

*Review*

# A review of growth monitoring as an indicator for child survival in 21<sup>st</sup> century Nigeria

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Growth monitoring has been advocated as an effective, simple and inexpensive way of preventing most childhood malnutrition. In 1990, more than 12 million children in developing countries died before the age of five from diseases such as diarrhea, malnutrition, pneumonia, AIDS, malaria, and tuberculosis, by 2012, that number had dropped to 6.6 million, yet under five mortality rates remain unacceptably high, especially considering that most of these deaths are due to preventable or treatable causes. The child mortality MDG is one of the goals lagging farthest behind, more than half of all countries are not on track to reduce the under-five death rate by two-thirds by 2015. The World Bank is redoubling efforts in nutrition, health care, infrastructure, and the other areas that can help save children's lives. UNICEF currently estimates that approximately 146 million children under five worldwide about one in four are underweight. Malnutrition is a direct cause of about half of the more than 10 million child deaths in the developing world each year. More of those deaths come from children who are mildly or moderately malnourished, due to their sheer numbers, as compared to those who are severely malnourished. Effective approaches to preventing malnutrition, especially mild and moderate malnutrition, are essential to achieving the Millennium Development Goals (MDGs). This paper therefore, reviewed growth monitoring as an indicator for child survival.

**Keywords:** Growth monitoring, child, survival and strategies.

## INTRODUCTION

Child survival strategy is an essential component of public health which was developed by WHO, UNICEF and World Bank in 2006 to address the issue of high mortality rate of under-five in African region. The strategy aims to scale up a defined set of effective child survival interventions, including antenatal care, newborn care, appropriate infant feeding, immunization, management of common childhood illnesses and use of insecticide-treated nets (ITNs) (Habimana et al., 2010).

Under-five mortality rate in the African Region was estimated at 145/1,000 live births in 2007, these death were mainly of preventable or treatable conditions (Neill et al., 2012). Furthermore, World Health Organization (WHO) also identified a number of health problems that need special attention in under-five children, and childhood malnutrition is one of those health problems that have been identified to be given high priority in terms of its management and control.

Recently, during the 2012 World Health Assembly (WHA), a 13 year comprehensive implementation plan (2012-2025) to address maternal, infant and child nutrition was endorsed. The aim of the plan is to alleviate the double burden of malnutrition in children, starting from the earliest ages. The plan includes six global nutrition targets: child stunting; wasting; overweight; anemia in women of reproductive age; low birth weight; and exclusive breastfeeding. (De Onis et al., 2012).

However, malnutrition is still contributing significantly to the death and burden of disease of children in many parts of the world claiming one-third of under-five deaths especially in Africa way beyond the year 2000 (Liu et al., 2012). Therefore, the most cost-effective way to address the pressing public health challenge of malnutrition is to prevent it, hence the importance of promoting healthy growth as a strategy cannot be overemphasized. This means ensuring that all of the children who have normal

weight at birth continue within the normal range and those who are low weight at birth are brought swiftly into a healthy growth range (Griffiths and Del Rosso, 2007).

Growth monitoring consists of routine measurements to detect abnormal growth, combined with some action when this is detected. It aims to improve nutrition, reduce the risk of death or inadequate nutrition, help educate caregivers, and lead to early referral for conditions manifest by growth disorders (Garner et al., 2000). Since the medical community introduced the practice of measuring the growth of children in clinics in developing world in the 1960s, UNICEF had been active in nutrition programming and has supported growth monitoring as a tool of promoting child health, primarily through provisioning programs with scales, growth charts, and training of health workers, and in 1970s the use of growth charts became a standard practice. Publications emerged at this time that linked growth monitoring to nutrition education and counseling, and reported the use of growth monitoring outside of the clinic as part of community based primary health care activities. Adding to the momentum was the promotion of the growth chart for international use by the World Health Organization (WHO) in 1978 and the inclusion of under-five growth monitoring as one of the key components of UNICEF's GOBI (growth monitoring, oral rehydration therapy, breastfeeding, and immunization) approach in the "Child Survival Development Revolution" of the early 1980s. Confusion around growth monitoring dates back to this time, when it was unclear whether growth monitoring alone produced results, apparently in the mid-1980s emerged the concept of Growth Monitoring and Promotion, which linked growth monitoring results to an action to be taken for the child. Growth monitoring promotion aims to improve individual child nutritional outcomes, thereby increasing the survival rate in children (Griffiths and Del Rosso, 2007; UNICEF, 2013).

## Growth Monitoring

Growth monitoring and promotion of optimal nutrition are essential components of health care for all children. Monitoring a child's growth helps to confirm a child's healthy growth and development, or identify early a potential nutritional or health problem (Pediatric Child Health, 2010). Growth monitoring is defined as the process of following the growth rate of a child in comparison to a standard by periodic, frequent anthropometric measurements in order to assess growth adequacy and identify faltering early. It is not the infrequent or one-time anthropometric measurement of a child to assess nutritional status without assessing growth velocity over time. It is a regular and sequential measurement of growth, recognizing it to be the result of overall health, nutrition, environment, psychosocial and developmental factors in the child and it is based on a strategy aimed at behavioral change and adoption on

improved self-help action within the family and the community to promote optimal health (Griffiths and Rosso, 2007).

Growth Monitoring is a screening tool to diagnose nutritional, chronic systemic and endocrine disease at an early stage. It has been suggested that growth monitoring has the potential for significant impact on mortality even in the absence of nutrition supplementation or education. Growth monitoring is widely accepted and strongly supported by health professionals, and is a standard component of community pediatric services throughout the world (Khadilkar et al., 2007).

## Roles in Growth Monitoring

**Assessment Role:** It allows for early detection of growth faltering and helps to initiate effective action in response to abnormal patterns of growth. Thus it is used as a component of health promotion.

**Educational Role:** It serves as a guide in teaching parents and the communities on how nutrition, physical activity, genetics and illness can affect growth and, in doing so, motivate and facilitate individual initiative and improved child care practices. Hence, it is a home based behavioral change strategy carried out through effective communication and must rely heavily on the full participation of the mother and the community.

**Promotional and motivational role:** It provides regular contact with primary health care services and facilitates their utilization. It raises caregivers' and communities attention and commitment to child growth and nutrition.

It helps to reduce the risk of death or inadequate nutrition, and lead to early referral for conditions manifested by growth disorders. Thus it ensures a right based approach to nutrition (Dietitians of Canada and Canadian Pediatric Society, 2010).

## Challenges of Growth Monitoring Strategies

**Lack of co-ordination:** A great deal of coordination is necessary among the government and all medical and non-medical personnel working directly with under-five age group to ensure a smooth implementation. Government should reallocate resources and raise awareness to the importance of child growth monitoring and redesign their surveillance systems to enhance good decision making on adequate monitoring by empowering trained personnel, providing them with resources and necessary support to develop and strengthen programmes to deal with the growth problems and implementation of standard. There should be feedbacks on the actions taken.

**Caliber of Personnel:** Many health personnel lack adequate knowledge on growth monitoring thus it should

be incorporated into pre-service training programmes for medical and nursing professionals. They should be well trained on the concept of growth monitoring and promotion. The training package should emphasize on the importance of accurate measurement, plotting and interpretation of growth charts for correct identification of growth problems and also, other personnel working in close contact with this age group especially mothers should be health educated on growth and factors affecting proper growth and development.

**Resource constraints:** Under-staffing in primary health care facilities and shortage of equipment is an important factor that cannot be over emphasized as it impedes a successful implantation of growth monitoring (De Onis et al., 2012).

### Implication for Nursing

The main purpose of growth monitoring is prevention, not rehabilitation or treatment, they include the following:

The Nurse ensure regular measuring of growth parameters including; (the weight, height of children).

Plotting the information on a growth chart to make abnormal growth visible.

If abnormal growth is detected (usually faltering), the Nurse ensure proper action is taken in concert with the mother. The action will prevent the occurrence mortality.

As a result of these actions, the child's nutrition improves, the child receives appropriate social or medical support, or doctors are able to diagnose early serious disease.

Thus, it requires an on-going monitoring and follow-up, to evaluate the response to the recommended action to improve the child's growth.

Accurate, reliable measurements are fundamental to growth monitoring and to making sound clinical judgments on the appropriateness of a child's pattern of growth. Accurate measurements have three components:

- A standardized measurement technique.
- Quality equipment which is regularly calibrated and accurate and
- Trained measurers who are reliable and precise in their technique.

Reliable growth data does not require expensive equipment, just careful technique and accurate charting; therefore, a child's measurement should be consistently and accurately recorded in an age and gender appropriate growth record, carefully plotted and then analyzed to identify any disturbances in the pattern of growth. Failure to plot measurements and document growth abnormalities also contribute to missed opportunities to identify and address nutrition or illness related growth problems (Dietitians of Canada and Canadian Pediatric Society, 2010).

## Growth

Growth is a positive change in the length and size of an individual. Optimal growth depends on genetic constitution, normal endocrine function, adequate nutrition, a nurturing environment, and an absence of chronic disease. It is a dynamic measure of health which serves as the best available indicator of nutrition status and the only real measure of nutrition adequacy (Wikipedia, 2008).

### **Accurate and reliable physical measures are used to:**

- Monitor the growth of an individual
- Detect growth abnormalities
- Monitor nutritional status
- Track the effects of medical or nutritional intervention

### **Factors Affecting Normal Growth and Development**

Every child's path or pattern of growth and development is determined by

- Genetic factors and
- Environmental factors.

These factors could either be favorable or unfavorable. Favorable factors heavily rely on adequate nutrition, exercise, intake of fresh air and consumption of water for effective growth and development, while unfavorable factors slow or stop growth and development, some of these factors include: malnutrition, infections, congenital malformations, hormonal disturbances, disability, lack of emotional support, lack of play, and lack of language training (Garner et al., 2009).

### **Indicators for Growth Monitoring and There Measurement**

- Weight
- Height
- Head circumference
- Mid upper arm circumference (MUAC)
- The eruption of teeth.

Appropriate technique for each measure must be utilized; the techniques should be very similar to those used to obtain data to develop the growth charts. These measures should be performed by a trained measurer so they are both accurate and reliable.

### **Technique of Measuring Weight**

Weight is measured with the use of a beam balance or spring balance or calibrated beam or electronic scale. Before weighing a child, the weighing scale should be properly checked to ensure a good working condition; this can be done by weighing a known weight and noting



Figure 1.

whether the scale has obtained the same weight. It is desirable that two people be involved with infant weight measures. One measurer will weigh the infant and read the weight as it is obtained. The other measurer will immediately note the measurement in the infant's chart.

### Procedure

The infant's clothing is removed and the infant is nude or wearing a clean, dry diaper. Regardless of the type of infant scale used, the infant should be positioned in the center of the scale tray. Infants should be weighed to the nearest 0.01 kg or 1/2 oz. Then the infant should be re-positioned and the weight measurement repeated and noted in writing. After the infant is removed from the scale tray, the weights should be compared and they should agree within 0.1 kg or 1/4 lb. If the difference between the weights exceeds the tolerance limit of 0.1 kg or 1/4 lb, the infant should be re-positioned and reweighed a third time. Then record the average of the two weights in closest agreement.

An alternative measurement technique may be used if an electronic scale is available. Have the parent stand on the scale, reset (tare) the scale to zero, then have the parent hold the infant and read the infant's weight. Shows in figure 1 above.

### Technique Measuring the Head Circumference:

An accurate head circumference measure is obtained with a flexible non-stretchable measuring tape. A plastic tape such that one end inserts into the other is recommended.

#### Procedure

Head circumference or OFC (occipital frontal circumference) is measured over the most prominent part

on the back of the head (occiput) and just above the eyebrows (supraorbital ridges). This can be translated to mean the largest circumference of the head. Any braids, barrettes, or other hair decorations that will interfere with the measurement should be removed. The infant or child may be more comfortable in the arms or on the lap of a parent. The tape is positioned just above the eyebrows, above the ears, and around the biggest part of the back of the head. The goal is to locate the maximum circumference of the head. The tape is pulled snugly to compress the hair and underlying soft tissues. The measurement is read to the nearest 0.1 cm or 1/8 inch and recorded on the chart. The tape should be repositioned and the head circumference remeasured. The measures should agree within 0.2 cm or 1/4 inch. If the difference between the measures exceeds the tolerance limit, the infant should be repositioned and remeasured a third time. The average of the two measures in closest agreement is recorded. The piece of string used in the absence of a tape measure is then measured with a ruler to obtain the head circumference.

### Technique Measuring the Mid Upper Arm Circumference (Muac):

The mid upper arm circumference is measured using a tape or string in the absence of a tape. The tape or string is placed around the upper arm, midway between the olecranon and acromion processes. Care is taken not to pull the tape or string too tightly. The tape measure is then measured with a ruler to obtain the mid upper arm circumference.

### Technique for Measuring the Length and Height:

Length, measured in the recumbent position, is the correct linear measurement for infants younger than 24



Figure 2.



Figure 3.

months of age or children aged 24 to 36 months who cannot stand unassisted. Accurate length measurement requires a calibrated length board with certain features for measuring length in the recumbent position.

### Procedure

Length measurements for infants and young children should be obtained while the child is dressed in light underclothing or a diaper. The child's shoes must be removed. Hair ornaments should be removed from the top of the head.

The child should be placed on his back in the center of the length board so that the child is lying straight and his shoulders and buttocks are flat against the measuring surface. The child's eyes should be looking straight up. Both legs should be fully extended and the toes should be pointing upward with feet flat against the foot piece. Accurate length measurements require two measurers. One measurer holds the infant's head, with the infant looking vertically upward and the crown of the head in contact with the headpiece in the Frankfort Horizontal Plane. The head of the infant is firmly but gently held in position. The measurer gently cups the infant's ears while

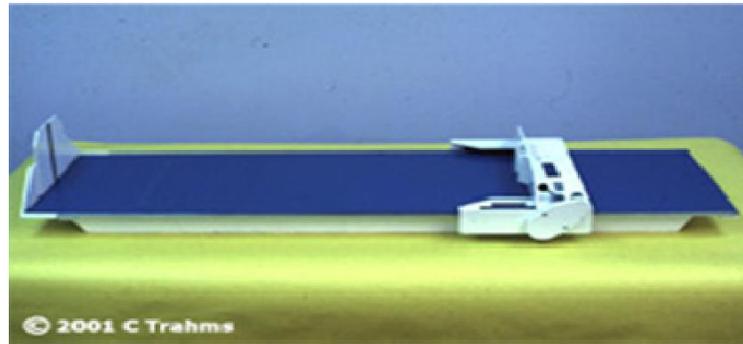


Figure 4.

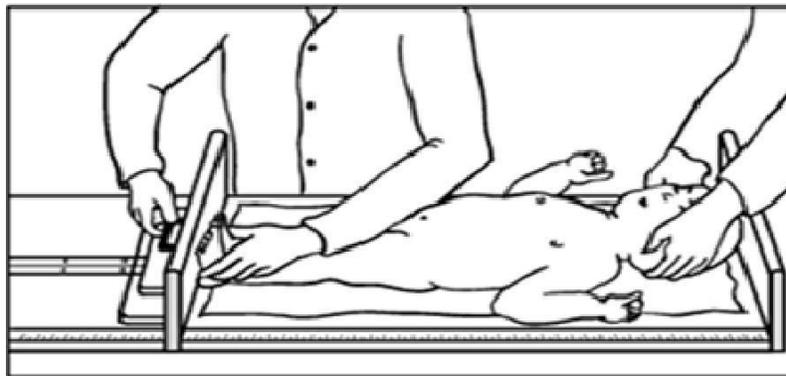


Figure 5  
Nardella, M, (2001).

holding the head. Make sure the infant's chin is not tucked in against his chest or stretched too far back. While the second measurer holds the infant's head in the proper position, the measurer aligns the infant's trunk and legs, extends both legs, and brings the foot piece firmly against the heels. The measurer places one hand on the infant's knees to maintain full extension of the legs. The infant's toes are pointing upward. It is imperative that both legs be fully extended for an accurate and reproducible length measurement. If only one of the infant's legs is extended during the length measurement, the measurement may be unreliable and inaccurate. The length should be recorded on the data form as soon as it is completed. (CDC 2009; Khadilkar et al., 2007).

### The Growth Charts

Effective growth monitoring requires that these measurements must be accurately taken using reliable equipment and correct measuring techniques. It must be recorded using the growth chart. Growth charts are graphic presentations of body measurements of a population that aid in the assessment of body size and shape, as well as the observation of patterns in growth

performance. They are used in the assessment and monitoring of individual children and in screening whole populations. They are not a diagnostic tool and they should always be used in conjunction with other information when evaluating a child's general health condition. The ideal growth chart would be based on data collected longitudinally and should be representative of children whose feeding and care comply reasonably with recommended health practices so that the growth illustrated would represent the best standard possible for all children (Dietitians of Canada and Canadian Pediatric Society, 2010).

### Interpretation of the Growth Curve

It is important to know how to interpret the individual child's Growth Curve or pattern on the Child Health Card which is done by watching the direction of the child's growth pattern. The weight growth pattern of the larger term infants will be above the pattern of the average term infant. On the other hand, the weight growth pattern of the smaller term infants will be below the pattern of the average term infant. A small baby whose growth pattern is below the bottom line in the growth chart is healthy if

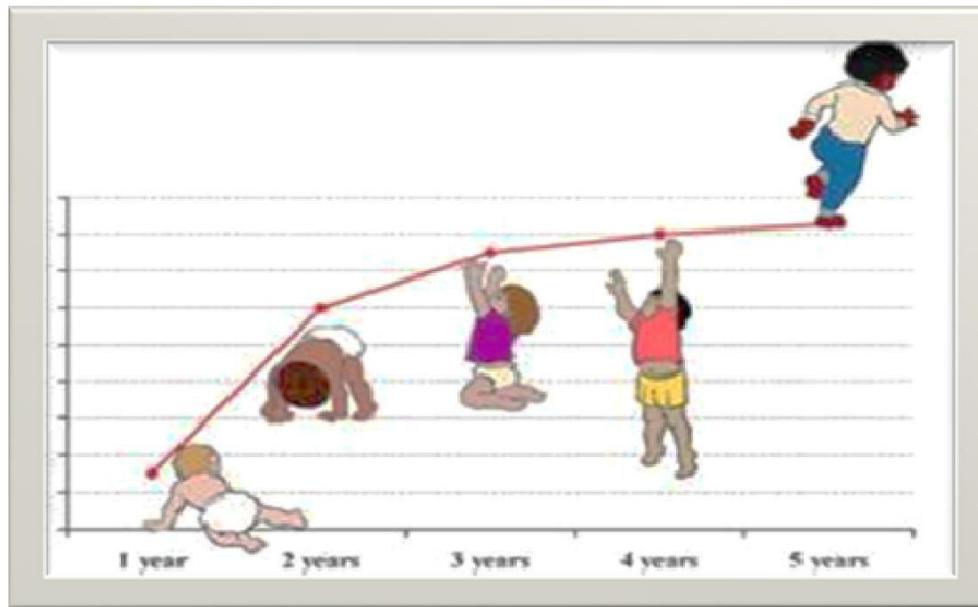


Figure 6. WHO CHILD GROWTH STANDARD

that child's growth pattern is parallel to the bottom percentile line. As long as the baby is gaining weight at an acceptable rate, the mother should not worry.

A horizontal (flat) growth curve means *DANGER* this indicates that the child is not growing properly, it is a sign of malnutrition. A malnourished child cannot thrive properly or resist diseases, thus proper intervention should be ensured.

A curve deviating downwards indicates a *VERY DANGEROUS* situation. This means child is losing weight, and the child needs extra care immediately. The baby may be suffering from malnutrition, tuberculosis, AIDS or other medical conditions and needs an urgent attention. (Khadilkar et al., 2007)

## MATERIALS AND METHODS

A literature search was done, with the use of various search engines like PubMed, journals on sickle cell disease and prenatal diagnosis, also other related journals were used together the relevant information needed in the discussion. The searching was done using the following terms, child survival strategy, growth and development, growth monitoring, growth chart and the technique measuring growth indicator. The study does not include quantitative or qualitative data; it is based on literature data analysis.

## CONCLUSION

Child malnutrition is a major concern in developing

countries that affects millions of young children. The way growth monitoring is performed in many settings is to assess weight gains, there is a lack of guidelines to score and interpret these weight gains and, as a result, the direction of the child's growth curve is often just checked routinely without paying careful attention to the curve on the chart. Growth monitoring and promotion of optimal nutrition are essential components of health care for all children. Monitoring a child's growth helps to confirm a child's healthy growth and development, or identify early a potential nutritional or health problem. When potential problems are identified early, health professionals and parents can work together to initiate action before the child's nutritional status or health is seriously compromised.

## REFERENCES

- CDC Growth Charts (2009). Accurately Weighing and Measuring: Equipment. Available from: [www.cdc.gov/growthcharts](http://www.cdc.gov/growthcharts).
- De Onis M, Onyango A, Borghi E, Siyam A, Blossner M, Lutter C(2012). Worldwide Implementation of the WHO Child Growth Standards. *Publ. Health Nutr.* Doi: 10.1017/S136898001200105X. Pp. 1-8.
- Dietitians of Canada and Canadian Pediatric Society (2010). Promoting Optimal Monitoring of Child Growth in Canada. Available from, [www.dietetistes.ca](http://www.dietetistes.ca).
- Griffiths M, Del Rosso J(2007). Growth Monitoring and the Promotion of Healthy Young Child Growth: Evidence of Effectiveness and Potential to Prevent Malnutrition. The Manoff group. Pp. 2-36.
- Habimana P, Mwinga K, Sagoe MC, Ketsela T(2010). Progress in Implementing the Child Survival Strategy in the African Region. *The Afr. health monitor Issue.* 11: 18-23.
- Khadilkar VV, Khadilkar AV, Choudhury P, Agarwal VE, Deepak UD,

- Shah NK(2007). Growth Monitoring Guidelines for Children from Birth to 18 Years Indian Pediatr. 44: 187-197.
- Liu L, Johnson HL, Cousens S, Perin J, Scott S, Lawn JE, Rudan I, Campbell H, Cibulskis R, Li M, Mathers C, Black RE(2012). Child Health Epidemiology Reference Group of WHO and UNICEF. Global, regional, and national causes of child mortality: an updated systematic analysis for 2010 with time trends since 2000. Lancet. 379: 2151–61.
- Nardella M, Campo L, Ogata B(2010). Nutrition Interventions for Children with Special Health Care Needs. State Department of Health Washington. Third Edition. Pp. 1-441.
- Neill MO, Fitzgerald A, Briend A, Den Broeck JV(2012).Child Mortality as Predicted by Nutritional Status and Recent Weight Velocity in Children under Two in Rural Africa. Afr. J. Nutr. 142(3): 520-525.
- Paediatric Child Health (2010). A health professional's guide for using the new WHO growth charts. Pulsus J. pediatr. child health.15(2): 84–90.
- Panpanich R, Garner P(2009). Growth monitoring in Children. Cochrane Database of Systematic Rev. The Cochrane Library. Issue 1DOI: 10.1002/14651858.CD001443.
- UNICEF (2006). Progress for Children: A Report Card on Nutrition. Available from [www.unicef.org](http://www.unicef.org).
- World bank (2011). Worrying Trends in Child Mortality.Available from [www.worldbank.org](http://www.worldbank.org).
- World Health Organization (2008). Training Course on Child Growth Assessment. Available from [www.who.int/childgrowthtraining](http://www.who.int/childgrowthtraining).