CHAPTER - III

MATERIALS AND METHODS

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The present study entitled "**Growth and Development pattern of 0-2 years children and factors associated with it**" was undertaken longitudinally at Biridi block of Jagatsinghpur district located on the way of Cuttack-Jagatsinghpur road during 1997-2000.The block was selected purposively for the study.

3.1 Geographical information of Biridi Block

The Biridi block is situated 20 kms to the east of Cuttack city on latitude 20, 29' N and 85°-52' meridian. The block is nearly 2 kms away from the main road, Cuttack to Jagatsinghpur and well communicated by pitch road. Jagatsinghpur town is to the east, river Mahanadi is to the north and river Kathojodi is to the south of the block. The area is well irrigated by branches of the Machhagaon Canal. There are 101 villages spread over area of 151 sq.kms. Every village is connected to the main road either by pitch road, metal morrham or Kuccha road.

The area covers a population of 1,18,608 population as per 1991 census where population density is 563/sq.km approximately. There are 16,953 women in the reproductive age group of 15-44 years. Literacy rate is 64 % in general and female literacy rate is 50 %. Most of the inhabitants are Hindus.

3.2 Occupation

Male worker constitute a large proportion of the population. Most of them are cultivators and agricultural labourers engaged in growing paddy and vegetables mainly in kharif and green gram, black gram, horse gram, vegetables and some oilseed crops in rabi season. In addition to this some of them are employed in Government services, private sectors and business. Female belonging to lower caste take a considerable share in the cultivation and other out-door works of the area where as ladies from higher caste were simply housewives. Rice is the staple food of the area.

3.3 Health facilities

Health facilities are mainly provided by PHC at Biridi and a network of dispensaries and its sub-centres. The sub-divisional hospital at Jagatsinghpur (presently district hospital), which is 20 kms away from the block, render services for all the needful persons. Besides these, ICDS scheme has been started functioning since 1989-90 to improve the overall health and nutritional status of pregnant and lactating women and children below 6 years of age who are in the beneficiary list. Under this scheme, 121 Anganwadi centers are functioning. People take curative and preventive services from homeopathic and ayurvedic practitioners, LHVs and ANMs also render their constructive supports for MCH services. Therefore the investigator decided to carry out research in the area.

3.4 Study Area and Sample size

Out of 121 Anganwadi centers functioning in the study area (Biridi block of Jagatsinghpur district),18 anganwadi centers were selected on the basis of simple random sampling techniques which consists of 15 per cent of the total Anganwadi centers (Annexure – I). These are Nuagaon, DaradaSasan, Daradapari, Sarasuda, Batimira, Uttarsasan-I, Madhyasasan, Sompur-1, Ramkumarpur, Salijanga, Kamarapada-II, Hazipur-I, Allanda, Kalantira, Bastapada, Kamasasan, Kotuan and Nuadhana.

As the study is a community based longitudinal study, it required frequent monthly observations on children upto the age of 2 years from birth. Therefore, it was decided to include all live births in four months of a year. Within 72 hours of delivery, these observations were carried on for four months from the start of the first enumerative observations. The average live births in a year in the particular block, were expected to be 3226 on the basis 27.7 live births per 1000 population (SRG, RG' Office, 1995) as the population of that block was 1,18,608 (1991 census). So the expected live births in one Anganwadi center would be 6.7 in four months. Likewise, in 18 Anganwadi center the live births were expected to be 120.6. On this basis , 120 new borns were registered within 4 months . Subsequently 18 infants were dropped out due to death (5), migration (9) and parents unwillingness of taking weight measurements of their child (4). Finally 102 children were considered for the observation purpose till their attainment at the age of 24 months i.e. 25 numbers of visits were made for every individual in a monthly interval.

3.5 Tools of the study schedule

Keeping the objectives of the study in mind, interview schedule was designed to obtain various informations about mother and child. A pre -designed schedule was tested on a sample of 25 families. The question which was found ambiguous were eliminated and necessary modifications were made. Schedule consists of three parts. The first part of questionnaire was "general information", where in the information about the family pertaining to caste, religion, age, education, type and size of family, total income and occupation, were included. The second part consisted of questions regarding age, sex, birth order, mother's antenatal care, delivery history, birth weight and length of new born infants. In the 3rd part of the schedule consisted regarding information on weight, length, morbidity, immunization, developmental milestone, treatment during illness and monthly feeding pattern upto24 months have been recorded. After the required modifications in the schedule relevant data were collected.

3.6 Methodology

3.6.1 Longitudinal method

This method involves repeated observations and measurements of the same individual over a period of time. The longitudinal method is the only one which can give a complete description of the growth phenomenon (Tanner, 1955) while emphasizing the improvement of such studies, stated that mean velocities of growth or standards for rate of growth from one age to another can preferably be

estimated by longitudinal method. Kodlin and Thomson (1958) also opined that "when the objective of the growth study is to arrive at predictions of individual growth in general, or to establish the correlation between measurements obtained at successive ages, it is necessary to employ the longitudinal approach".

3.6.2 Interview

The anganwadi worker and helper of the concerned area were approached first and purpose of the study was explained to them. They were requested to inform the investigator about the delivery within 72 hours. Local dhais were identified and also requested to intimate the AWW/helper of their conduct any delivery cases. Immediately after receiving information visits were made and data were collected as per first part of the schedule with the help of AWWs, of the respective Anganwadi centers. Because they are relevant persons for the villagers and the villagers do not hesitate to allow the researcher to take weight and length measurements of the new born in presence the anganwadi workers. At the first visit, first few minutes were spent on talking about general well being of the family to create an informed friendly atmosphere. Then the mother as well as senior most family members were approached for the required information about the family, mother and child. After collection of general information weight, length, morbidity, treatment during illness were recorded. From the first entry of child, 24 subsequent follow up visits have been made at monthly intervals to record weight, length, morbidity of previous months, treatments, immunization, feeding pattern of every child under study. Milestones of development were recorded under direct observation during the study period.

3.6.3 Anthropometry

Among all the physical measurements, the evaluation of weight is important because it sums up all the increments in size and is the best index of nutrition and growth. Since weight and height (length) are simple and reliable indicators of growth and nutritional status of infants and children. Therefore, only these two parameters were taken into consideration and utilized for analysis.

3.6.3.1 Weight recording

Weight of the children were recorded with the help of salter weighing machine which records weight from 0.1 kg up to 25 kg. The weighing machine was each time standardized before taking the weight of the baby with a sensitivity of $\pm$ 10 gm. The children were allowed minimum of clothing at the time of weight recording. The weight of these sampled children was taken with same scale once a month upto 2 years.

3.6.3.2 Length or height recording

The crown heal length of the children was recorded on the infantometer till they were able to stand. The child was laid on the flat board of the infantometer. The head was positioned firmly against the fixed head board. The knees were kept extended by applying gentle pressure and feet were fixed at the right angle to the legs. The upright sliding piece was moved to remain in firm

contact with the heels as described by (Jelliffe, 1966) when the child was able to stand, the standing height of the child was measured through non-expansible fibre glass tape. The child was made to stand with bare feet on a flat floor against a wall with feet parallel and with the heels, buttocks, shoulders and the back of the head touching the wall. The head was laid comfortably erect and demarcated with a hard flat object touching the top of the head horizontally. Height or length was then measured by using a non-expansible fibre glass tape upto the nearest 0.1 cms.

3.6.3.3 Grading of nutritional status

Weights and heights of the children were expressed as percentage of 50^{th} centile weights and heights as per the WHO standard. Further, classification of children into different grades of malnutrition was done by using the ICDS growth charts as the study has been conducted in a ICDS block.

By using Waterlow's classification children were classified into normal, marginal malnutrition, moderate malnutrition and severe malnutrition taking 50^{th} centile of WHO standard into consideration.

Likewise the children under study were classified as 'Low', 'normal' and 'high' in weight-for-age, height-for-age and weight-for-height distributions by the median and cut-offs –2 S.D. and +2 S.D. Children to the left of –2 S.D. are classified as 'short' or 'low', those to the right of +2 S.D. as 'tall' or 'high' and those between the two cut-offs as normal. By using this some of

these combinations and their interpretations using WHO standards. The parameters were classified as follows.

	Combinations of indicators		Interpretation of nutritional status
1.	(i)	Normal wt.-for-age	Normal
	(ii)	Normal ht-for-age	
	(iii)	Normal wt-for-height	
2.	(i)	Low wt.-for age	Presently malnourished
	(ii)	Normal ht-for-age	
	(iii)	Normal wt-for-ht	
3.	(i)	Low wt-for-age	Presently underfed with past
	(ii)	Low ht-for-age	history of malnutrition
	(iii)	Normal wt-for-ht	
4.	(i)	Normal wt-for-age	Presently normal fed with past
	(ii)	Low ht-for-age	history of malnutrition
	(iii)	Normal wt-for-ht	
5.	(i)	Low wt-for-age	Presently underfed
	(ii)	Normal ht-for-age	
	(iii)	Low wt-for-ht	
6.	(i)	Low wt-for-age	
	(ii)	Low ht-for-age	Present and past underfed
	(iii)	Low wt-for-ht	

3.6.4 Morbidity

The morbidity of children were elicited at the time of each survey and infections during the preceeding month were also taken into consideration by

mothers' recall method. Information regarding type of morbidity and treatment during illness were also recorded. Asking the mother and verifying his mother –child Card at the time of interview, recorded immunization.

Then it was expressed as incidence rate (person) and incidence spell rate. Incidence person rate is defined as the number of new cases occurring in a defined population during a specified period of time while incidence spell refers no spells or episodes of diseases arising in a given period of time.

$$\text{Incidence person rate} = \frac{\text{No. of new cases of sp. disease during given a specific time period}}{\text{Population at risk}} \times 100$$

$$\text{Incidence spell rate} = \frac{\text{No. of spells of sickness starting in a defined period}}{\text{Mean number of persons exposed to risk in that period}} \times 100$$

3.6.5 Feeding practices

These were obtained by asking the mother. The hour or day of first breast feeding whether colostrum was given or not, nature of top feeding, age of introducing supplementary feeding and reason for introduction of supplementary feeding were recorded for this purpose.

3.6.6 Milestones of development

It was recorded under direct observations during follow up.

3.7 Method of analysis

After completion of the study, the data thus collected was transformed on to transfer sheets. Tables were generated manually. The various methods adopted in analysis were as follows :

3.7.1 Statistical analysis

Percentage : Simple percentage were worked out to assess the contribution of desired observations.

3.7.1.1 Measure of central tendency

Mean was calculated where it was felt necessary.

$$\text{Mean } (\bar{x}) = \frac{fx}{n}$$

Where, $\bar{x}$ = Mean

X = Variable

N = Number of observation

F = frequency

3.7.1.2 Measure of variance

Standard deviation (SD) the most common measures of variance was worked out as follows :

$$SD = /\text{Variance} = \sqrt{\frac{f(x-\bar{x})^2}{N}}$$

Where, f = Frequency

x = The variable in question

$\bar{x}$ = Mean of the variable

N = No. of observation.

In calculating variance and standard deviation, the N (Number of observation) in the denominator is always replaced by N-1, the reason of this was

that in applying the methods statistical inference, it is useful to regard the collection of observation as being a sample drawn from a much larger group of possible readings. The large group is often called a population and the better estimate of the population variance is obtained by using a divisor (N-1) in stead of N .

Thus, SD = $\sqrt{\text{Variance}} = \sqrt{\frac{f(x-\bar{x})^2}{N-1}}$

3.7.1.3 Statistical significance

(a) Formulation of "Null hypothesis"

To test the difference between two means or proportions of "Null hypothesis" was formulated that "There is no difference between two means or proportions". The rejection of null hypothesis indicates that the differences have statistically significant and the acceptance of null hypothesis indicates that the difference are due to chance factor. It can be tested at a given level of probability (0.1 %, 1 %, 2 % or 5 % usually adopted). If the probability level (P) were more than 5 %, the "null hypothesis" was accepted and when the probability level was less than 5 %, the "null hypothesis" was rejected and the real sence of difference between two means/proportions was depicted.

(b) To test the association between/among two or more groups

A statistic χ^2 (Chi square) test was worked out to test the association between or among two or more groups, and specific inference was drawn on the basis of acceptation or rejection of "null hypothesis".

$$\chi^2 = \frac{(O - E)^2}{E}$$

where, O = Observed frequency

E = Expected frequency

Σ = Sum of frequency

If the calculated value of χ^2 is more than table value of χ^2 (at a given level, generally 5 % level), the difference between theory and observation is considered to be significant i.e. it could not have arisen due to fluctuations of simple sampling. If the calculated value of χ^2 is less than table value, the difference between theory and observation is not considered as significant, i.e. it is regarded as due to fluctuations of simple sampling and hence ignored.