active.
- d. 6 months after conception – fetus is about 14 inches long and weighs one and half pound; eyes and eyelids are completely formed; fine layer of head covers the head; grasping reflex is present and irregular movements occur.
- e. 7 months after conception – fetus is about 16 long and weighs 3 pounds.
- f. 8 and 9 months after conception – fetus grows longer and gains substantial weight, about 4 pounds.

# Teratology and Hazards to Pre-natal Development

**Teratology** is the field that investigates the causes of congenital (birth) defects. A teratogen is that which causes birth defects. It comes from the Greek word “*tera*” which means “*monster*”.

# Below are clusters of hazards to pre-natal development:

1. Prescription and nonprescription drugs – These include prescription as well as non-prescription drugs. Antibiotic is an example of a prescription drug that can be harmful. Examples of nonprescription drugs are diet pills, aspirin and coffee.
2. Psychoactive drugs – These includes nicotine, caffeine and illegal drugs such as marijuana, cocaine and heroin.

Heavy drinking by pregnant women results to the so-called *fetal alcohol syndrome* (FAS) which is a cluster of abnormalities that appears in the children of mothers who drink alcohol heavily during pregnancy.

1. Environmental hazards – These include radiation in jobsites and X-rays, environmental pollutants, toxic wastes and prolonged exposure to heat in saunas and bath tubs.
2. Other maternal factors such as Rubella (German Measles), syphilis, genital herpes, AIDS, nutrition, high anxiety and stress, age (too early or too late, beyond 30)

Rubella (German measles) in 1964 – 65 resulted in 30,000 pre-natal and neonatal (newborn) deaths and more than 20,000 affected infants were born with malformations, including mental retardation, blindness, and deafness and heart problems (Santrock, 2002).

A mother can infect her child in three ways: 1) during gestation across the placenta, 2) during delivery through contact with maternal blood or fluids, and 3) postpartum (after birth) through breast-feeding.



Folic acid is necessary for pregnant mothers. Folic acid can be reduced the risk of having a baby with a serious birth defect of the brain and spinal cord, called the 'neural tube'. A baby with *spina bifida*, the most common neural tube defect is born with a spine that is not closed. The exposed nerves are damaged, leaving the child with varying degrees of paralysis and sometimes mental retardation. (

<http://www.squidoo.com/folicacidpregnant>)

A baby with Down syndrome rarely is born to mother an under age 30 but the risk increases after the mother reaches 30. By age 40, the probability is slightly over 1 in 100, and by age 50 it is almost 1 in 10. The risk is also higher before age 18. (Santrock, 2002)

5. Paternal factors – Fathers' exposure to lead, radiation, certain pesticides and petrochemicals may cause abnormalities in sperm that lead to miscarriage or diseases such as childhood cancer.

As in the case of older mothers, older fathers also may place their offspring at risk for certain defects. (Santrock, 2002.)

# BIG IDEAS

Concept	Related Processes/Ideas	Characteristics/Description
The Course of Prenatal Development	The Germinal Period	<ul style="list-style-type: none"><li>• It is divided into 3 stages – <b>germinal</b>, <b>embryonic</b> and <b>fetal</b> periods</li><li>• The germinal period is the period of prenatal development that takes place in the first 2 weeks after conception.</li><li>• This period includes the ff.:<ol style="list-style-type: none"><li>a. Creation of the zygote,</li><li>b. Continued cell division and</li><li>c. The attachment of the zygote to the uterine wall</li></ol></li></ul>

# BIG IDEAS

## Concept

## Related Processes/Ideas

## Characteristics/Description

The Embryonic Period

The **embryonic** period is the period of prenatal development that occurs 2 to 8 weeks after conception.

In the embryonic stage, the name of the mass cells, zygote, becomes **embryo**

The following developments take place:

- a. Cell differentiation intensifies
- b. Life-support system for the embryo – the placenta, umbilical cord and amnion-develop and
- c. Organs systems appear (organic genesis).

The Fetal Period

- This period lasts from about 2 months after conception until 9 months when the infant is born.
- Growth and development continue their dramatic course and organ systems mature to the point at which life can be sustained outside of the womb.

# BIG IDEAS

Concept	Related Processes/Ideas	Characteristics/Description
Teratology	Meaning of teratology	<ul style="list-style-type: none"><li>• This is the field of study that investigates the causes of congenital (birth) defects.</li><li>• That which causes birth defects is call <b>teratogen</b>.</li></ul>
Hazards to Prenatal Development	Prescription and Non-prescription drugs	<ul style="list-style-type: none"><li>• <b>Thalidomide</b> when taken in by pregnant mothers has a negative effect on the developing fetus as proven by the thalidomide tragedy in the 1960s.</li><li>• Prescription drugs that can be harmful include antibiotics.</li><li>• Diet pills, aspirin and coffee are examples of non-prescription drugs that can be harmful</li></ul>

# BIG IDEAS

## Concept

## Related Processes/Ideas

## Characteristics/Description

Psychoactive Drugs

- Researchers found that pregnant women who drank more caffeinated coffee were more likely to have preterm deliveries and newborns with lower birthweight compared to their counterparts who did not drink caffeinated coffee.
- Heavy drinking by pregnant women results to the so-called **fetal alcohol syndrome (FAS)** which is a cluster of abnormalities that appears in the children of mothers who drank alcohol heavily during pregnancy. These abnormalities include facial deformities and defective limbs, face and heart. Most of these children are below average in intelligence and some are mentally retarded.

# BIG IDEAS

## Concept

## Related Processes/Ideas

## Characteristics/Description

- Fetal and neonatal deaths are higher among smoking mothers. There are also higher incidences of preterm births and lower birthweights among children with smoking mothers.
  - On the average, maternal heroin addicts deliver smaller than average size babies with more incidence of toxemia, premature separation of placenta, retained placenta, hemorrhaging after birth, and breech delivers.
- Environmental Hazards
- These include radiation jobsites and X-rays, environmental pollutants, toxic wastes and prolonged exposure to heat in saunas and bath tubs.
  - Research found that chromosomal abnormalities are higher among the offspring of fathers exposed to high levels of radiation in their occupations.



# BIG IDEAS

## Concept

## Related Processes/Ideas

## Characteristics/Description

- X-rays also can affect the developing embryo and fetus, with the most dangerous time being the first several weeks after conception when women do not yet know that they are pregnant.
- Researchers found that toxic wastes such as carbon monoxide, mercury and lead caused to defects in animal exposed to high doses. For instance, early exposure to lead affects children's mental development.
- Prolonged exposure of pregnant mothers to sauna or hot tubs raises the mother's body temperature creating fever that endangers the fetus. The high temperature due to fever may interfere with cell division and may cause birth defects or even fetal death if the fever occurs repeatedly for prolonged periods of time.

# BIG IDEAS

Concept	Related Processes/Ideas	Characteristics/Description
	Other Maternal Factors	<ul style="list-style-type: none"><li>• Rubella (German Measles) can be harmful</li><li>• Syphilis, genital herpes and AIDS are other teratogens.</li><li>• A developing fetus depends entirely on its mother for nutrition. It is recognized that maternal malnutrition during pregnancy may result to inadequate growth of the fetus. If a fetus does not receive enough nourishment, the rate of cell division is seriously hampered.</li><li>• One aspect of maternal nutrition that has emerged is folic acid. Lack of folic acid in the mother's diet leads to a birth defect of the brain and the spinal cord.</li><li>• Highly anxiety and stress in the mother are linked with less than optimal prenatal and birth outcomes.</li></ul>

# BIG IDEAS

## Concept

## Related Processes/Ideas

## Characteristics/Description

### Paternal Factors

- Two maternal age periods can lead to problems before the offspring's development: **adolescence and 30 or older.**
- Paternal factors that can adversely affect prenatal development include exposure to lead, radiation, certain pesticides and petrochemicals
- Older fathers also may place their offspring at risk for certain defects. (Santrock, 2002).

Thank You  
&  
God Bless!!!