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CHAPTER V

DESIGN OF DATA COLLECTION AND PLAN OF ANALYSIS

Population of Data Collection :

As stated in the previous chapter, the data collection for the study was incorporated in the larger project. Consequently the sample ~~from~~ for the present study was drawn from the total sample of the wider project. The major project, as described before, was in two sections. The earlier one was the longitudinal study of mental and motor development of higher class babies. In 1966, to supplement this longitudinal study, a cross-sectional project of the lower socio-economic class of Baroda and surrounding villages was launched.

Background Factors of the Design of Data Collection :

In this study, socio-economic class, sex, age, and urban-rural residence are kept as the control variables. The measurements of stature, stem height, head circumference, chest circumference, and weight are studied as the dependent variables.

It was decided to measure the infants in the first fifteen months of life as it was felt that this was the feasible age group that could be studied in the stipulated duration of the project. At the beginning of the data collection, a target of 50 babies to be measured at each month in the first fifteen months of life was fixed. The urban target was reached with some difficulty; but it was not possible to reach the target of 50 infants at each age in the rural community.

Considering the rapid rate of growth during infancy, the interval between measurements was kept at one month ± 3 days of the actual birth date. To determine the correct birth date documentation by official, or religious evidence was insisted upon. Those infants, whose parents could not provide such documentation, even if they qualified in every other respect, were not included in the study. Since this was to be a normative study, only 'healthy' infants were included. For this purpose, the term 'healthy' was defined to include all those infants (1) who did not suffer from any congenital or chronic disease, (2) who did not suffer from any acute illness at the time of measurements, and (3) who had not had any major illness during the three months prior to being measured.

Lastly these infants had to be certified by the pediatrician as healthy after a medical check up before being measured.

These children were selected by making house to house calls in the slum areas of the city, and for the rural sample, the entire infant population of the village was surveyed.

The task of puting together of this sample was beset with many difficulties. Elementary assumptions (of documented birth dates, cooperation with the project personnel and a sense of time and obligation to keep an appointment previously agreed to) so easily taken for granted while working with the educated, higher class population, were hard to come by.

The parents of the infants of the lower socio-economic population are justifiably so absorbed with the business of surviving at the subsistence level that for them to cooperate with the study often ment taking off from much needed work.

These difficulties were overcome by establishing rapport with the parents, offering them transportation to and from the departmental laboratory, sometimes with an escort, reminding them of the appointment in the morning and measuring them in the afternoon, often going to fetch them,

and lastly giving them a token of appreciation in return for their cooperation.

As a first step towards data collection in the villages, it became necessary to contact the District Development Officer stationed in Baroda. He in turn, gave us introductions to the Sarpanch of the village most likely to cooperate with the project. On a previously arranged date the research team went to the selected village, and while two members of the team set up the field laboratory in a central place, the rest started a house to house survey in search of infants in the age group of 1 to 15 months who met our selection criteria previously mentioned. Those infants who met our selection criteria were included in the sample. To meet the condition of data collection on ± 3 days of the documented birth date, it had become necessary to visit each of the 27 villages weekly on the same day for at least four weeks in succession, and sometimes additional visits were also necessary.

Socio-economic Scales :

To determine the socio-economic status of the infants to be included in the study two socio-economic

scales were used. These are :

A. Kuppuswami's[1] socio-economic scale : urban.

B. Pareek [2] and Trivedi's socio-economic scale : rural.

A. Kuppuswami's socio-economic scale, urban.

This scale, published in 1962, is based on the education, occupation and income of the head of the family rather than income alone. In applying this scale widely to the sample it was found to reflect the socio-economic status of the individual remarkably faithfully. Each of the three variables is given a seven point scale. The weightages for the three variables are fixed as 7, 10, 12 points respectively. The total possible score is 29. The scores are classified into five groups as follows :-

Socio-economic status class	Total score
I	26-29
II	16-25
III	11-15
IV	5-10
V	below 5

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1. Kuppuswami, B., 1962. Manual of Socio-economic Status Scale (urban) Manasayan, Delhi-7.

2. Pareek, U. & Trivedi, G. 1964. Manual of Socio-economic Status Scale (rural) : Manasayan, Delhi-7.

For the purposes of this study, class I, II, III were grouped together to form the 'higher' or 'upper' class of society, where as class IV and V were grouped together to form the lower socio-economic class of society.

B. Pareek & Trivedi's socio-economic status scale : rural -

Published in 1964, this scale was standardised on the population of a village near Delhi. It is based on the following information about the rural family.

I Head of the family :

1. Occupation
2. Education
3. Social participation of the head of the family.

II The family :

1. Caste
2. Land ownership
3. Type of housing
4. Farm animals and tractor possession
5. Material possessions i.e. (chairs, radio, clock, sewing machine, fan etc.)
6. (a) type of family, joint or single
   (b) size of the family
   (c) distinctive features about any family member

The first seven items of I and II taken together are on a six point graded scale. Item nos. 5 and 6 of II are additive in nature and have a weightage of 'one' for each sub-item. Very minor adaptations were made in the scale to increase its applicability to the village population of Gujarat, taking special care that no changes were made in the weightages. The final scores are classified into 5 classes like that of the Kuppuswami urban scale. viz.,

Socio-economic class	Total score
I	above 43
II	33-42
III	24-32
IV	13-23
V	below 13

Again, for the purposes of this study, the socio-economic classes I, II, III were grouped together to form the 'higher' or 'upper' class and the socio-economic classes IV and V were grouped together to form the 'lower' class.

Selection of Sample :

Collection of anthropometric measurements was the main criteria for this study. Therefore, the major sample for it is the cross-sectional sample of the lower socio-economic class infants and the rural population. From amongst the urban lower socio-economic class 35 infants

were being followed longitudinally. Consequently, records of 35 infants were also selected from the higher class longitudinal sample, which contained the maximum number of measurements for heights and weights. Since these measurements in the earlier higher class sample were recorded by trained testers, only those records were used for which the measurements taken were considered reliable. Table I gives the details of the records used for each measurements.

Urban cross-sectional lower socio-economic group :

All the infants in this group belonged to the two lowest categories of the Kuppuswamy scale, viz., class IV and class V. 746 belonged to class IV and only 4 infants came from class V. These 750 infants, comprising of 50 infants in each age group (1 month to 15 months), make up the cross-sectional urban sample of the low income group of Baroda City. To find 750 infants who were healthy according to our definition we rejected many more who fell short of the minimal health standard. These rejected babies could form the sample of another study.

This group of the sample is made up of 750 infants : 390 males and 360 females. Almost half of these are first and second borns. They come from the low income group of

urban Baroda society where in the majority of the families only one member earns. Their family income range is from Rs.50/- and below to Rs.749/- per month with the majority earning between Rs.100/- Rs.300/-. Most of their fathers have had from 4 to 7 years of schooling and are engaged in unskilled or semiskilled work. Their mothers are mostly illiterate or have had only primary education, and majority of them are housewives.

Age ~~wise~~ distribution of sexes is as follows :-

Age ~~wise~~ distribution of sexes

Age in months	Males	Females	Total
1	21	29	50
2	24	26	50
3	29	21	50
4	19	31	50
5	29	21	50
6	35	15	50
7	27	23	50
8	22	28	50
9	20	30	50
10	25	25	50
11	28	22	50
12	32	18	50
13	26	24	50
14	30	20	50
15	24	26	50
Total :	391	359	750

Urban Longitudinal lower socio-economic class :

At the start of the decision to measure a few infants from the lower socio-economic class, longitudinally, 35 infants, 18 male and 17 female infants, were enrolled. At the end of the stipulated period of data collection 29 infants had their measurements recorded everytime they had come to the laboratory. The others (6) were dropped from the sample for lack of data on the five measurement variables.

The background of these infants was similar to those of the urban lower socio-economic class sample described earlier.

Urban Longitudinal higher class :

As stated earlier, this group of 35 infants were selected from the major departmental project on the basis of maximum number of anthropometric measurements recorded.

The infants in this group belong to the I, II, III upper classes according to Kappuswami's scale. These infants were registered in the departmental laboratory nursery school prenatally for admission at the age of 2½ years.

The parents of these infants were young, below 35 years of age, most of their fathers were professionals or clerks; their mothers had gone to high schools and were housewives. Their family income range was Rs.167/- to more than Rs.1000/- per month in the early sixties.

Rural Cross-sectional higher and lower socio-economic groups :

The parents of these infants belong to the rural population of 27 villages around Baroda and represent the different socio-economic strata of this rural population.

These infants were selected by making house to house calls on the entire village population. Since we had the short summer months only to complete the work, we were not able to collect as large a sample as we had wanted to.

27 Villages : These villages are situated more than 16 kilometers from Baroda City but not more than 30 minutes of travelling time from Baroda. The '16 kilometer' restriction was imposed to move away from any possible urban influence and the '30 minute' restriction was adhered to to avail of the limited summer months for data collection to maximum advantage. These villages were studied for their levels of conveniences necessary for modern living, viz., electricity supply, water, public transport to city and educational facilities. Unlike the villages in the Western world, where the only difference in rural and urban living is density of population and welcome isolation, the difference in our country is that of availability and non-availability of the basic comforts of life.

All of these villages had some provision of water. 14 of them were small, and did not have any electricity, or

public transport to the city. Seven villages were large, had electricity and piped water, boasted a secondary school and were linked to the city by easy public road transport. One of these seven was next to the only petroleum refinery of the state and had a primary health unit.

Six villages had no electricity supply, no piped water and no primary schools. They were linked to the city by mud roads which were linked to major paved roads on which public transport was available. Please see map (Appendix III).

Socio-economic status scale-rural (Pareek, U. and Trivedi, G.1964) was applied to the background information of the infants included in the sample. This scale is based upon the education and occupation of the head of the family, like the Kuppuswamy scale. To determine the financial level of the family, it takes into account the material possessions of the family, which include such items as land, housing, farm and prestige animals, improved farm equipment etc. Like the Kuppuswamy scale, this scale also stratifies the rural society into five groups.

This group of the sample is made up of 653 infants. They belong to the whole strata of the rural population of 27 villages around Baroda. 43.80% of these infants came from families who owned no land. 5% possessed more than 20 acres and 22.36% possessed between 1 and 5

acres. 43.95% of these families lived in more than one room mud houses with thatched roofs. 23.89% lived in brick houses and 12% lives in mansions which had more than one storey and more than 5 rooms. About 45% owned no farm animals. 3% owned 5-6 animals or one tractor and the remaining 52% one or two bullocks for farm power or alternately one or two dairy animals. 28% owned bullock carts.

Classwise and sexwise distribution of these infants is as follows :

Rural cross-sectional lower socio-economic class

Males ... 210
Females ... 207
417

Agewise distribution of sexes.

Age in months	Males	Females	Total
1	16	16	32
2	20	17	37
3	12	25	37
4	23	18	41
5	20	13	33
6	15	15	30
7	19	14	33
8	12	17	29
9	20	14	34
10	12	9	21
11	8	6	14
12	13	9	22
13	12	16	28
14	5	9	14
15	3	9	12
Total:	210	207	417

Rural cross-sectional higher socio-economic class

Males	...	142
Females	...	94
		236

Agewise distribution of sexes.

Age in months	Males	Females	Total
1	2	4	6
2	9	5	14
3	11	4	15
4	2	8	10
5	8	8	16
6	5	9	14
7	14	4	18
8	12	9	21
9	8	9	17
10	17	8	25
11	13	7	20
12	10	3	13
13	13	5	18
14	6	5	11
15	12	6	18
Total:	142	94	236

Procedure of Data Collection :

Medical Examination :

Meeting the medical requirements and being certified by a pediatrician as healthy was one of the necessary criteria of selection of the infant for inclusion in the sample. Over the period of data collection, several pediatricians

were associated with the project. Initially, one of the pediatricians attached to the departmental nursery school, and one to the medical college attended the planning stage of the meetings. It was at these meetings that the following decisions were made.

(1) 'Health' be defined as absence of congenital defect, acute illness, chronic illness and absence of any major illness during the three months prior to the time of recording of the measurements.
Following anthropometric measurements were selected for recording.

(2) (a) weight, (b) crown-heel height, (c) crown-rump height (d) head circumference, and (e) chest circumference.

(3) The procedure and equipment for taking these measurements were specified and written down.

An appropriate form * was designed for the purpose of data collection.

This form also carried the information about feeding, major illness during the three months prior to the said medical examination, birth rank of the infant, size of the family, and birth weight of the infant.

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* A sample data collection form is given in the appendix.

Measurement of the five variables studied :

(1) (a) Weight at the time of the medical examination :

This measurement was taken with the infant having a very light single garment on him. The weight was taken on a beam scale, which was checked from time to time, and recorded in kilograms. The scale was balanced before placing the infant on it.

(b) Birth weight :

This was recorded as reported by the mother or substitute.

(2) Height :

Height was measured with the help of the 'infantometer'. This instrument was a hollow wooden box with a freely movable foot board. It had two steel tapes calibered in centimeters and inches fixed on the top edges of the boards which formed the two fixed long sides of the box. The head board formed the fourth fixed side of the box.

When taking the crown - heel length of the infant, the mother or substitute acted as the measurer's assistant. The infant was placed in the supine position on the infantometer. The assistant held the infant's head in contact with the head board, the measurer stretched the child, straightened the legs, held the knees down, turned

the feet and the toes upwards and brought the sliding board into contact with the baby's heels.

(3) The crown-rump measurement was taken similarly except that the infant's legs were raised from the hips and the foot board brought into contact with the seat of the baby.

(4) Head circumference : This measurement was taken with a flexible steel tape caliberred in centimeters. The tape was placed on the highest bony projection of the occiput, encircling the head above the ears and the forehead. The infant was held by the mother in her lap.

(5) Chest circumference : Chest circumference was also measured by a flexible steel tape, caliberred in centimeters, which was placed on the infant's chest under the arms at the level of the nipples and was held at right angles to the infant's trunk.

Table I gives the five measurement variables under study, comprising the final data for the study.

Table I

Number of values for each anthropometric measurements under study.

1.	Weight ...	1,986
2.	Stature ...	1,921
3.	Sitting height..	1,337
4.	Head circumference	1,336
5.	Chest circumference	1,336
6.	Birth weight	266

Plan of Statistical Analysis :

As mentioned in the introduction, this study is purely of an exploratory nature with the aim of exploring the possibility of setting up standards. The most common analysis for such a purpose is that of central tendencies and variability of the observed data. Means with standard deviations, medians, suitable percentile point estimations such as 10th, 25th, 50th, 75th, 90th etc. are usually selected for setting up norms, taking into consideration the available data. This study also explores the different techniques of statistical analysis to find the one most suitable for application to the available data, such that valid norms may be set up for the anthropometric measurements of male and female infants of the lower socio-economic class of urban and rural community in and around Baroda City, at a future date.

Consequently, in analysing the data under study, means and standard deviations, percentile point estimations, ratios, correlation analysis and regression analysis techniques are employed.

As mentioned in the last chapter, the data ~~is~~ consist of distributed under five ~~variables of~~ anthropometric measurements ~~Hence,~~ though the data consists of 11,815 values ~~studied~~ from 2,363 records, they get ~~fr~~egmented ~~between~~ the three

control variables of residence, socio-economic status, and sex. Further they get diminished when in each control variable it is distributed over the 1-15 months of age groups. For this reason, all the calculations for the measurements of the higher rural group of infants were abondoned as the N became too small on fregmentation due to controls.

Means and standyad deviations are calculated from both the longitudinal and the cross-sectional data of the urban sample and only cross-sectional for rural areas.

The percentile point estimations are plotted for the 50th, 10th, 25th, 75th and 90th percentiles. This analysis is done from the raw data for maximum accuracy, and is based on the cross-sectional data of the urban and rural communities.

Each measurement is treated as a distinct continuum. The age interval represented by each measurement is one month; and wherever the increments are calculated for quarterly rates of growth, the interval is that of three months. This treatment of the data takes into consideration (1) the scope and aims of the study, (2) the inherent known trends of growth and development with advance of age and (3) the number of available observations. The monthly interval makes a continuous series of fifteen measurements.

The tables for the different measurements give a series of means and standard deviations or percentiles or ratios as the case may be. These values are so arranged as to represent the age to age change in the magnitude of a single physical measurement. The figures of these tables are also presented in relevant graphs which give a clearer picture of the growth from age to age. Graphs are drawn both for the distance travelled by each measurement during the course of the age group under study, and for the mean and selected individual rates of growth to visualise the velocity of growth of each of the anthropometric variables.

All the relevant tables from which the graphs are drawn are given in the appendix. Four graphs of each measurement are drawn, and they represent the control variables of sex, socio economic group and residence.

Ratios of skelic index and percentage growth of lower limbs in relation to stature are calculated. Correlation analysis is done for weight and stature and stature and chest circumference for each month. Separate correlation analysis is done for all the anthropometric measurements for the entire age group of 1 to 15 months. Simple regression analysis is carried out for head and chest circumference to test the efficiency of use of this technique to set up standards.

Multiple regression analysis is carried out for the entire data, separately for the three control variables viz.,

(1) Socio-economic class

(2) Urban - rural

(3) Sexes.

This analysis may indicate the predictive value of each variable in relation to the other variables, irrespective of chronological age.

Sexwise ~~wise~~ fragmentation of the available sample to less than 30 for each month with regard to control variables, does not permit regression analysis for month to month prediction for the age range of first fifteen months.

The next chapter presents the results of this analysis.