
UNIT 8 ASSESSMENT OF GROWTH & DEVELOPMENT

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8.0 OBJECTIVES

After going through this unit, you should be able to:

- Outline the parameters to be assessed for evaluating growth and development;
- Identify, select and use the tools needed for assessment of growth and development in a particular child; and
- Reproduce the growth of a child on monitoring charts and detect deviations from normal.

8.1 INTRODUCTION

In this unit, we introduce you to the actual procedures for assessing growth and development. You will also discover how to monitor the growth and development of a given child.

By this time you must have gone through the theory units concerned with growth and development. This present unit is a component of practical manual and will serve as an aid to the theory unit.

In the first section of this unit, you will get familiarised with the various parameters (such as weight, height, body circumferences, developmental milestones) used to assess the growth and development and the tools used for their assessment. In the second section, you will learn to use these tools in assessment and monitoring of growth and development. The last section includes instructions and model exercises of practicing the skills, you have already learnt. In this section, you will also find the list of various activities that you are supposed to carry out at your work place, centre and work centre.

8.2 PREPARATION FOR ASSESSMENT

8.2.1 Parameters to be Assessed

Let us discuss separately the parameters which must be assessed for growth and for development.

1) Assessment of Growth.

- a) **Weight:** It is the best index of nutrition and growth and most easily measured. Careful assessment of subject is necessary to avoid errors. The obese infants or an infant with oedema will show a gain in weight that does not indicate a better state of nutrition. A term child loses 10% of his weight during first three days of life. The birth weight is regained after 10 days of life and thereafter the infant gains at the rate of 20-40 grams per day. A child doubles, triples and quadruples his birth weight by 5 months,

1 year and 2 years respectively. After the second year of life, weight gain occurs at the rate of 2 – 2.5 kg per year till adolescence begins. The adolescent acceleration in weight occurs earlier in girls (10 – 12 years) than boys (beginning 2 years later). The rapid weight gain is greatest in year before menarché.

- b) **Length/Height:** For children of 0 – 2 years, length is measured by placing the child supine. A term newborn measures 50 cm at birth. The length is 75 cm and 90 cm by 1 and 2 years of age respectively. Thereafter, till the onset of adolescence, children grow at a rate of 4 – 5 cm per year. By 13 years of age, a child triples his birth length. Adolescent spurt of growth in height corresponds closely to weight gain.
- c) **Circumference of Head, Chest and Mid-arm:** At birth, head measures 35 cm. By one year of age, it is 45 – 47 cm. An increment of 2 cm occurs during the second year. Thereafter the head grows by 0.5 – 1 cm per year only till 18 years of age. Head circumference is more than the chest at birth but is overtaken by chest circumference after one year of age. Mid Arm Circumference (MAC) is 9 – 11 cm at birth, 16 cm at 1 year and does not increase significantly during 1 – 5 years.

2) **Assessment of Development**

Usual ages at which the developmental assessment should be made are 6 weeks, 6 months and 10 months of age. Developmental assessment includes a detailed history with emphasis on significant events during pregnancy, delivery, neonatal period and course of development. The status of hearing, sight and motor control has to be ascertained. Note all the milestones and time of their appearance till date.

Pre-requisite for Assessment

The child should be in good mood. The playtime of the child should coincide with the time of assessment. Child should not be hungry, thirsty, sleepy or wet. Keep irrelevant toys and objects out of the room in which you are assessing the child. Mother should be present while you are assessing the child's development. Instruct her not to disturb or help the child during assessment. Watch the child as closely as possible. Look for any abnormal movements.

8.2.2 Tools for Assessment

Tools used for assessment of growth can be easily listed and give specific information. On the other hand assessment of development is more difficult and requires lot of practice and experience.

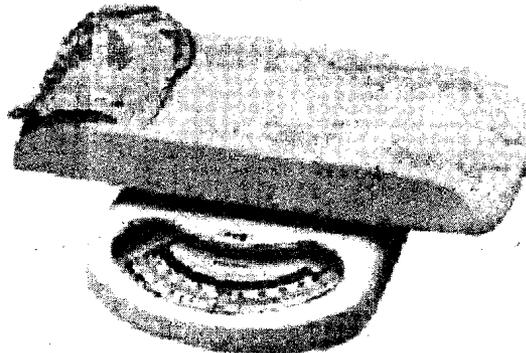
1) **Tools for Growth Measurement**

The following tools are commonly used for measuring growth of a baby:

i) **Weighing Scale:**

You should have two types of weighing scale at your facility.

- a) For small infant weighing up to 10 kg



The infant can be placed on the tray which in turn is supported on a reading frame calibrated for measuring a minimum of 100 gram increment.

b) For older children who can stand on a platform.



ii) *Infantometer*

It measures the length of a newborn and infant. If the instrument is not available at your workplace, see it at your SDC or PSC. The tool consists of wooden board limited by two planks on the two ends. One plank is fixed on one end while the other slides on a reading scale. You have to put baby on this scale with head touching the fixed plank. The legs are extended and the sliding plank is moved to touch the sole of the baby, the reading is recorded. It gives the length of the baby.



iii) *Stadiometer/Wall Scale:*

If you don't have a height measuring scale, also known as stadiometer, select a piece of plain wall and mark it in centimetres with help of a scale. The child can be made to stand against the calibrated wall for measuring his/her stature (height). A non-traumatic flat board (wooden, metallic or cardboard) will also be needed to level off the height at head end of the child (see the figure below).



iv) **Measuring Tape:** It should be made of soft material and it should not be stretchable and shrinkable. Also its edges should not be sharp (A sharp edge may injure the baby).

2) **Tools for Growth Assessment and Monitoring (Growth Charts)**

Once the measurements have been recorded, the next step is to plot these measurements in term of a chart or graph. The X-axis is used for age and Y-axis for physical measurement (Fig. 8.4a). At a given age, the weight or height can thus be indicated on this chart (Fig. 8.4b). Now if you will keep on following this child for sometimes with periodic measurement of his size, you will get a number of serial readings regarding a growth parameter with relation to advancing age (Fig. 8.4c). Draw a line joining all these readings and you will get a curve. This curve is known as a Growth Curve and the methodology is called Growth Monitoring or charting.

The next step is to decide whether the curve you have obtained denotes a normally growing child or not. For this, you will have to compare your curve to those of general population. A standard growth chart for general population is expressed in terms of percentile curves (Fig.8.5). This facilitates a direct interpretation a child's size. The number of percentile indicates the position that a measurement would hold in a typical series of 100 arranged in ascending order. Thus the 10th percentile gives the value for the 10th child of a group of 100. Nine children will be smaller in the measurement under consideration and 90 will be larger. At the 50th percentile, an equal number of children will be smaller or larger than the measurement. Eighty per cent of the weight/height measurements of children at a given age are expected to fall between 10th and 90th percentile and are considered normal. A child, who at initial evaluation is between two percentile curves, normally maintains his position between those curves, even if he is followed up over a time period.

A standard growth chart prepared by World Health Organisation (Road to Health Card) for monitoring growth under five children has been provided. Note that this is a rising growth curve. A rising growth curve indicates a healthy child. A flat growth curve is a warning signal and a down going growth curve calls for immediate action (Fig. 8.6).

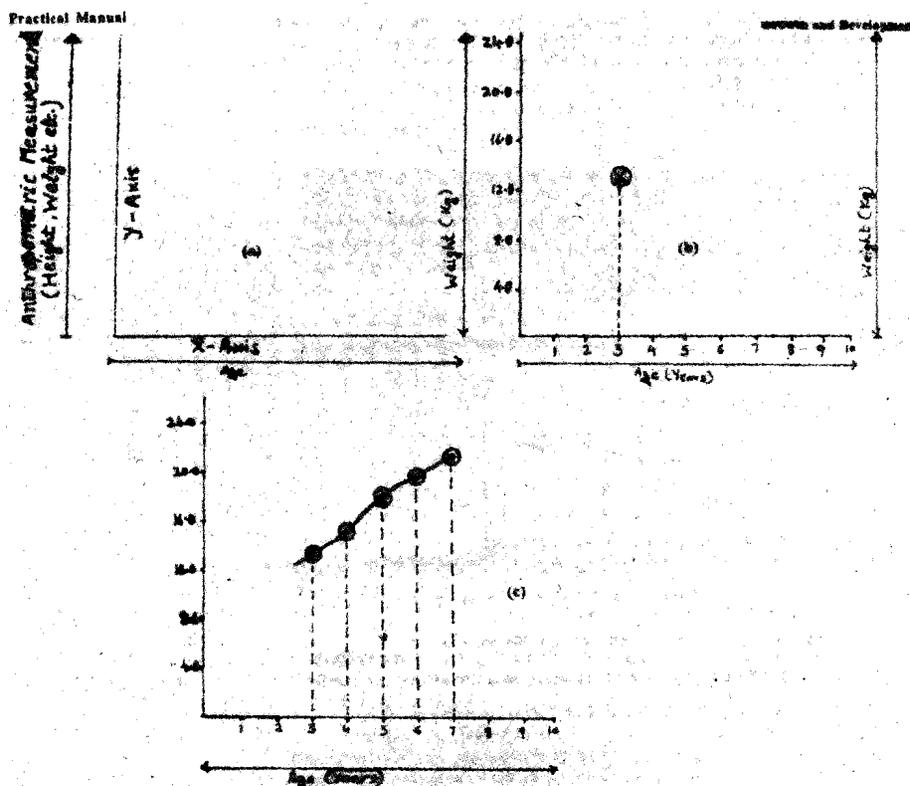


Fig. 8.4: Drawing a growth curve

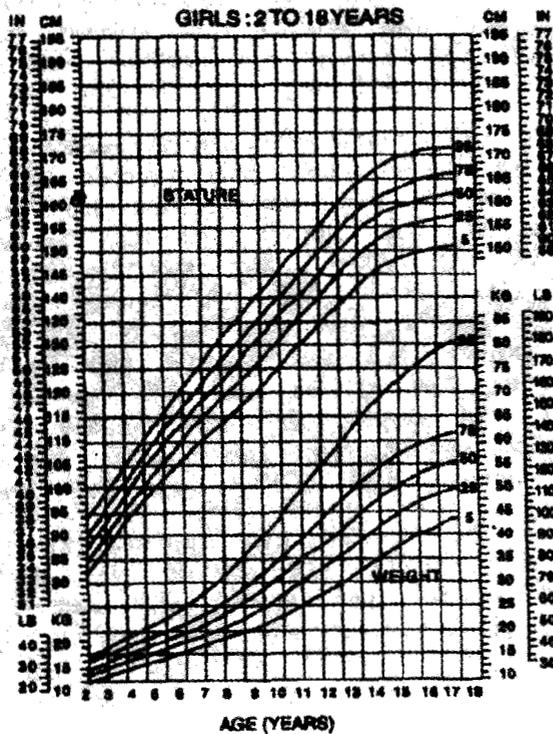


Fig.8.5: Percentile curve

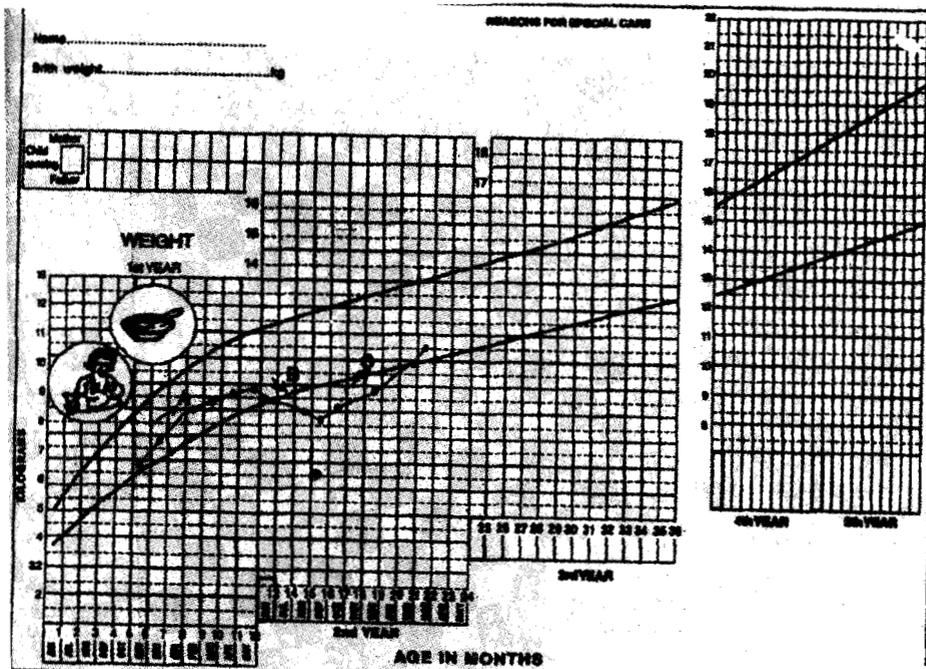


Fig.8.6: Road to health card

You can plot the growth of children assigned to you on these charts and assess whether they are growing normally or not. Instruments for detecting variation from a normal curve will follow in the sub-section 8.3.2. on growth monitoring.

3) Tools for Developmental Assessment

The most important tools for development assessment are your special senses that listen to the history; vocalization and language of the child and that elicit various reflexes and developmental milestones (described below). In addition, you may need a small bell, a pen and paper, a red ring, and cubes of 1 inch size.

8.3 METHODS OF ASSESSMENT

8.3.1 Anthropometry

- i) **Weight:** Weight the child in bare minimum of clothes and without shoes. Check the zero of the scale before weighting. A child on follow up should preferably be weighed on the same scale. Record in kilogram and hundred of gram, e.g. 4.3 kg denotes 4 kilogram and 300 grams.
- ii) **Length:** Place the child on flat surface on infantometer. Hold his head in contact with the fixed board and ask your assistant to stretch out the child to his maximum length and then bring the moving board into contact with his heels. Note the reading on the moving strip. For demonstration, go to your skill development centre.
- iii) **Height:** Place the child in standing position against the calibrated wall
 - The child should not be wearing shoes and his heels and back should be in contact with the wall.
 - Ask the child to look straight forward
 - Hold his head to keep the lower border of his eye sockets in the same horizontal plane as his external auditory meati.
 - The wooden board (head piece) is moved down on to the child's head, keeping it perpendicular to the wall.
 - Ask the child to take a breath, relax the shoulders and stretch up to be as tall as possible. At the same time, take care so that the heels do not come off the ground. Record the stature to the last completed cm and mm.
- iv) **Head circumference:** Pass a measuring tape over the head so as to overlie the most prominent part of the occiput and area just above the eyebrows. Take three such measurements of the same child and select the maximum obtained as the head circumference.
- v) **Chest circumference:** Take the circumference, midway between inspiration and expiration, by encircling the chest at the level of nipples with the help of a measuring tape, to nearest of mm.
- vi) **Mid-arm Circumference:** Let the left arm hang naturally by the side of body. Find out the mid point between tips of acromian and olecranon process of ulna. Record the circumference at this point.

8.3.2 Growth Monitoring

Taking a one time measurement may not be enough to assess growth in a child. For assessing the velocity and pattern of growth follow up the child for at least at 6 monthly intervals. The follow up growth recording is also termed as growth recording is also termed as growth monitoring.

Growth monitoring is best done on standardized percentile curves (e.g. Fig. 8.5). These graphs are most helpful in explaining to the mother that her child is growing normally or having a problem. These are better than verbal explanation. Growth charting also helps to monitor the effect of treatment/intervention modalities on the pattern of growth.

When you see a child for the first time, assess whether his measurement is less than 3rd or more than 97th centile on the corresponding growth chart. If yes, the child is growing abnormally and needs evaluation.

Children with weight/height measurements that fall between 3rd to 10th centile or between 90th to 97th centile need to be followed up and review periodically by plotting the measurements on a growth chart as per instructions given above. You might face any of the following situations after following him up for the requisite time period.

Situation	Inference
<p>1) Initially, this child was between 3rd-10th percentile</p> <p>On follow up:</p> <p>i) he continues to retain his position between two centile curves for 3rd and 10 th percentile</p> <p>ii) He shift down his position to less than the 3rd percentile curve (show downward trend)</p> <p>iii) he shift up his position to more than the 10th percentile curve (show upward trend).</p>	<p>Growing normally with a normal velocity of growth</p> <p>having diminished growth velocity. Growth is abnormal Needs evaluation.</p> <p>Child is enjoying a period of accelerated growth due to high growth velocity (catch up growth), Needs encouragement.</p>
<p>2) Initially, this child was between 90th-97th percentile.</p> <p>on follow up:</p> <p>i) He remained within the same Percentile curves.</p> <p>ii) Moves to an upward position above 97th centile.*</p> <p>iii) Moves to a downward position below 90th centile</p>	<p>Growing normally.</p> <p>Growth and the velocity both are accelerated, indicating abnormal growth. Needs evaluation</p> <p>May be is just a catch down growth phenomenon or the child is suffering from an illness resulting in aberrant growth. Keep on monitoring and evaluate in case of further downward shift in percentile curve.</p>

* Make sure that the gain in weight is not due to edema; before inferring the observation.

Remember that:

- A child, who stays on or near one percentile line or between the same lines on subsequent monitoring is said having a normal growth.
- A normal child usually remains between 10th and 90th percentile curves and does not change his percentile group (e.g. between 10th-25th centile curves) at succeeding ages or change only gradually. A sudden shift in the percentile group (i.e. from higher to lower or lower to higher) on serial monitoring needs evaluation.
- In a normal child, height and weight usually fall in the same percentile position. At times, the two parameters may defer in their actual percentile positions on their respective charts but tend to maintain the same relation throughout childhood. However, these children, before being labeled as normal, should be reviewed for growth abnormalities.

8.3.3 Developmental Examination

Development refers to functional maturity. It indicates acquisition of skills and is related to maturation and myelination of nervous system.

Development after birth: An infant’s head grows very quickly especially in the first year of life, because the brain is growing so fast. Development of skills depends mainly on the functioning of the brain and nervous system and the stimuli the child receives from outside. When born, an infant can do very little for himself. Gradually he develops until he can control his body and do specific tasks. It is useful to know the age when most children are able to perform certain of these tasks. They can be used as markers or indicators of development and are sometimes called ‘milestones of development’.

The table below shows the ages when the average child reaches some of these milestones. Some children achieve these skills earlier and some later. The table also shows the upper age at which the majority of children achieve certain skills. If several milestones are not reached by the upper age limit, delayed development should be suspected and further advice sought.

Table 8.1: Milestones of development in young children

Skills	Age of achievement	
	Average child (months)	Nearly all children (months)
Social smile	1½	3
Following object	2-3	4
Balance Head (neck holding)	3-4	6
Turns to sound	4	6
Active grasping with hand	4-5	6
Sits with support	5	8
Sitting without support	6	8
Stands alone	9-11	12
Able to walk a few steps	12-14	15
Walks on its own without any support	14-16	18
Able to speak 4 – 5 single words	15	21
Can copy a lines	18-22	24
Can copy a circle	24-30	36
Can copy a cross	36-42	48
Can copy a square/triangle	48-60	72

Table 8.2: Drawing skills in young children

Age	Can draw
2 years	Vertical line
3 years	Horizontal line, Copiescircle
4 years	Cross X
5 years	Square
6 years	Triangle
7 years	Diamond

Stimulation, particularly by taking interest in and talking to children, helps them to develop. If children have no toys or are often left alone, they develop more slowly.

Race or ethnic origin is unimportant influences on growth and development compared with nutrition and stimulation.

Please note that the above milestones have arranged in a chronological order. You must try to assess children in different age groups e.g. 0 – 6 months, 6 – 12 months, 12 – 24 months, and 2 – 5 years. Try to observe if they are delayed or normal.

Check your observations with your Academic Counsellor and try to determine the cause of delay from a good history.

8.4 LET US SUM UP

In this unit you were introduced to the tools and methodology of assessing and monitoring growth as well as development. In the last section a set of exercises were provided which you could carry out at your workplace and get counter checked from the counsellors at study centres, so as to refine your skills.