CHAPTER IV

HEALTH AND GROWTH-MONITORING INTERVENTIONS

Affecting measurable (in statistical terms) improvement in health and growth of under-five slum children through professional social interventions was the ultimate goal set for the present experiment. This chapter illustrates impact of all health care and growth-monitoring activities denoted as input 'A' in introductory chapter one.

In the said context, researcher had postulated seven hypotheses as given in section 1.6.3. and the assessment of these based on students's t-test would be presented serially. Two bar diagrams have been added to pictorially compare the treatment and control groups at pre and post intervention stages.

Thirdly, we include here results of multiple regression analysis between some relevant predictor variables like household size, mother's age, mother's education and per capita monthly income; and criteria variables like weight for height; haemoglobin status and nutritional status of the study children.

However, before we proceed with actual presentation of results, it is necessary to explain the following :

i) Why monitor growth ?

ii) Modus-operendi for present study.

iii) Rationale for selection of criteria indicators.

iv) Important characterstics of criteria indicators.

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It may be recalled here that the concept of Growth Monitoring has been already presented in chapter one.

4.1 Why Monitor Growth ?

First, the fact that mal-nutrition and resultant poor health in children remains invariably invisible till it attains dangerous proportions.

A detailed review of several hundred nutrition programmes conducted by the Harvard Institute for International Development (1981) concluded that :

> The average moderately malnourished child in 6-24 months age range looks entirely normal but is too small for his or her age, has lowered resistance to infections and therefore easily succumbs to illness.
>
> The child receiving only 60% of caloric requirement may give no outward sign of hunger beyond a frequent desire to breastfeed. In the Philippines study, 58% of the mothers of second and third degree malnutritioned children said their babies were growing and developing well.

Secondly ignorance of required nutrients leads to improper diet causing malnutrition. Studies undertaken in several countries, including India have shown that <u>more than half</u> of all cases of malnutrition are to be found in households where there is no absolute shortage of food. The reason why available food is not given to a malnourished child is usually that the mother does not know that her child is becoming undernourished and also that a child has special nutritional needs. And in many cases, the child's own appetite is depressed-often by the same illness which is causing malnutrition.

Thirdly, the note-worthy fact that growth - monitoring interventions are extremely cost - effective even when applied to large populations on a mass scale. The appropriate technology for it are Road - to - Health cards (available for 50 p. each) described later in section 4.4.3.

Lastly, and most importantly, cocept of growth - monitoring is revolutionary in the sense that it essentially involves the mother in the child health concerns.

MOTHER, : the one person who loves and cares for the child the most. If and when the mother is empowered with the following simple message :

- Weight gain from one month to the next is good.
- Weight constant is not good;
- Weight loss is a serious danger signal.

She (the mother) can do the most to prevent or correct any undersirable trends.

In conclusion, we quote UNICEF (1987) -

> As a technique, growth-monitoring can give an early warning of growth-faltering. As a process, it can be a channel for new information on growth promotion. And as a focal point for child health care, it can help shift the emphasis from professionals to parents, from clinics to communities, from dependence to empowerment. And in so doing, it can help to build genuine primary health care.

4.2 Modus-operandi for the Present Study

True to all that has been said above, during the present field-experiment we came across several mothers oblivious of their child's endangered health. Invariably the mother felt her child was well because he or she was 'easy to look after' and/or 'liked to eat' etc. The mother could hardly be labelled as ignorant or negligent because the child seldom presented any outwardly signs of malnutrition like skin lesions, a swollen belly, light coloured hair, signs of apathy or illness (cold, cough, fever, diarrhoea) etc. It was only when we had the initial assessment of haemoglobin level done and each child plotted on Road-to-Health cards, for his or her 'weight for age' parameter, did it become apparent that only a small minority of study children possessed good health.

Now, explaining growth charts and monitoring results can be done either in a group or through one-to-one counselling or discussion with the mother of her respective child's weight gain or weight loss and the concommitant inter-pretations were usually carried out on-the-spot i.e. the matter was taken up immediately after anthropometric measurements. This was possible due to the valuable assistance provided by the CHV and the field work students. At times, few mothers did leave before the discussion of results (owing to other pressing engagements) but later they invariably contacted the researcher on their own to inquire about the same.

Growth monitoring through the group medium was also quite effective. The mothers listened in rapt attention when we cited live examples from their own environment and of children known to them. The women were encouraged and guided to reflect on questions like :

What could be the cause ?
What needs to be done now ?
Could it have been prevented ?
Who should do what ?
Special situations of children of working or widowed mothers.
Food fads of children.
Economics of nutrition etc.

It turned out to be one of the areas in which maximum number of women participated and made the discussions lively. Besides, the women were both positive and respectful to others in their deliberations. On our part we were careful that mothers of malnutritioned children were not singled out in an awkward manner and embarrassed. Also, the mothers who had tried to practice recommended feeding were called upon to share their experiences of whether they faced any problems; how did they solve the problems; and what modifications they would like to suggest etc.

It was also required to monitor vitamin and iron supplements to each child as prescribed in order to ensure correct use without a break or discontinuation of the drug altogether. Although this was the assigned responsibility of the CHV, initially the researcher also went around the community to gain first hand knowledge of the field level realities. In most cases, there were no serious difficulties. Occasionally mothers complained that the children made a fuss about taking the medicine. Mothers of very small children found it genuinely difficult to administer the tonics even in powdered form with sugar. Such children were supplied with paediatric syrups in lieu of tablets. At times when the child was down with an infection, the mother stopped giving the tablet. We decided to respect her judgement at that instant but advised that the treatment be resumed when the child recovered health.

4.3 Selection of Criteria Indicators

According to Rao P.N. (1986 : 77)selection of indicators should depend on the following :

i) It should be reliable and available on regular basis from the same set of populations collected under comparable conditions;

ii) It should be simple enough to collect, analyse and interpret even at the peripheral and immediate level;

iii) Above all, the indicator should bear a theoretical relationship with the condition which is being measured or monitored.

In other words, availability, simplicity, reliability, comparability, and relevance are the essential characterstics of a good indicator. Under the present study, all selected indicators with the exception of 'incidence of morbidity' to some extent not only had the above characterstics for a good measure but these could be defined un-ambiguously, in clear terms, too. Description of these indicators now follow.

4.4 Characterstics of Criteria Indicators

4.4.1 Weight for Height

Although, in general terms, 'weight for age' (in case of children) is a sound measure of health and nutrition, in India its interpretation is accompanied by serious flaws as the true age of the child is not known many a times.

In an attempt to find a truly age dependent index, Rao K.V. and Singh D. (1970) compared heights and weights of apparently normal children with no signs of mal-nutrition and coming from low socio-economic families in Hyderabad city, India. They found that ratio Weight/Height^2 x 100 was remarkably constant over the age range of 1 to 5 years and was the same for males and females. Their mean value for normal children was 0.15 and for those with signs of Protein Energy Malnutrition (PEM) it ranged between 0.12 and 0.14.

For the present study, we adopted the above stated standards as the children belonged to low socio-economic groups. Secondly, height and weight data could be reliably collected by our community health volunteer under proper guidance.

4.4.2 Haemoglogin Estimation

It is the most important laboratory test that is carried out in health and nutritional studies. Park J.E. and Park K., (1985 ;110) state that haemoglobin is a useful index of overall state of nutrition irrespective of its significance in anaemia.

In our study, we secured the necessary expertise and logistics support from S.S.G. Hospital, Baroda, for collection and analysis of samples.

For interpretation, we used WHO standard regarding haemoglobin content in under-five children i.e. 11.0 gm/dl. as the cut off point to set apart the healthy from the weak.

4.4.3 Nutritional Status

At the outset, it needs to be clarified that although haemoglobin and 'weight for height' are themselves good indicators of nutritional status, for the present purposes, the criterion variable 'nutritional status' exclusively refers to the readings from Road-to-Health cards used for growth-monitoring. The cards obtained from S.S.G. Hospital, Baroda had two sets of weight for age graphs:- separate for infants under one year and for those between one to five years of age (please refer appendix). For grading nutritional status we used a classification by UNICEF & Ghose S. (1976) as per below :

Area between Curves	Per-centile of median weight	Nutritional Status.
top-most and one below	80%	Satisfactory
Second and third from top	80-71%	1st degree of mal-nutrition
third and fourth from top	70-61%	2nd degree of mal-nutrition
fourth and fifth from top	under 60%	3rd degree of mal-nutrition.

The card 'inter-alia' helps early and easy (at-a-glance) detection of growth faltering so that mothers could be advised and alerted in time.

4.4.4 Incidence of Morbidity.

Recording of morbidity or sickness in a community study is always a ticklish issue. That is so because report ing of sickness is a highly subjective matter. Besides, there usually remain gaps in definitions of illnesses and interpreta- tions of probe questions amongst all concerned viz. investiga- tors, respondents, subjects (whose health is under study) and professionals.

According to Pathak M. (1985) who conducted a study of perceived morbidity and utilisation of health services in slums of Nagpur city and 43 villages in Saoner town, medically defined illnesses are 2.24 and 3.6 times higher than perceived illnesses amongst infants and 1 - 5 year old children respectively.

Therefore, for the present study we decided to have our own method of data keeping of morbidity. The trained community health volunteer visited door-to-door and inquired from mothers whether their children under the project had a spell of diarrhoea, skin disease, cough and cold, low grade fever, high grade fever, measles, chicken pox or any other ailment during the past week. The CHV passed on the data to the researcher the very next day for information and necessary action. Such type of record was maintained from 1st March 1987 to 31st Aug 1987 i.e. the period in which all health care and growth-monitoring interventions were carried out.

4.5 Results based on Hypotheses Testing

Assessment of the seven hypotheses related to health and growth-monitoring interventions is discussed hereafter.

4.5.1 Hypothesis 1 : The mean value of Weight/Height^2 x 100 index of growth in treatment group children would show increase after the experiment vis-a-vis the mean value before.

To test the above hypothesis, pre-intervention mean weight/height^2 x 100 value recorded in Feb '87 was compared and subjected to paired samples' t-test alongwith the post-intervention mean value recorded in Aug '87. Table 4.1 furnishes the details. It can be seen that the two said values were. .1295 and .1411 respectively and the increase was statistically highly significant at $p = .000$ level; degrees of freedom being 29. Hence the hypothesis is accepted.

TABLE : 4.1

t - test Analysis : Pre-Post Means of Wt./Ht.^{2} x 100 Index in Treatment Group.

Paired Samples :

V_{13} - Weight by Height^2 x 100; Feb. '87 data.
V_{16} - Weight by Height^2 x 100; Aug. '87 data.

No. of Cases : 30

Degrees of Freedom : 29

Variable	Mean	S.D.	Correlation	t - Value	2-Tail Value
V_{13}	.1299	.009	.853	- 13.88	.000*
V_{16}	.1411	.008			

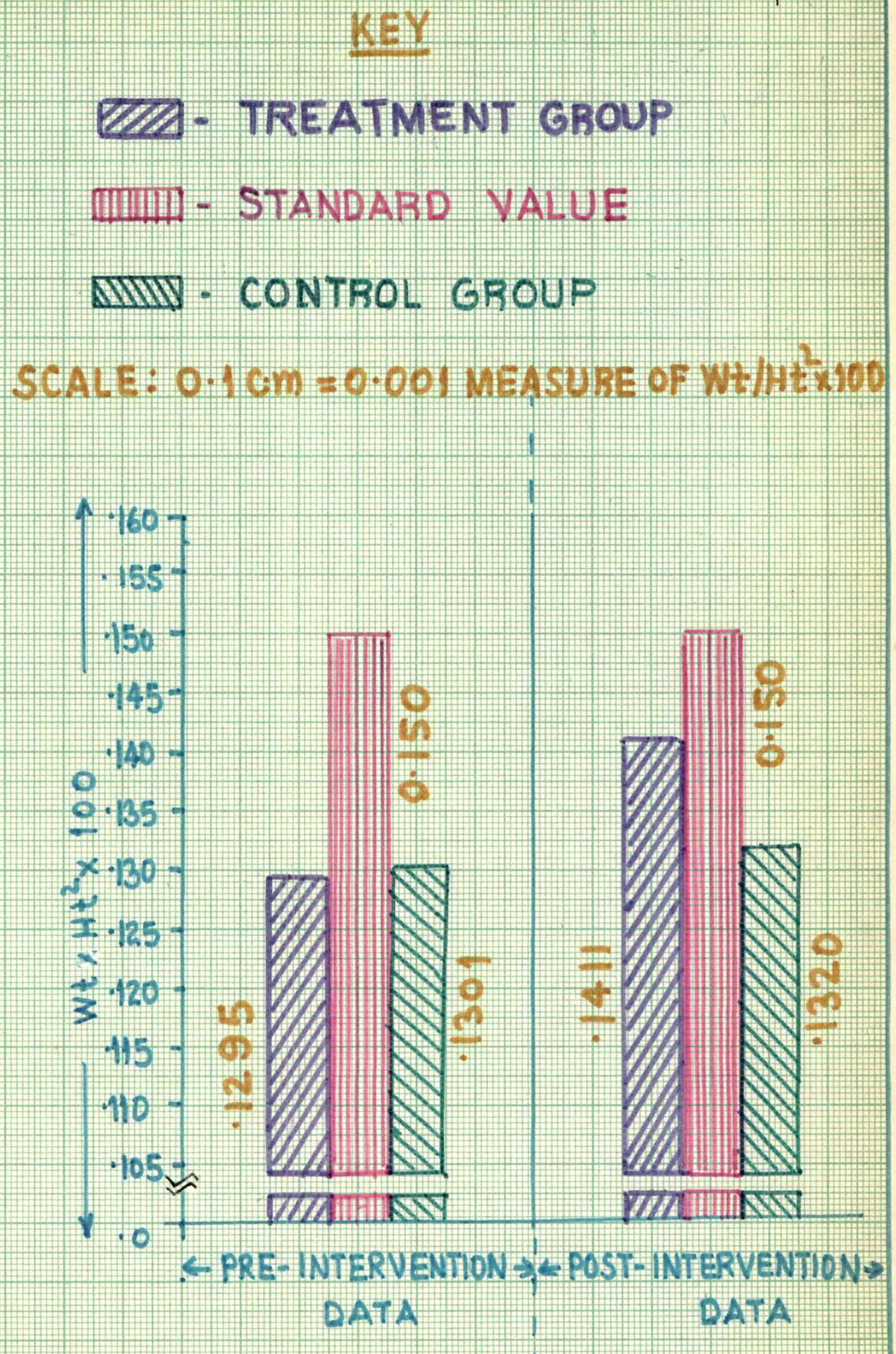
*Extremely Significant at 0% level.

As stated earlier in section 4.4.1 the mean value for normal Indian children from low socio-economic groups is 0.15. This implies that the children were in very poor health before the experiment and although there was significant improvment in their growth after six months of intervention they (children) could not still reach the normal level. However they did come quite close to the normal value.

4.5.2 Hypothesis 2 : The mean value of Weight/Height^2 x 100 index of growth in treatment group children vis-a-vis the control group children would be higher after the experiment.

To test the above hypothesis, it was first necessary to establish that the two groups were initially well matched and highly comparable

FIG. III : Pre and Post Intervention Weight-for-Height Measure in Treatment & Control Groups



on the criterion of weight/height^2 x 100. This was done by subjecting the pre-intervention mean values to independent samples t-test as shown in table 4.2A. The table shows that the mean values of .1295 and .1301 in treatment and control group respectively were statistically not different at p = .820, degrees of freedom being 53. In other words the two groups based on the criterion in question were much alike before the experiment. This very fact has been pictorially presented in fig. III.

TABLE : 4.2A

t-test Analysis : Pre-Intervention Means of Wt./Ht.^{2} x 100 Index in Treatment and Control Groups.

n of Treatment Group = 30
n of Control Group = 25

Group	Mean	S.D.	F Value	Pooled Variance Estimate t-value	d.f.	2 Tail Prob Value
Treatment	.1295	.009	1.12	-.23	53	.820*
Control	.1301	.009				

*Not Significant at 5% level.

TABLE : 4.2B

t-test Analysis : Post-Intervention Means of Wt./Ht.^{2} x 100 Index in Treatment and Control Group.

Group	Mean	S.D.	F Value	Pooled Variance Estimate t-value	d.f.	2 Tail Prob Value
Treatment	.1411	.008	1.05	4.19	53	.000*
Control	.1320	.008				

*Extremely Significant at o% level.

Next we sought to establish that after the interventions the mean values in both groups stood statistically different. Table 4.2B depicts post-intervention mean values of weight/ $height^2$ x 100 as .1411 and .1320 in treatment and control group respectively. The mean difference of .0091 was found to be statistically highly different at p = .000. Hence, hypothesis 2 is retained.

4.5.3 Hypothesis 3 : The mean value of haemoglobin level for treatment group children would show increase after the experiment vis-a-vis the mean value before.

To test the above hypothesis before and after mean values of haemoglobin in treatment group were subjected to paired samples t-test. Details are given in table 4.3.1.

TABLE : 4.3.1

t-test Analysis : Pre-Post Means of Haemoglobin Status in Treatment Group.

Paired Samples :

V_{17} - Haemoglobin level; Feb. '87

V_{18} - Haemoglobin level; Aug. '87

No of Cases : 30

Degrees of Freedom : 29

Variable	Mean	S.D.	Correlation	t value	2Tail Value
V_{17}	8.8600	1.364	.587	-2.58	0.15*
V_{18}	9.4433	1.366			

*Significant at 1.5% level.

It can be seen from table 4.3.1 that the pre-intervention mean of 8.8600 gm/dl. was statistically significantly different from the post-intervention mean value of 9.4433 at p = .015; degrees of freedom being 29. Hence, hypothesis 3 is accepted.

The table also depicts that the children were severely anaemic before intervention and though their haemoglobin levels improved significantly during the six months of interventions, they (children) failed to reach the attain the normal value of 11.0 gm/dl - WHO (1968).

TABLE : 4.3.2

Per cent Distribution of Children According to Mean Hb levels as obtained for 200 pre-schoolers of Rural Hissar-study by Kakker S. (1987).

Haemoglobin gm./dl.	Percent distribution of Children		Total
	Male	Female	
Below 5.0	1.27	1.27	2.53
5.00 to 6.9	8.86	10.13	18.99
7.00 to 8.9	30.38	26.58	56.96
9.00 to 11.0	13.92	7.60	21.52

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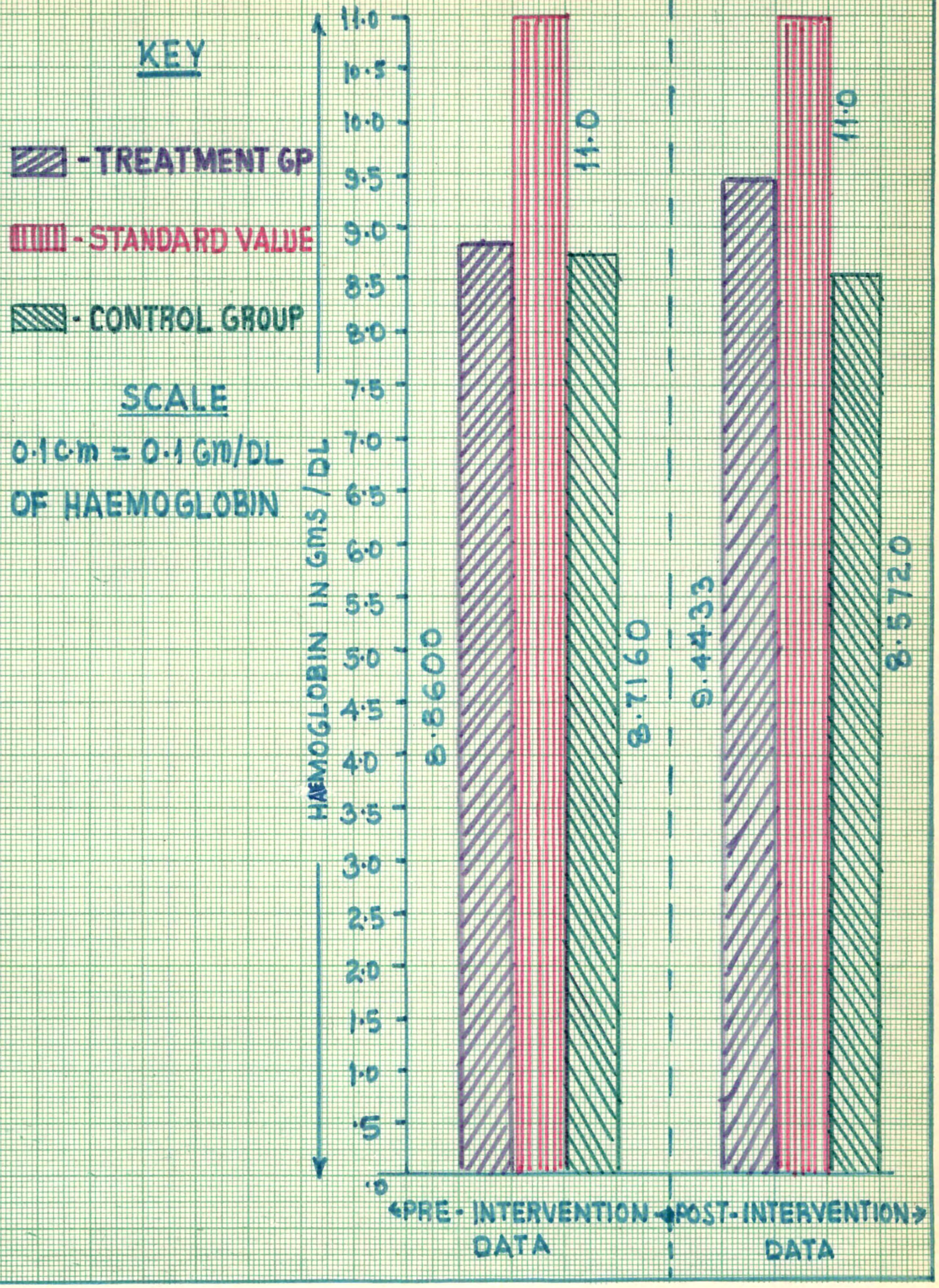
FIG IV : Pre and Post Intervention Haemoglobin Levels in Treatment & Control Grs.



Kakker S. (1987) in a study on nutritional status of pre-school children in rural Hissar (N = 200) also found very low levels of haemoglobin amongst study children Table 4.3.2 reproduced from the study above may be referred. Similary Gopaldas T. (1986) also found low haemoglobin level amongst under-fives i.e. of the order of 7.4 gm/dl. These studies have been quoted to bring out the fact that anaemic condition amongst pre-school Indian children from low socio-economic strata seems to be an ubiquitous phenomenon.

However, since our intervention could successfully achieve positive change in the intended direction, it may be concluded that such interventions for an extended period could contribute immensely towards health of under-fives.

4.5.4 <u>Hypothesis 4 : The mean value of haemoglobin level for treatment group children vis-a-vis control group would be higher after the experiment.</u>

To verify the above hypothesis, it was first necessary to establish that the two groups were initially well matched and highly comparable on the criterion of haemoglobin status. This has been done by subjecting the pre-intervention mean values to independent samples t-test as shown in table 4.4A. The table shows that the mean haemoglobin values of 8.8600 and 8.7160 in treatment and control groups respectively were statistically not different at p=.680; degrees of freedom being 53. In other words, the two groups based on the said criterion were much alike before the experiment. This very fact has been presented pictorially in fig. IV

TABLE ; 4.4A

t-test Analysis : Pre-Intervention Means of Haemoglobin Status in Treatment and Control Groups.

n of Treatment Group = 30
n of Control Group = 25

Group	Mean gms/dl	S.D. gms/dl	F Value	Pooled Variance Estimate t-value	d.f.	2 Tail Value
Treatment	8.8600	1.360	1.35	.42	53	.680*
Control	8.7160	1.174				

*Not significant at 5% level.

TABLE : 4.4B

t-test Analysis : Post-Intervention Means of Haemoglogin Status in Treatment and Control Groups.

Group	Mean gms/dl	S.D. gms/dl	F Value	Pooled Variance Estimate t-value	d.f.	2 Tail Value
Treatment	9.4433	1.366	1.38	2.52	53	.015*
Control	8.5720	1.1623				

*Significant at 1.5% level.

Next we sought to establish that after the intervention the mean values in both groups stood statistically different. Table 4.4B depicts post-intervention mean values of 9.4433 and 8.5720 in treatment and control group respectively to be statistically different at p = .015 level of significance; degrees of freedom being 53. As the F-value was 1.38 pooled variance estimate was made. Hence hypothesis 4 is accepted.

4.5.5 Hypothesis 5 : The mean value of nutritional status for treatment group children would show increase after the experiment vis-a-vis the mean value before.

To test the above hypothesis before and after mean values of nutritional status in treatment group were subjected to paired samples t-test. Details are given in table 4.5.

TABLE : 4.5

t-test Analysis : Pre-post Means of Nutritional Status in Treatment Group.

Paired Samples :

V_{19} - Nutritional Status Feb. '87

V_{22} - Nutritional Status Aug. '87

No. of Cases : 30

Degrees of Freedom : 29

Variable	Mean*	S.D.	Correlation	t-value	2 Tail P Value
V_{19}	3.0333	.718	.477	5.19	.000**
V_{22}	2.4000	.563			

**Extremely Significant at 0% level.

* Variable Code :

1 = Satisfactory nutritional status
2 = 1^{st} degree of mal-nutrition.
3 = 2^{nd} degree of mal-nutrition.
4 = 3^{rd} degree of mal-nutrition.
5 = 4^{th} degree of mal-nutrition.

It can be seen from table 4.5 that the pre-intervention mean (please refer variable code in the table) of 3.0333 was statistically significantly different from the post-intervention mean value of 2.4000. Hence hypothesis 5 is accepted.

Despite the fact that the nutritional status of treatment children improved significantly table 4.5 illustrates that they (children) merely moved from 2^{nd} degree of mal-nutrition to somewhere close to 1^{st} degree of mal-nutrition only. This implies that more inputs or perhaps the same inputs for a longer duration are required to raise the childrens' nutritional status to a satisfactory level.

In a study conducted in Central India, Gopaldas T. (1986) showed that 75% of children in the age group 0-6 years suffered from second and third degree malnutrition. Similarly Kakker S. (1987) in an earlier mentioned study found that only 18% children had normal or satisfactory level of nutrition. The remaining were distributed as : 38% in grade I; 31% in grade II; 9% in grade III and 4% in grade IV of mal-nutrition. These findings reflect that the children in our study conformed to the prevailing trends of mal-nutrition amongst under-five children.

4.5.6 Hypothesis 6 : The mean value of nutritional status for treatment group children vis-a-vis control group would be hihger after the experiment.

To verify the above hypothesis it was first necessary to establish that the two groups were initially well matched and highly comparable on the criterion of nutritional status. This was done by subjecting the pre-intervention mean values to independent samples t-test as shown in table 4.6A. The table shows that the mean nutrition status (coded as shown in the table) of 3.0333 and 3.1402 in treatment and control groups respectively were statistically not different at p=.708; degrees of freedom being 53. In other words, the two groups based on the said criterion were much alike before the experiment.

TABLE : 4.6A

t-test Analysis : Pre-Intervention Means of Nutritional Status in Treatment and Control Groups.

n of Treatment Group = 30
n of Control Group = 25

Group	Mean*	S.D.	F Value	Pooled Variance Estimate t-value	d.f.	2Tail-P-value
Treatment	3.0333	.718	1.24	.65	53	.708*
Control	3.1402	.695				

*Not Significant at 5% level.

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TABLE : 4.6B

t-test Analysis : Post-Intervention Means of Nutritional Status in Treatment and Control Groups.

Group	Mean*	S.D.	F Value	Pooled Variance Estimate t-value	d.f.	2Tail P Value
Treatment	2.4000	.563	1.46	2.58	53	.036**
Control	2.9802	.688				

**Significant at 3.6% level.

*Variable Code :

1 = Satisfactory nutritional status
2 = 1st degree of mal-nutrition
3 = 2nd degree of mal-nutrition
4 = 3rd degree of mal-nutrition
5 = 4th degree of mal-nutrition

Next, we sought to establish that after intervention, the mean values in both groups stood statistically different. Table 4.6B depicts post-intervention mean values of 2.4000 and 2.9802 in treatment and control groups respectively to be statistically different at p = .036 level of significance,; degrees of freedom being 53. As the F- value was 1.46 pooled variance estimate was made.

Hence hypothesis 6 is accepted.

4.5.7 Hypothesis 7 : Teh mean reported incidence of each of the eight morbidity conditons viz - diarrhoea, vomitting, measles, chicken pox, skin diseases, high grade fevers, low grade fevers, coughs and colds (there was 'nil' response for the ninth category - 'any other') under observation during the intervention period in treatment group would be lower than the corresponding values for control group at the end of the experiment.

The above stated hypothesis virtually consists of eight parts i.e. the eight morbidity conditions as mentioned for which the treatment and control groups were observed throughout the six months of intervention. As per the hypothesis we were interested in only the post intervention situation of both groups. Accordingly, the mean occurrence of each condition in the last month of intervention i.e. Aug. '87 in both groups were subjected to independent samples t-test. Details are presented tables 4.7.1, 4.7.2, 4.7.3, 4.7.4, 4.7.5, 4.7.6, 4.7.7, 4.7.8 interpretations of which are taken up serially now.

1.5.7.1 Post-intervention Reporting of Diarrhoea.

TABLE : 4.7.1

t-test Analysis : Post-Intervention Reported Incidence of Diarrhoea in Treatment and Control Groups.

n of Treatment Group = 30
n of Control Group = 25

Group	Mean	S.D.	F Value	Pooled Variance Estimate t-Value	d.f.	2Tail P value
Treatment	1.5333	1.456	1.47	2.12	53	.039*
Control	.7600	1.200				

*Significant at 3.9% level

Table 4.7.1 shows that in treatment group mean reporting of diarrhoea was 1.5333 as against .7600 in control group i.e. the mean reporting was higher in treatment group vis-a-vis control group - a situation diametrically opposite to the stated hypothesis. Besides, the difference of means was statistically significant at p = .039; degrees of freedom being 53. How do we account for this ? How is it that the treatment group children after undergoing a rigorous health care intervention package experienced higher morbidity than the control group children who received no health care at all ? Since the treatment group children had shown significant improvement on all the major health indicators there was no reason to accept a proposition that our health care had nil or in fact, detrimental impact. Since the final outcome in some other morbidity conditions like measles, low grade fevers and coughs 'n cold were similar, the situation was rather baffling initially, to say the least.

As exhaustive search of factors responsible for the unexpected and curious trends, led to the following possibilities :

i) As stated earlier, may be there were lacunae in data collection itself i.e. the community health volunteer did not work sincerely or the discharge of supervisory role by the researcher was unsatisfactory etc. In other words, due to some such reasons, the data on hand had low/no validity. However, the researcher does not believe that any of the above were true. We have enough confidence in the work of CHV and also the supervisory instrument set up.

ii) Having ruled out the above possibility, we suggest here what we believe to be one of the true causative factors.

It may be recalled that our research design incorporated a regular, continuous and welfare-oriented contact between the researcher and the treatment group mothers through the apparata of growth-monitoring discussions and health education sessions. On the other hand, the researcher maintained only an occasional contact with the control group mothers, say during anthropometric measurements, clinical examinations, haemoglobin testing or chance meetings on her (researcher's) various community visits. As such it is quite likely that while the treatment group mothers developed genuine interest in the project and co-operated by sincerely reporting morbidily as per their perceptions; the control group mother felt rebuffed and were careless in reporting as an expression of their rebellion. Therefore, it should be noted that higher reporting of morbidity by treatment group mothers does not necessarily mean that the actual morbidity levels in their children were higher, due to the reason just discussed.

iii) The second important causative factor seems to be a direct outcome of our health education intervention. The treatment group mothers were not only imparted knowledge of common childhood diseases, how to care for and manage the child during each specific illness but were also stimulated to develop right kind of attitudes towards 'health'. Attempts were made to make them more health conscious; to perceive health as a valuable asset; to believe in the old cliche - 'prevention is better than cure'; and to realise the importance of early detection and timely treatment of a disease for its control. These inputs in treatment mothers led them to report more frequently.

The situation in this project seems similar to the falsified increase in incidence of Diabetes Mellitus, Cancer, heart conditions etc. in recent years as compared to past. Higher reporting of morbidity does not necessarily mean rise in actual incidence but suggests that people are better aware and report sickness in early stages.

4.5.7.2 Post-intervention Reporting of Vommitting.

TABLE : 4.7.2

t-test Analysis : Post-Intervention Reported Incidence of Vommiting in Treatment and Control Groups.

Group	Mean	S.D.	F Value	Pooled Variance Estimate t-value	d.f.	2Tail P value
Treatment n=30	.5333	.571	1.01	1.12	53	.267*
Control n=25	.3600	.569				

*Not Significant at 5% level.

Table 4.7.2 shows that in treatment group mean reporting in Aug. '87 was .5333 as against .3600 in control group i.e. mean reporting in treatment group was slightly higher vis-a-vis control group - a situation defying the stated hypothesis. However, the difference of means was not so wide as to make it significant at $p < .05$ (as shown in table 4.7.2). In order to explain this un-expected finding we offer the reasons described in detail in section 4.5.7.1 as (i), (ii), (iii).

4.5.7.3 Post-intervention Reporting of Measles

TABLE : 4.7.3

t-test Analysis : Post-Intervention Reported Incidence of Measles in Treatment and Control Group.

Group	Mean	S.D.	F Value	Separate Variance Estimate t-value	d.f.	2Tail P value
Treatment n=30	.1000	.305	2.33	.87	50.40	.386*
Control n=25	.0400	.200				

*Not significant at 5% level.

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Once again mean reporting of measles in treatment group was slightly higher as compared to mean value of control group; the precise figures being .1000 and .0400 respectively. However, the difference was not so wide as to make it significant at p $< .05$ as shown in table 4.7.3. Here, since the F-value was 2.33, separate variance estimate was made.

To explain this unexpected result, we attribute the same reason discussed at length in section 4.5.7.1 as (i), (ii), and (iii).

4.5.7.4 Post-intervention Reporting of Chicken Pox.

TABLE : 4.7.4

t-test Analysis : Post-Intervention Reported Incidence of Chicken Pox in Treatment and Control Groups.

Group	Mean	S.D.	COMPUTER WARNING
Treatment n=30	.0333	.183	NO VARIANCE FOR INDEPENDENT SAMPLE t-test.
Control n=25	.0000	.000	(One or more samples has no variance).

Table 4.7.4 clearly depicts that there was only a marginal difference between the mean reporting in treatment group :- .0333 and mean value of control group :- .0000 the variance was so negligible that the computer issued a warning : No variance For Independent Samples t-test (One or more samples has no variance).

It must be conceded here that there was no need to inquire about incidence of chicken pox in month of August as the ailment is usually seasonal, occuring mainly in summers. Perhaps this explains 'nil' or low reporting in both groups.

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4.5.7.5 Post-intervention Reporting of Skin Diseases.

TABLE : 4.7.5

t-test Analysis : Post-Intervention Reported Incidence of Skin Diseases in Treatment and Control Group.

Group	Mean	S.D.	F Value	Pooled Variance Estimate t-value	d.f.	2Tail P Value
Treatment n=30	.5333	1.570				
			1.41	-.67	53	.504*
Control n=25	.8000	1.323				

*Not significant at 5% level.

This was first instance, where as expected, we found that mean reporting in control group was higher as compared to mean value of treatment group as obtained in Aug. '87. However, the difference was not large enough, so that the hypothesis 7 could be retained at $p < .05$ level of significance as shown in table 4.7.5. As the F-value was 1.41 pooled Variance estimate was made.

The hypothesis in this case is clearly rejected.

4.5.7.6 Post-intervention Reporting of High Grade Fevers.

TABLE : 4.7.6

t-test Analysis : Post-Intervention Reported Incidence of High Grade Fevers in Treatment and Control Groups.

Group	Mean	S.D.	F Value	Separate Variance Estimate t-value	d.f.	2Tail P value
Treatment n-30	.3333	.711	2.66	.60	49.01	.533*
Control n=25	.2400	.436				

*Not significant at 5% level.

Contrary to hypothesis 7, the mean reporting of high grade fevers in treatment group vis-a-vis control group was higher in Aug. '87; the exact figures being .3333 and .2400 respectively. The difference of means was however not so large as to make it significant at $p < .05$ as shown in table 4.7.6. As the F-value in this case was 2.66 separate variance estimate was made. To explain this unexpected result, we put forth the same submissions, presented in detail in section 4.5.7.1 as (i), (ii) and (iii).

4.5.7.6 Post-intervention Reporting of Low Grade Fevers.

TABLE : 4.7.7

t-test Analysis : Post-Intervention Reported Incidence of Low Grade Fevers in Treatment and Control Groups.

Group	Mean	S.D.	F Value	Pooled Variance Estimate t-value	d.f.	2 Tail P value
Treatment n=30	2.0667	1.530	1.59	3.25	53	.002*
Control n=25	.8400	1.214				

*Extremely Significant at .2% level.

Table 4.7.7 clearly depicts that mean reporting of 2.0667 in treatment group was considerably higher as compared to mean reporting of .8400. The difference was highly significant at p = .002; degrees of freedom being 53. As the F-value in this case was 1.59 pooled variance estimate was made as shown in the table.

Once again the reality situation is diametrically opposite to the stated hyposthesis and we attribute it to the same causative factors, discussed at length in section 4.5.7.1 as (i), (ii) and (iii).

4.5.7.8 Post-intervention Reporting of Coughs and Colds.

TABLE : 4.7.8

t-test Analysis : Post-Intervention Reported Incidence of Coughs and Colds in Treatment and Control Groups.

Group	Mean	S.D.	F Value	Pooled Variance Estimate t-value	d.f.	2 Tail P value
Treatment n=30	3.2000	2.140	1.02	2.27	53	.028*
Control n=25	1.8800	2.166				

*Significant at 2.8% level.

Once again, table 4.7.8 clearly depicts a trend contrary to the stated was considerably higher vis-a-vis control group. The difference of means was large enough to be significant at p=.028; degrees of freedom being 53. Since the F-value was 1.02, pooled variance estimate was made as shown in the table.

Here too, we explain the un-expected results by putting forth the same reason - (i), (ii) and (iii) discussed in section 4.5.7.1 at length.

4.6 Results of Correlation and Multiple Regression Analysis.

Multiple regression analysis is one of the most important tools which makes possible the study of direction and magnitude of effects of more than one independent variables on one dependent variable. That precisely served our purpose as we were interested in studying the correlation between our major dependent criterion variables and some independent predictor variables like household size, mother's age, mother's education and per capita monthly income as also the extent of variance that each of the latter variables could produce with regard to the former.

Understanding of the nature and quantum of these relationships empowers us with the tested knowledge towards improving practice of, more specifically in this case, how predictor variables could be manipulated in designing further interventions for promoting health of underfives from low socio-economic groups. The following three sub-sections present findings related to weight for height measure, haemoglobin and nutritional status.

4.6.1 Correlation and Multiple Regression between Criterion Variable Weight/Height^2 x 100 and Predictor Variables as listed below:

Household Size, Mother's Age, Mother's Education and Per Capita Monthly Income.

TABLE : 4.8.1

Correlation and Multiple Regression between Criterion Variable V_{36} i.e. Wt/Ht.^{2}x100 and Predictor Variable as listed below:

Variable	Lable	Mean	Standard Deviation
V_{25}	House hold size	5.527	1.289
V_{28}	Mother's Education	1.709*	.994
V_{32}	Per Capita M.Income	111.382	57.448
V_{33}	Mother's age	25.418	3.895
	N of Cases = 55		

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Correlation :

	V_{25}	V_{28}	V_{32}	V_{33}	V_{36}
V_{25}	1.000	-.052	-.271	.671	.099
V_{28}	-.052	1.000	.316	-.174	.284
V_{32}	-.271	.316	1.000	-.133	.002
V_{33}	.671	-.174	-.133	1.000	.001
V_{36}	.099	.284	.002	.001	1.000

Table 4.8.1 shows that of all the predictor variables in the equation, V_{28} i.e. mother's education had the strongst positive correlation of .284 with the dependent variable weight/height^2 x 100.

Multiple regression analysis reveals that of all the variables in equation only V_{28} i.e. mother's education is positively and significantly related to weight for height

Multiple Regression :

Method : Enter

EQ 1 : V_{36}
(Wt./Ht.^{2} x 100)

Variables in Equation

Variable	B	SEB	T	Sig-T
V_{33}	1.549570E.04	3.12368E-04	.495	.6229
V_{32}	-1.45208E-05	1.71742E-05	-.846	.4019
V_{27}	1.256286E-04	2.08354E-03	.060	.9522
V_{28}	2.629236E-03	9.49840E-04	2.768	.0079
V_{25}	-3.77625 E-04	1.05575E-03	-.358	.7221

(Constant)	2.311634E-03	6.61375E-03	.350	.7282

Multiple R .36954

R Square .13655 or 13.66%

Adjusted R Square .04844

Standard Error 6.373105E-03

Variable Codes

*1 = Illiterate

2 = 1 to 5 years of formal education

3 = 6 to 9 years of formal education

4 =10 to 12years of formal education

measure. The level of significance is quite high i.e. .0079 and the variance produced is 13.66% (value of R square) According to Reid W.J. (1981) in social work research models that can explain 15 per cent of variance are considered good enough. Therefore, in our present model variance of 13.66% caused by mother's education level is quite close to 'good enough'. It should also be noted that partial regression co-efficient or Beta weight for V_{28} i.e. mother's education was .002629 indicating that when all the other independent variables were held constant or controlled, V_{28} added considerable variance.

How does the above finding add to social work knowledge ? In a poor country like India where per capita incomes are amongst few of the lowest in the world; households usually large ; and the trend of early marriages quite common, it is certainly an encouraging revelation. It is encouraging because our intervention model has clearly demonstrated that income, house-hold size and mother's age had only a negligible impact on the dependent variable in question. The high, positive correlation with mother's education emphasises importance of raising women's education in the society for improving health standards of under-fives.

4.6.2 Correlation and Multiple Regression between Criterion Variable -Haemoglobin Status and Predictor Variables as listed below:

Household size, Mother's Age, Mother's Education and Per Capita Monthly Income.

TABLE : 4.8.2

Correlation and Multiple Regression between Criterion Variable V_{37} i.e. Haemoglobin and Predictor Variables as listed below:

Variable	Label	Mean	Standard Deviation
V_{25}	House-hold size	5.527	1.289
V_{28}	Mother's Education	1.709*	.994
V_{32}	Per Capita M. Income	111.382	57.448
V_{33}	Mother's Age	25.418	3.895

N of cases = 55

Correlation :

	V_{25}	V_{28}	V_{32}	V_{33}	V_{37}
V_{25}	1.000	-.052	-.271	.671	-.117
V_{28}	-.052	1.000	.316	-.174	.383
V_{32}	-.271	.316	1.000	-.133	.161
V_{33}	.671	-.174	-.133	1.000	-.128
V_{37}	.099	.284	.002	.001	1.000

Multiple Regression :

Method : Enter

EQ 1 : V_{37} (Haemoglobin)

Variables in Equation

Variable	B	SE B	T	Sig T
V_{33}	-5.18621 E-03	.05275	-.098	.9221
V_{32}	8.390816E-04	2.90044E-03	.289	.7736
V_{27}	-.25256	.35188	-.718	.4763
V_{28}	.40769	.16041	2.542	.0143
V_{25}	-.02690	.17830	-.151	.8807
(Constant	.07921	1.11696	.070	.9445

Multiple R	.40614
R Square	.16495 or 16.495%
Adjusted R Square	.07974
Standard Error	1.07632

Variable Code

*1 = Illiterate
2 = 1 to 5 years of formal education
3 = 6 to 9 years of formal education
4 =10 to 12years of formal education

Table 4.8.2 reveals that house-hold size and mother's age were negatively correlated with haemoglobin status implying that smaller households, and low age of mothers produce positive effect on haemoglobin increase in the children. However, the correlations were low i.e. -.117 and -.128 for V_{25} and V_{33} respectively and made no satistically significant impact. Per Capita monthly income was positively related ; implying that higher the income, higher the increase in haemoglobin level. This indeed is self-explanatory in the sense that persons with higher incomes had higher purchasing power for adequate and nutritious food so necessary to raise an individual's haemoglobin level.

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Here too, the relationship was not statistically significant. Education level of mother, was once again found to add considerable variance (with B = .40769) to the dependent variable when other predictor variables were held constant. The positive impact made by this variable was also significant at .014 level; implying that increase in mother's education leads to definite and significant increase in haemoglobin level (in the present intervention model). Value of R square; was also quite high i.e. 16.495% which according to Reid W.J. (1981) was better than 'good enough' level of 15% Variance.

4.6.3 Correlation and Multiple Regression between Criterion Variable Nutritional Status and Predictor Variables as listed below:

Household Size, Mother's Age, Mother's education and Per Capita Monthly Income.

TABLE : 4.8.3

Correlation and Multiple Regression between Criterion Variable V_{38} i.e. Nutritional Status and Predicator Variables as listed below :

Variable	Label	Mean	Standard Deviation
V_{25}	House hold size	5.527	1.289
V_{28}	Mother's Education	1.709*	.994
V_{32}	Per Capita M. Income	111.382	57.448
V_{33}	Mother's Age	25.418	3.895

N of Cases = 55

Correlation :

	V_{25}	V_{28}	V_{32}	V_{33}	V_{38}
V_{25}	1.000	-.052	-.271	.671	.075
V_{28}	-.052	1.000	.316	-.174	.295
V_{32}	-.271	.316	1.000	-.133	.070
V_{33}	.671	-.176	-.133	1.000	-.087
V_{38}	.075	.295	.070	-.087	1.000

Multiple Regression :

Method : Enter

EQ 1 : V_{38}
(Nutritional Status)

Variable in Equation

Variable	B	SE B	T	Sig T
V_{33}	-.03391	.03774	-.899	.3733
V_{32}	2.022273E-05	2.07494E-03	.010	.9923
V_{28}	.21707	.11476	1.892	.0505
V_{25}	.01895	.12755	.820	.4165
Constant	.01895	.79906	.024	.9812

Multiple R .34241

R Square .11724 or 11.72%

Adjusted R Square.02717

Standard Error .76998

Variable Code

*1 = Illiterate

2 = 1 to 5 years of formal education

3 = 6 to 9 years of formal education

4 =10 to 12years of formal education

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Table 4.8.3 shows that of all the predictor variables only 'mother's age' bore a negative correlation with the dependent variable, namely, nutritional status. This implied that younger mothers had healthier children. However, the correlation matrix had low value of only -.087. From the remaining independent variables mother's education had the strongest positive correlation of .295 indicating that better educated mothers acheived higher nutritional status for their respective children. Multiple regression analysis further confirmed these findings. The relationship between mother's education and nutritional status of the child was statistically significant at $p = .05$ level. The variance produced or the R^2 value was 11.72% which is rather satisfactory. Partial regression coefficient or Beta weight for V_{28} i.e. mother's education was found to be .21707. Once again, present intervention model has suggested that by upgrading mother's education, it is possible to improve health of under-fives.