RESULTS AND DISCUSSION

CHAPTER 4 RESULTS AND DISCUSSION

The results of the present study are reported under the following sections and discussed with reference to the available literature.

Sect. I Qualitative Data : Focus group discussion with community women and functionaries; health seeking behaviour, anaemia related knowledge and attitude for consumption of iron tablets and indentifying an alternative delivery system for iron tablets.

Sect. II Linking the distribution with child immunization : coverage and compliance, reasons for non-compliance side effects and beneficial effects of iron tablets, Role of private sector in terms of coverage and compliance and Utilization of free government health services with respect to receipt and compliance of iron tablets.

Sect. III An analysis of factors affecting compliance.

Sect. IV Impact of iron supplements

(A) Baseline data upto 24 weeks of gestation. Enrollment profile, socio-demographic information; past obstetaric history; utilization of health services, anthropometry and haemoglobin values.

(B) Impact of iron supplements linked with immunization on maternal and infant outcome and morbidity profile.

SECTION I QUALITATIVE DATA

Phase I : Perceptions of the Pregnant Women, Lactating Women, Elderly Women and Functionaries Regarding Anaemia

In all, twelve focus group discussions were conducted with pregnant women in Baroda and Ahmedabad to know about their belief, systems and knowledge, attitude and practices (KAP) regarding anaemia and consumption of iron tablets. The number of FGDs conducted with lactating women, mothers-in-law of the subjects and AWWs were four each.

The field setting was urban slums in the city of Baroda and Ahmedabad. Each slum had a population of approximately 500-1000. The slums were situated in the city and therefore hospitals and health facilities were easily accessible.

Majority of the subjects were construction workers. Most of them had their houses constructed with government aid with a minimal expenditure and their own labour. They also had electricity, toilet and drainage facility. A few, however, who did not have the advantage of this scheme lived in huts without toilet facilities. The FGDs were conducted in the selected areas after a good rapport was built with the women, either at the AWC or in a subject's house.

FGDs started with an introduction of the participants to each other and the moderator. The subjects were oriented to focus groups and encouraged to talk freely. They were explained that the FGDs were like opinion survey but were

general, broad questions. It was emphasized that everyone's participation was important and that experiences and ideas were to be explored and articulated during the FGDs. The participants were informed that there were no right or wrong answers and all positive and negative comments were welcome. Since the responses obtained with the four categories of informants (pregnant women, lactating women, older women and AWW were very similar, data are presented for all the three groups under the following subheads :

(1) Health problems faced during pregnancy.

(2) Perceptions regarding anaemia.

(3) Role of diet in health problems : general and specific to anaemia

(4) Health-seeking behaviour : general and specific to anaemia.

(5) Awareness regarding the iron tablets and attitude towards consumption of tablets.

Key characteristics of the Sample

Pregnant Women : In all, 88 pregnant women participated in the FGDs. All of them were between 18 to 35 years of age. Most of the women were in their 6th or 7th month of pregnancy, some were in the 8th month, whereas very few were in their 1st trimester. Most of the women had less than five children and a very few had more than five children. About a fourth of the women were in their first pregnancy. Most of the women were educated upto primary or secondary level. Most of the women

were housewives. Of the women engaged in economic activities, most did light work at home like stitching by hand, embroidery or engaged in light shoe making activities. At least one antenatal checkup had been taken by a majority of the women.

Lactating Women: All the 28 lactating women were between 18 to 30 years of age. Their family size consisted predominantly of four, with a few who had five or more children and hence a family size of seven or more.

Elder Women : All of the elderly family members (mother-in-law) were between 40 and 55 years of age. They had no formal education and they were housewives.

AWW : All of the AWWs had passed the secondary school certificate (SSC) examination. They were between 30 to 45 years of age and had 5 to 12 years of experience.

Health Problems Faced During Pregnancy

Health problems that the women faced during pregnancy were first elicited and are presented in Table 4.01. Relationship of these problems to anaemia, their health-seeking behaviour and their attitude towards consumption of iron tablets were major point of discussion following general health problems. As seen from Table 4.01 the problems faced during pregnancy as described by the currently pregnant women were some what different from those described by the other groups which could be attributed to the past experiences not being recalled as well as those of the present experience.

However, some of the consistently mentioned health

Table 4.01 : Health Problems Faced By The Women During Pregnancy

Health Problems	Pregnant Women	Lactating Women #	Elder Women#	AWWs#
Nausea and Vomiting	++	+	++	++
Lack of Appetite	+	-	+	-
Dislike for food	+	+	+++	-
Aches and Pains	+	+	++	++
Tiredness	++	-	+	+
Breathlessness	++	+	+	+
Weakness	++	++	+	+
Giddiness	+	-	++	++
Oedema	-	-	-	+
Poor Vision in Dim Light	+	-	-	-
Drowsiness	+	-	-	+
Others*	+	-	++	-

+++ :- Most Frequently cited ++ :- Less Frequently cited

\+ :- Least Frequently cited

* Others : Feeling uneasy, intolerance to smells, heart beats faster due to physical strain.

\# : Problems refered to those experienced when they were pregnant. Therefore these are current experiences for the pregnant women group, resent experiences for lactating women and AWWs while it refers to past experience for the elder women.

problems by all groups of subjects were nausea and vomiting, weakness, breathlessness, aches and pains, giddiness and dislike for food. Most of the women said that they were expected to continue all routine tasks including heavy manual labour throughout pregnancy. These responses were more or less similar in all the three groups. It is to be noted that at least three out of these six problems could have their origin in anaemia.

Perceptions Regarding Anaemia

Pregnant and Lactating Women : Women were largely unaware of anaemia or its local term "Pandurog" even though they suffered from anaemia related symptoms. When probed about specific symptoms of anaemia they said that they were familiar with thin/less blood, a term which they said they had learnt from their interaction with physicians or nurses. Weakness and tiredness that they frequently experienced was not attributed to "thin blood", but to social problems like tension, harassment and so on. In general, there was little awareness about anaemia for it was not perceived to be a health problem. Many women mentioned taking strength-giving tablets ("Shakti ni goli") to make blood healthy. None of the women in any of the FGDs mentioned any traditional practice that they followed to make blood healthy.

Elderly Women : None of the elder women (mother-in-law) had heard about "Pandurog" (Anaemia). However, a few were aware that weakness and dizziness could occur when "there was less

blood in the body" (Lohi Ochhu Thai) which, they believed, made delivery difficult. Thus, there was a minimum awareness about symptoms of anaemia.

Functionaries (AWW) : Unlike the community women the AWWs were well aware of "thinning of blood". They were aware of local term for anaemia, namely "Pandurog". They recognized it as "thin blood" or increased pallor. Other symptoms like weakness, low body weight (thinness), tiredness, aches and pains were mentioned. They mentioned that if the proportion of iron in the body decreased, it resulted in anaemia. However, none mentioned Hb test/ blood test to detect anaemia.

Eating mud, which they believed was due to calcium deficiency, in children or perverted appetite in pregnant women was perceived to result in worm infestation and hence, cause thinning of blood. Eating lot of beetle nuts and tamarind seeds were also considered to make the blood thin, although the causes underlying this was not mentioned by any one.

Role of Diet in Health Problems : General And Specific to Anaemia

Dietary deficiency as a cause of health problems was not mentioned, all beliefs concerning the role of diet related to pregnancy outcome, and are depicted in Table 4.02.

Pregnant and Lactating Women : The following interesting beliefs were mentioned by the pregnant and lactating women.

(1) Avoiding "sticky foods" like bananas, ghee, curds for the

Table 4.02 : Women's Beliefs Regarding Role of Diet During Pregnancy

Dietary Beliefs	Pregnant Women	Lactating Women	Elder Women	AWWs
Avoiding 'Sticky' Foods	+++	++	+++	++
Avoiding 'Hot' Foods	+++	+++	+++	+++
Avoiding non-food items#	-	-	+	++
Craving for sour food	++	+	-	+
Avoiding large meals	+	-	+	+
Eat 'Good' foods				
* Milk, Pulses, GLV	+++	-	+++	+++
* Ghee	-	-	++	+++
* Almonds (Badam)	+	-	+	-
* Bajara, Jaggery in last month	-	++	-	-
* Sheera and magas	-	-	+	+++
* Methi Ladoos	-	-	++	++

+++ :- Most Frequently cited ++ :- Less Frequently cited

\+ :- Least Frequently cited # :- Beetle nuts and Tamarind seeds

fear that they would make the delivery difficult, as they were considered to be sticky foods that made the foetus adhere to the mother's body and that freeing it at the time of delivery became difficult. A contradiction can be noted from Table 4.02, that in spite of ghee being considered a sticky food, it was recommended to be eaten in good amount by the elderly women and the AWWs, but mostly as a part of "Sheera" and "Magas", since it was considered strength-giving.

(2) Quantity of food consumed at each sitting was also believed to be related to the pregnancy outcome. Two belief-systems emerged. First belief was that food occupies the same space as that of the foetus and hence would cause distress to the foetus and inhibit its normal growth. So small, frequent meals were advocated. Another belief was regarding the total quantity of food which was restricted in order to avoid having large babies to prevent difficult delivery. The former expressed concern for the health of the foetus while the latter, for the health of the mother.

(3) "Hot" (garam) foods like ginger and papaya were avoided due to the belief that they induced miscarriage.

(4) Foods rich in iron and vitamin C, like green leafy vegetables (GLVs), pulses or citrus fruits were not restricted. In fact, craving for sour foods, especially tamarind was frequently mentioned and allowed. A few women mentioned that they were advised to consume more

milk, pulses and GLVs by their family members or doctors, so that they may remain in good health.

(5) Many women mentioned eating "good food" being desirable for good health, if economically feasible, "one may want to eat various things, but we need money ... How can we afford ghee, milk and Badam?" were often the kind of responses that came through.

Elderly Women : Most of the elderly women recalled eating lots of fresh vegetables from their garden, dry fruits, milk and curds. The women attributed pregnancy related general health problems like breathlessness on exertion and fatigue to a lack of good quality, quantity and variety of foods. The importance of variety of foods required for good health was appreciated and emphasized. Their awareness and practices of good diet concerned good health and no food specifically related to correction or prevention of anaemia were consumed. All the women felt that they could get unadulterated food, grains and milk with more cream in older days, which kept their health far better than that of their daughter-in-laws, for whom they could not provide these, since they are now very expensive. The food taboos and dietary restrictions were similar to those already mentioned by the pregnant women, but were followed strongly during their pregnancy.

Functionaries (AWW) : The AWW placed greater emphasis on overall general improvement in the diet rather than advocating only iron rich foods. In general they believed that the pregnant women should eat all foods, especially fruits and

vegetables to avoid deficiencies. At the same time they also believed that none of the iron rich foods should be avoided. They also tried to convey these to the women. They advised the women in their community to eat bananas because they believed that they were rich in calcium and increased weight, ghee, milk specially with added saffron (which was believed to make the child fair), green leafy vegetables, sprouted pulses, jaggery, vegetables like tomatoes and carrots to improve their health. If possible, they also advocated "Sheera" and "Magas" (sweets made from flour/gram flour, ghee and jaggery), especially made in iron pan for good health, since they were considered to be "important sources of salts like iron and phosphorous which give strength".

Although the AWW mentioned that they did not avoid any specific food during their pregnancies, their beliefs were very similar to those of the pregnant women especially with respect to sticky foods like ghee, cream, bananas, curds etc. during their pregnancy, which were supposed to stick to the foetus and caused delayed labour. One of the AWWs mentioned that she was advised to avoid green leafy vegetables and sweets which were thought to cause diarrhoea and miscarriage respectively. Dry ginger and pepper and papaya were known to be "hot" and hence, to induce miscarriage. They also mentioned avoiding beetle nuts and roasted mud which made the blood thin. Although the AWWs were told to avoid many foods during their pregnancies, the avoidance of foods depended on the mother-in-law's persistence, routine food habits and their

willingness to follow the taboos. They admitted that their perceptions had changed due to their training and hence, said that they tried to avoid only "hot" foods that were likely to cause miscarriages. Did they succeed? It did not seem to be so as they mentioned other belief systems quite frequently during the FGDs.

Health Seeking Behaviour : General and Specific to Anaemia

Did the subjects seek treatment for the predominant health problems they faced during pregnancy? It is apparent from Table 4.03 that they did not. Factors delaying treatment seeking for one of the problems "weakness" are shown in Table 4.03 which applied to other problems as well.

Pregnant Women and Lactating Women : All the women mentioned that pregnancy was confirmed if a menstrual period was missed simultaneously with symptoms like nausea, vomiting, decreased appetite and GI upsets. Only a few pregnant and lactating women got their pregnancies confirmed by medical checkups or urine tests.

A majority of women in all FGDs felt that the symptoms indicating anaemia like tiredness, breathlessness, excessive fatigue, dizziness (weakness/"Ashakti") were not considered serious enough for outside intervention. With regard to weakness, women ignored the symptoms and accepted them as a part of their general ill health. The general response was "Everyone experiences these during pregnancy and they (elder women) say that it will be alright after delivery" (Table

Table 4.03 : Factors Delaying Treatment Seeking For "Weakness"

Factors	Pregnant Women	Lactating Women	Elder Women	AWWs
Condition not considered serious	+++	+	+++	+
Financial Problems	-	-	++	-
Ignore general ill health	+	+	+	++
Self limiting Problem	+++	+++	+++	+
Others *	+++	+	-	++

+++ :- Most Frequently cited ++ :- Less Frequently cited
+ :- Least Frequently cited
* Others : Religious wows and shyness

Table 4.04 : Symptoms For Which Health Care Was Usually Sought

Symptoms	Pregnant Women	Lactating Women	Elder Women	AWWs
Severe Breathlessness, Excessive fatigue/ dizziness	-	-	+	++
High fevers	+	+	-	-
Diarrhoea	-	-	-	+
Severe Leucorrhoea	+	-	-	+
Severe pain in abdomen	+	+	++	+++
Spot Bleeding	+	+	++	+++
High B.P.	-	-	-	+
Diabetes	-	-	-	+
Prolonged Labour	-	-	++	-
Oedema	-	+	-	+++
Backache	-	-	-	++
Pain During Micturition	-	-	+	+

+++ :- Most Frequently cited ++ :- Less Frequently cited
+ :- Least Frequently cited

4.03).

Most of the pregnancy related health problems including tiredness, weakness and poor appetite were believed to be due to the unchangeable characteristics that they inherited from their mothers (i.e. their tendency/"Hel"), of which were interpreted in two ways. The first one was that the health problems in pregnancy were familial traits that they had inherited and therefore they were bound to suffer from these.

The second belief system was one which attributed the health problem - the type and severity of discomforts during pregnancy to "hot/cold" body composition of the women, the foetus and the sex of the baby. These factors were believed to influence the health of the women during pregnancy and were also considered responsible for differences between women. Since these problem were not attributed to any external influence such as diet and since the maternal and foetal characteristics could not be changed, they believed that they could do very little about the discomforts and hence believed in tolerating them. Therefore, though women in all FGDs were aware about antenatal checkups (ANC), very few made use of them regularly. Usually the first ANC taken any time after the 20th week of gestation was termed as "booking beds" to ensure access to hospital delivery and help in case of emergency. Subsequent visits were irregular and depended upon the morbidities faced during that period.

As indicated in Table 4.04, only serious conditions like persistent high fevers, diarrhoea, severe leucorrhoea, malaria

or miscarriage threatening symptoms like severe pain in abdomen and spot bleeding led to their seeking health care from medical or health specialists in private practice or free services provided from the government/trust hospitals. For minor ailments, mothers-in-law or other elderly family members were consulted. The elderly women usually advised them regarding the acceptance or rejection of prescriptions offered to the daughters-in-law, whether it was necessary to take them or should they be avoided. Thus, the elderly members of the family were very influential in acceptance or rejection of health related behaviour.

Financial constraint was one of the major reasons for not seeking remedial health measures even for health problems. Other reasons like heavy work load, inhibition for gynaecological checkups by doctors and religious reasons (badha) were mentioned by women for delay in seeking health care.

Elderly Women : None of the elderly women had either access to general health care or antenatal checkups during their time. The only health care during delivery was the presence of an experienced "Dai" (midwife) or elderly and experienced family member. Many women delivered their children all by themselves at home or in the fields. However, in case of prolonged labour or difficult delivery, they were taken to hospitals in the nearest town. A few women who had migrated to the city had their last one or two deliveries in the hospitals.

Although the older women were against taking medicines

for minor ailments like headaches or pain, they were aware of the health facilities available through the government/trust hospitals. Their attitude to the health services was positive. They were in favour of utilizing these for their daughters-in-law. They felt that they should go for health checkups and should take prescribed medicines for their health problems. In case of problems like severe pain in abdomen, pelvic region, fever, spot bleeding, they thought that prompt medical care should be given to avoid complications. No specific health seeking behaviour for anaemia was mentioned by any of them.

Functionaries (AWW) : The functionaries made use of the ANCs more regularly than the subjects of the study. They also said that pregnancy was confirmed if menstrual period was missed, simultaneously with symptoms like nausea, vomiting, decreased appetite and GI upsets. Only some of them got their pregnancy confirmed through medical practitioners. In this respect, the group of AWWs was not very different from the subjects of the study. However, most AWWs had taken regular ANCs and also the iron preparations prescribed by the doctors. Two of them took ayurvedic medicines (Bhasma) which kept them in good health. One of them avoided tablets due to mother-in-law's non-approval. However, all of the AWWs mentioned taking iron tablets at other times and had experienced the beneficial effects.

AWWs mentioned greater number of symptoms regarding health problems requiring immediate attention and considered

conditions like high BP, spot bleeding, oedema, too much vomiting, pain in pelvic region, diabetes, severe fatigue, breathlessness or backaches as danger signs indicating necessity for immediate medical advices.

Awareness Regarding Iron Tablets and Attitude to Tablet Consumption

Pregnant Women And Lactating Women : Most of the women were aware of the iron folic acid tablets distributed by the AWWs and by doctors in general hospitals, but were not aware of the relationship between these and anaemia. Iron tablets were viewed as energy giving or "Shakti" preparations, indicating that the major emphasis of the programme was one of promotion of the tablets through some simple attributes of the tablets, which is entirely justifiable. However, in the long term and for better compliance, health education to make them aware of the condition of anaemia, its serious health consequences and the iron tablets as a preventive measure for anaemia are necessary.

"I don't like to take any medicine" or "I have never taken medicines" or "tablets are not necessary for me, I am healthy" were the most frequently stated reasons by women who never took tablets or medicines (Table 4.05).

Apart from these, those women who were very poor and preoccupied with arranging for their necessities of earning for food, fetching water and so on were too busy to give high priority to take tablets. However, the response of the women, not so preoccupied with their minimum necessities depended on

Table 4.05 : Reasons For Non-Consumption Of Iron Tablets

Reasons	Pregnant Women	Lactating Women	Elder Women	AWWs
Dislike for medicines	+++	+++	+++	+
Tablets not necessary	+++	++	+++	+
Preoccupation with work	++	-	-	-
Past experience/side effects	++	-	+++	-
Too many tablets are harmful	++	-	+++	-
"Hot" effect	+	+	+	-

+++ :- Most Frequently cited

++ :- Less Frequently cited

\+ :- Least Frequently cited

their past experience with tablet consumption, its side effects and the advice of the other women.

Many of the women had consumed these tablets at least once during their pregnancies or lactation and were aware of its beneficial effects such as decreased tiredness, breathlessness, dizziness, aches and pains and improvement in appetite and health. A few women also mentioned that it improved blood, prevented paleness, increased weight and made the child healthy.

These tablets were considered to be "Shakti" (energy giving) tablets and they also knew about similar preparations available in capsule or liquid forms. Some of the lactating women knew that they "improved blood". There were, however, some women in each group who were not aware of this information, or did not agree to consume these tablets. They considered taking too many medicine to be "harmful" and causing miscarriage due to their "hot" effect. Though the "Shakti" (iron) tablets were not considered to be "hot" they were avoided if they were prescribed along with multivitamin or calcium preparations or tablets for other morbidities, as was usually done by the physicians.

Thus, the women's attitude towards consuming the iron tablets depended on their felt need to take the tablets, their past experience with the tablets or the perceived harmful effects of the tablets, when consumed with other prescribed supplements.

Elderly Women : During the FGDs all the women knew that iron

tablets were distributed by the AWWs to the pregnant women and that these "Shakti ni goli" or strength giving tablets were "good for health" and should be taken by pregnant women. They were aware that these tablets improved appetite, gave strength, decreased weakness and cured aches and pains. A few of the elderly women had taken these tablets during other morbidities and had experienced the beneficial effects. One of the elderly women opined from her daughter-in-law's experience "Now that the 'desi' herbs (traditional medicines) are not taken by the women for health care, they require to take medicines; otherwise they become weak. They cannot take the labour pains and 'drip' has to be given during delivery."

One of the women gave an example of her daughter-in-law who avoided iron tablets in spite of the doctor's prescription and her child had to be given blood transfusion. So, she strongly advocated taking "shakti" tablets during pregnancy.

A few women opined that these medicines might sometime prove "hot" causing excessive perspiration in some women with such tendency, and hence should always be taken with a lot of milk.

Though most of the women felt that their daughters-in-law should take iron tablets regularly, they pointed out that women avoided taking these tablets due to carelessness or general dislike for medicines.

Thus, in spite of the fact that the elderly women believed in "hot" and "cold" qualities of food and medicines and were not convinced that their daughters-in-law should take

medicines for trifle ailments, they were not against consuming the iron tablets regularly if required. They knew its beneficial effects due to their own or relatives' past experience.

Functionaries (AWW) : The AWWs advocated taking iron tablets regularly as treatment of pregnancy anaemia.

The AWWs were aware that the tablets improved blood, appetite, general health and ability to work, removed aches and pains, tiredness, giddiness and increased weight. Thus, the functionaries had better knowledge regarding causes, symptoms and role of iron tablets in prevention of anaemia.

Summary

Following important observations could be made from the FGDs:

(1) Symptoms of anaemia like fatigue, weakness and breathlessness while doing routine tasks, giddiness and inability to do much work at a time were experienced by many women, but they were not identified as anaemia. None of the women were familiar with the local term for anaemia, "Pandurog". Health problems were attributed to the state of pregnancy and not due to any specific deficiency.

(2) Routine ANC during pregnancy was not considered necessary by many women. It was considered important only in the last trimester to "book their beds" to have access to hospitals for emergencies.

(3) Symptoms of severe breathlessness and extreme fatigue

which compelled them to leave their routine tasks was one of the conditions for which women sought remedial measures. Mild or moderate conditions of the same were usually left unattended.

(4) Many foods were avoided during pregnancy, generally due to the belief that "hot" food caused miscarriage, and sticky foods caused distress to foetus at the time of delivery.

(5) The AWW's belief and attitude towards food taboos in some instances were similar to those of the women in the community. In other respect, they admitted that a change had occurred with their exposure to training and information. Food restrictions they practiced were chiefly related to hot foods.

(6) The AWWs tried to dispel the women's fear regarding food taboos but the only means of counselling available to them was talking with the women who went to the AWC for utilizing other services provided by the ICDS. Hence, there is a need to help the AWWs in counselling for bringing about a change in attitude of the women regarding food consumption.

(7) While the problem of anaemia per se and the role of diet in its causation was unknown to the mothers and other members of the community, they were all well aware of the iron folic acid supplements provided to the pregnant women, which usually was known to them only as "shakti ni goli" (strength or energy giving tablets).

(8) The attitude towards iron tablets was determined largely by their attitude to medicines in general. For instance, medicines and tablets were considered as "hot and liable to cause miscarriages" and therefore viewed as best avoided. Finer discriminations were made that size of the tablets and the number consumed mattered. So if only iron folic acid tablets were prescribed, this was viewed as less likely to cause any problems than two or three different types of tablets being prescribed together.

(9) Positive effects of iron supplements had been experienced by many women.

(10) The grass-root level health workers had a better knowledge of all the aspects of anaemia and their attitudes had shown certain desirable changes.

The qualitative data presented so far indicated that the beliefs of the pregnant women were similar to those of the lactating women or the older women in the community. Although the AWWs were exposed to similar beliefs, a change appeared to have occurred in their attitudes. They had a greater knowledge regarding anaemia, its prevention and treatment.

During the FGDs, some of the interesting beliefs about pregnancy were revealed. Some of these beliefs were very common among women in all communities as is evident from various studies. The health problems that the women faced during pregnancy were also similar to those reported by the other researchers (Seshadri et al 1992, Raman 1992, Khanna 1992).

Since pregnancy was considered to be a natural process, the women did not consider it necessary to go for regular health checkups. Minor discomforts were either attributed to the pregnant situation, heredity or maternal and foetal characteristics. Hence, women went to the hospitals once during the third trimester to ensure access to the hospitals at the time of delivery and in case of emergency. This has also been reported by other researchers (Moore et al 1991, Khanna 1992).

Khanna (1992) reported the practice of tribal women in Panchmahal with regard to confirmation of pregnancy, their health seeking behaviour, work during pregnancy, food taboos and general dislike for the "western medicines" by the women. The findings of their study are similar to those in the present study, indicating that the different ethnic groups in India might share similar belief systems.

Manderson and Mathews (1981) reported that Vietnamese women were expected to continue their routine activities till delivery. A study carried out in 203 societies on activity and work during pregnancy also revealed that pregnant women were expected to continue full activities till the onset of labour (Jimnez and Newton 1979).

Studies from various parts of India and abroad suggest that the diet of pregnant women was viewed in perspective of the pregnancy outcome rather than maternal and foetal health. These were mainly related to the threat of "hot" foods causing miscarriage, "sticky" foods making the delivery difficult or

greater quantity of foods causing large babies resulting in difficult deliveries. (Laderman 1987, Ojofeitemi et al 1982, Nichter and Nichter 1983, Moore et al 1991).

The "hot/cold" concept of foods or the humoral theories are based on the concept that good health is maintained due to a balance of the opposing body humors, ie "hot" or "cold" state of the body. Diet plays a major role in altering the body humors. Some foods may have a "hot" effect and some may have "cold" effect on the body.

Nichter and Nichter (1983) reported that South Indian women believed that "hot" foods or medicines might cause miscarriage and hence were avoided during pregnancy. It was also reported that the villagers believed that pregnant women should decrease their food intake to avoid large babies.

Dietary restrictions were also reported among pregnant Nigerian women. Foods like milk and cow peas were avoided to avoid having a big baby. Certain fruits were avoided since they were believed to cause gastro-intestinal problems and nausea (Ojofeitimi et al 1982).

Malay dietary restrictions were based on humoral theories. "Hot" foods and medicines were avoided in order to avoid miscarriage during pregnancy. Coolness was considered necessary for the developing embryo and therefore dietary practices were followed according to the humoral properties of food (Laderman 1987).

The humoral beliefs of the women also seemed to have an impact on the acceptability of western medicines during

pregnancy, especially iron tablets, which are supposed to be taken for a prolonged period and hence affect their health seeking behaviour and compliance towards prescribed medicines.

Lokeshwar et al (1992) reported the dislike by women to continue iron medicines for 2 to 3 months since they did not perceive themselves to be ill. The Mende of Sierra Leone interpret western pharamacheuticals according to their own traditional beliefs. The size of the pill, its shape, colour, taste and consistency governed the choice of treatment. In accordance to this, red food and medicinal substances have been used as treatment for replacing or purifying blood. Hence, red medicines like iron tablets, pile tablets and folic acid tablets were considered suitable for increasing blood. (Bledsoe and Gouboud 1985).

A general dislike for routine tablet consumption and "not feeling a need to take tablets" are also reported by several other researchers (Dudley 1979, Nichter and Nichter 1983, Charoenlarp et al 1988, Moore et al 1991).

In an attempt to know if some of the belief systems, especially with regard to foods had their origin in the traditional system of medicine, specialists in "ayurved" were interviewed to know their perceptions. While these specialists used the hot-cold classification of foods,they differed substantially from the popular beliefs of the community. For example, ginger and papaya were considered by the specialists to produce a cold reaction after digestion, while they may taste hot. On the contrary, the community strongly believed

that these two foods were hot and therefore should not be taken by pregnant women. Thus,it is apparent that the community held beliefs have had their origin in the older system of medicine but generations of oral diffusion of facts have evidently resulted in distortions.

Phase II : Focus Group Discussion On The Present Delivery System

Present Distribution of Iron Tablets and Mode of Its Delivery

A detailed evaluation of the various aspects of the current iron tablet distribution system was carried out by the Indian Council of Medical Research under the national level evaluation of NNAPP (ICMR 1989). Therefore, in the present study only the operational aspects of the existing system in urban slums were qualitatively assessed in terms of actual implementation of the distribution of the tablets to the beneficiaries, perceptions of the beneficiaries and functionaries regarding the ongoing distribution system and the possible alternative delivery systems.

The ongoing distribution system was observed by frequent visits to the AWCs and informal discussions with AWWs apart from the FGDs which were recorded to analyze the merits and demerits of the existing system.

Salient Features of the Existing Distribution System In the Study Areas - Observation of the Investigator

The observations of the ongoing system yielded the following findings :

(1) Women collected iron tablets at their own convenience because no specific date or time was fixed. This resulted in the women dropping in at the AWC at various points of

time either individually or in very small groups. If the AWW had a supply of iron tablets, she gave a few to them. Otherwise the women were asked to return later.

(2) A handful of tablets was given to each woman without counting and she was asked to return for more when she had consumed them. The AWW was interrupted frequently in her routine tasks bacause of the lack of a consistent timing for collection of tablets.

(3) A consistent mutually supportive group could not be built up because of the lack of a consistent timing for the group to gather.

(4) Adequate follow-up action by the AWWs to know the reasons for non-compliance or problems of tablet consumption was absent. However, the functionaries (AWWs) attributed non-consumption of iron tablets to lack of women's awareness regarding the beneficial effects of the tablet consumption or dislike for tablet consumption.

(5) The AWWs stressed the benefits of consuming the iron tablets in terms of positive pregnancy outcome, but benefits that could accrue to the woman were not emphasized.

Perceptions of the Beneficiaries and the Functionaries (AWWs) Regarding Ongoing Distribution System and its Acceptability

From the above qualitative observation, the drawbacks of the existing delivery system were evident. However, the views of the beneficiaries and functionaries on the ongoing

distribution system were important and worth consideration.

Perceptions of the Beneficiaries : Under the ongoing distribution system the women were expected to collect the iron tablets from AWC during the AW timing at their convenience. No particular day or time was fixed. Sometimes tablets were supplied through their neighbours or their children if so requested. Many of the women, however, did not collect the tablets regularly, although at some point of time a few tablets were collected by them. The beneficiaries did not voice any specific concern about distribution system as the tablets received rather a low priority by them. They collected them once in a way because the AWW or ANM told them so. Though no demand was made for packaging of the tablets, when asked, the women, during all the FGDs indicated that any form of packaging would be better than the loose tablets presently given, which became sticky and discoloured especially during monsoons. Many of the women recalled throwing off these tablets at least once due to such spoilage. Thus, only a part of the tablets received were consumed.

Perceptions of the Functionaries : The views of the functionaries regarding the present delivery system, its acceptability and the alternative delivery system were assessed.

Though none of the functionaries voiced any dissatisfaction regarding the mode of distribution of the ongoing system, a few of them pointed out that it posed an additional burden, since "actually the tablet distribution was

the ANM's responsibility" according to them. However, since they had a better rapport with the community women, they distributed the tablets out of good will. This, however, led to frequent distraction, especially during pre-school education when the women came for the tablets or had to be called if they were seen passing by the AWCs for reminding them to take the tablets and consume them regularly. Such an approach did not provide an opportunity for the AWWs to provide any form of meaningful counselling to the mothers. Yet another drawback was the absence of the ANM which made counselling entirely the responsibility of the AWW.

Packaging :- Though the AWWs had never had any demand for packed tablets, they had received frequent complaints regarding the spoilage of tablets especially during the monsoon due to moisture absorption. Hence, all AWWs felt that packed tablets would reduce the discarding of tablets due to spoilage. The reasons cited for packaging were :

(1) To avoid spoilage during storage in the AWCs (tin box got rusted) as well as at home.

(2) To avoid contamination due to spilling and frequent handling of the tablets from paper packs or open cups where they were frequently stored by the women.

(3) To avoid loss of tablets dropped by women while removing from loose paper packs.

According to the AWWs, inexpensive plastic covers were acceptable which spared them from frequently counting the tablets during distribution. However, they preferred the

bubble pack which would give the tablets a "professional look", making them more acceptable and avoiding all the problems of loose distribution. It also was thought to facilitate counting by the women so as to remind them to take the tablets regularly.

The Alternative Delivery System

Merits of the Suggested Delivery System v/s the Existing One:

The merits of the suggested delivery system and its feasibility are discussed under the following heads :

(1) Supplies

(2) Storage

(3) Attendance at AW on immunization day

(4) Convenience to AWW

(5) Convenience to pregnant women

(6) Time for counselling

Supply of tablets :- In the existing system of distributing the iron tablets, adequate supply was a constraint as pointed out earlier. Therefore, in order to ensure a regular supply for the purpose of the study, the co-operation of district medical officers and CDPOs and the AWWs and the ANMs was sought.

Accordingly, adequate supplies of iron tablets were available to all centres at Baroda and Ahmedabad during the study period from May 1991 to January 1994, except one incidence when the supply from the head quatres was

interrupted at few centres for one month.

Storage of tablets :- The FGDs revealed that women pointed out frequent deterioration of the loosely distributed iron tablets, which were not consumed. However, in the ongoing programme structure, no system existed for the packaging of the tablets. Hence, no packaging was introduced in the present study. However, the AWWs were instructed to advise the women to store the tablets in tight container to avoid spoilage.

Regular timings at AWC on the immunization day :- Most of the women visited the AWC on routine basis either to drop their child, take supplementary food or iron tablets and other medicines. They were informed about the immunization and availability of iron tablets on the previous day. Most of them came to the centre and collected the tablets at the said time. However, those women who went for work did not stay back just to receive iron tablets. Therefore, the AWWs had to give the tablets to such women at their convenient time or send through the neighbours or other family members, if so requested.

Advantages to the functionaries :- Fixing a single day for the distribution of tablets saved the AWWs of the frequent distraction from their routine task, especially preschool education. In the existing system, the tablet distribution day was not fixed and hence, it became difficult for AWW to keep track of the beneficiaries who had not received the full course of tablets.

Linking the distribution of iron tablets with

immunization made the system more organized in terms of the time that AWW spent on the particular task and also helped her to focus on the anaemia related messages that she could give to the mothers. Further, it helped in a more systematic recording of women who were not reached so that these few could be reached through other means. Thus this alternative mode of distribution of tablets ensured that more women were approached regularly. The unwilling participant could later be persuaded to receive and consume the iron tablets.

Advantages to the pregnant women :- Most women did not find any inconvenience with the timing of supplement distribution linked with the immunization. It created a sense of responsibility in them to take care of themselves and utilize the available services. It also provided an opportunity for the women to interact with the AWWs as well as the other pregnant women and clarify problems that they faced regarding consumption of iron tablets. Thus, the AWW could get proper feedback from the women. This helped in reinforcing a positive attitude towards consumption of iron tablets among the community women.

Thus, the merits of the alternative delivery system against the earlier ones are :

	Constraints of the Ongoing System	Merits of the Suggested System
1	Adequate tablets were not available to all the women.	Adequate supply of tablets was ascertained by district medical officer.

2	Packaging : due to loosely distributed tablets, loss and deterioration were common.	Women were distributed a single month's supply and advised to store the tablets in tight containers to minimize loss and spoilage.
3	Since no time was fixed for tablet distribution, the distribution was irregular.	Fixing a single day and time for the distribution made it more systematic and regular.
4	Coverage depended on the women's motivation to demand iron tablets or the AWW's memory as to who had received the full course and who was not approached.	All women were informed on the previous day regarding the immunization and the distribution linked with immunization. Only those absent needed to be contacted later.
5	Frequent distraction of the AWW made it difficult to concentrate on this task or do justice to the others.	A fixed day and time of distribution enabled the AWWs to concentrate on anaemia related tasks and also allowed her to attend to the other tasks without any interruptions.
6	Pregnant women forgot asking for the iron tablets while passing by the AWC and postponed the visit to the next day	Pregnant women had to go to the AWCs on a fixed day and therefore received the tablets regularly.

Thus, the suggested alternative system for delivering iron tablets had greater merits and higher acceptability, both by the beneficiaries and the functionaries.

It was evident from the FGDs as well as from the investigator's observations that little counselling occurred regarding anaemia, its hazards, symptoms and need to consume iron tablets. The AWWs usually linked the non-consumption of tablets with negative pregnancy outcome, like LBW baby or maternal or child deaths, miscarriage etc. The pregnant women, however, had not observed this frequently in their community.

There was a general inhibition towards taking medicines. Though women knew about positive effects of iron tablets, they felt that they did not require iron tablets since they were not "ill". It was, therefore, considered necessary to assess the knowledge of these women regarding anaemia and advantages of taking iron tablets. The reults of these data are presented below.

Knowledge of Pregnant Women

The knowledge of the pregnant women regarding anaemia was assessed on a sub-sample of pregnant women. The data presented in Table 4.06 reveal that only 12% of the women were familiar with anaemia, while as many as 96% were not aware of the causes of anaemia. Only 2% considered inadequate diet as a cause of anaemia, while a few women gave other miscellaneous reasons like tension, anger, illness etc. being responsible for it.

As many as 44% of the women could not state the symptoms of anaemia. However, more than a fourth of the women mentioned tiredness, 17% mentioned decreased work capacity and fewer mentioned pallor, breathlessness and oedema as symptoms to recognize anaemia. Again, more than three fourth of the women (78%) did not know whether anaemia or thinning of blood was serious enough to seek medical advice. Only 13% of the women thought that doctors should be consulted if "blood is thin".

A fourth (27%) of the women did not know what advice should be given to pregnant women with anaemia. Seventeen

TABLE 4.06 : KNOWLEDGE OF MOTHERS

SR NO		RESPONSE	N	%
1		FAMILIARITY WITH ANAEMIA		
	a	Yes	10	11.9
	b	No	74	88.1
2		CAUSES OF ANAEMIA		
	a	Inadequate diet	2	2.4
	b	Diet deficient in iron	0	0.0
	c	Worm infections	0	0.0
	d	Frequent blood loss	0	0.0
	e	Any other	3	3.6
	f	Donot Know	81	96.4
3		RECOGNITION		
	a	Decreased work capacity	14	16.7
	b	Tiredness	25	29.8
	c	Pale eyes/lips/nails (paleness)	6	7.1
	d	Anorexia	0	0.0
	e	Breathlessness	4	4.81
	f	Irritability	0	0.0
	g	Oedema	1	1.2
	h	Koloichia	0	0.0
	i	Lack of concentration	0	0.0
	j	Any other	24	28.6
	k	Donot know	37	44.0
4		SYMPTOMS SERIOUS FOR WHICH MEDICAL ADVICE		
	a	Yes	11	13.1
	b	No	5	6.0
	c	Doesnot know	66	78.5
5		ADVICE FOR PREGNANT WOMEN EAT MORE FOOD		
	a	Eat more food	15	17.4
	b	Consume GLV	4	4.8
	c	Consume iron rich food	0	0.0
	d	Take iron folate tablets/syrup	19	32.6
	e	c+d OR b+d	0	0.0
	f	Any other	46	54.7
	g	Doesnot know	23	27.4

6		ADVICE REGARDING SPECIAL PREPARATIONS		
	a	Yes	11	13.1
	b	No	73	86.9
7		AWARENESS REGARDING IRON TABLETS		
	a	Yes	82	97.6
	b	No	2	2.4
8		IRON TABLETS AVAILABLE IN COMMUNITY		
	a	Yes	79	94.0
	b	No	5	6.0
9		BENIFICIAL EFFECTS OF IRON TABLETS		
	a	Increased haemoglobin	0	0.0
	b	Increased blood	13	15.6
	c	Decreased tiredness,breathlessness etc.	24	28.6
	d	Gives strength, decreases weakness	44	52.4
	e	1+4	0	0.0
	f	2+4	0	0.0
	g	1+3+4	0	0.0
	h	Any other	35	41.6
	i	Doesnot know	12	14.3
10		WILLINGNESS TO TAKE LNG		
	a	Yes	71	84.4
	b	No	13	15.6
11		IF NOT WILLING REASON		
	a	Tables are "hot"	0	0.0
	b	Tablets are not necessary	13	15.6
12		CONSEQUENCES OF NOT TAKING LNG IN CASE OF LNK		
	a	Nothing	9	10.7
	b	Inadequate weight gain	4	4.8
	c	Difficult delivery	26	30.9
	d	Small baby (LBW)	4	4.8
	e	Premature	0	0.0
	f	Complications of delivery	4	4.8
	g	Any other	34	40.5

13	HUSBAND'S ADVICE REGARDING TABLET CONSUM.		
a	Yes	68	80.9
b	No	15	18.1
14	HUSBAND'S ADVICE		
a	Should be taken regularly	68	80.9
b	Shouldnot be taken	2	2.4
c	Taken when symptoms occur	7	8.3
d	Any other	11	13.1
e	Doesnot know	2	2.4
15	HUSBAND'S ATTITUDE		
a	Beneficial (positive)	68	80.9
b	Not beneficial (negative)	3	3.6
c	Neutral	12	14.3
16	CONTACT WITH AWW/ANM		
a	Daily	27	32.1
b	Once a week	20	23.8
c	Once in 15 days	4	4.8
d	once in 1 month	33	39.9
17	REASONS FOR CONTACT		
a	Drop the child to AWW	27	32.1
b	Supplementary food	30	35.7
c	Her own immunization	22	26.2
d	child's immunization	4	4.8
e	AWW's visit for NHE	1	1.2
f	Any other	0	0.0

percent of the women advocated eating more food, 5% advocated consuming green leafy vegetables (GLV), 33% mentioned consuming iron tablets or syrup and 55% gave miscellaneous responses like eating good food such as ghee, almonds, milk, taking doctor's advice etc.

Most of the women were aware that "energy giving" (shakti tablets) were available in the community. Half of the women (52%) mentioned that the tablets were strength giving and they decreased weakness. Other beneficial effects mentioned were : decreased tiredness, breathlessness etc. (29%), increased blood (16%) apart from other miscellaneous responses like tablets were good for health, good for baby, easy delivery and so on.

As many as 84% of the women said that they were willing to consume the iron tablets. The non-willing ones felt that the tablets were not necessary for them.

When asked regarding the consequences of not taking the iron tablets in case of anaemia, about a third of the women (31%) felt that it would cause difficult delivery, small baby (5%) or inadequate weight gain (5%). Eighty one percent of the women said that their husbands advised them to consume iron tablets.

Only a third of the women visited the AWC daily, a fourth of them once a week and others less frequently. The reasons of their visit to AWC were to drop their child to AWC (32%), supplementry food (36%), her own immunization (26%), child's immunization (5%) or AWW's visit for NHE (1%). Thus, most of

the women interviewed had poor knowledge regarding anaemia, it's causes or consequences.

Knowledge of Mothers-in-Law

Mothers-in-Law of the pregnant women were interviewed to assess their knowledge regarding anaemia and their attitude towards consuming iron tablets.

As indicated in Table 4.07, a majority of women (88%) were not familiar with anaemia (Pandorog) or thinning of blood. However when explained, about a fourth of the women said decrease work capacity, a third of them perceived tiredness, 13% thought anorexia, 3% thought irritability and 5% said oedema as signs to recognize thin or less blood. A third of the women also gave other signs like thin body, weakness and so on. However, more than half of the women (55%) could not state symptoms of anaemia.

As many as a third of the older women did not know the consequences of anaemia. However, a majority (58%) of them attributed ill health of the mother to lack of blood. A fourth of them also opined that it caused difficult delivery, whereas 15% perceived unhealthy baby as a consequence of thin or less blood.

When asked regarding the advice that they gave to their daughters-in-law with anaemia, a majority (58%) of them said that they should take medicines, but could not state which ones. Three percent of the women opined that they should consume iron rich foods whereas 20% said that they advised

TABLE 4.07 : KNOWLEDGE OF MOTHER-IN-LAW

SR NO	RESPONSE	N	%
1	FAMILIRITY WITH LNK		
a	Yes	5	12.5
b	No	35	87.5
2	RECOGNITION		
a	Decreased work capacity	9	22.5
b	Tiredness	13	32.5
c	Pale eyes/lips/nails/paleness	0	0.0
d	Anorexia	5	12.5
e	Breathlessness	0	0.0
f	Irritability	1	2.5
g	Oedema	2	5.0
h	Koloinchia	0	0.0
i	Lack of concentration	0	0.0
j	Any other	13	32.5
k	Doesnot Know	22	55.0
3	IS LNK SERIOUS ?		
a	Yes	36	90.0
b	No	4	10.0
4	CONSEQUENCES OF ANAEMIA		
a	Difficult delivery	10	25.0
b	Unhealthy baby	6	15.0
c	Unhealthy mother	23	57.5
d	Doesnot know	13	32.5
5	ADVICE FOR PREGNANT WOMEN WITH LNK		
a	Eat good food	12	30.0
b	Eat more food	13	32.5
c	Consume iron rich food	1	2.5
d	Take medicine	23	57.5
e	c+d	0	0.0
f	Any other	8	20.0
g	Donot know	1	2.5
h	Nothing	5	12.5

6		AWARNESS REGARGING IRON TABLETS (LNG)		
	a	Yes	38	95.0
	b	No	2	5.0
7		IS LNG BENEFICIAL ?		
	a	Yes	36	90.0
	b	No	1	2.5
	c	D.K.	3	7.5
8		BENIFICIAL AFFECTS OF IRON TABLETS		
	a	Increased blood	9	22.5
	b	Gives strength / decreases weakness	19	47.5
	c	Makes mother and child healthy	15	37.5
	d	Easy delivery	1	2.5
	e	1+2+3	0	0.0
	f	Any other	8	20.0
	g	Donot know	8	20.0
9		IS LNG HARMFUL ?		
	a	Yes	2	5.0
	b	No	38	95.0
10		HARFUL EFFECTS OF IRON TABLETS		
	a	Tablets are "hot"	2	5.0
	b	Tablets are heavy to digest	0	0.0
	c	Any other	0	0.0
	d	Donot know	38	95.0
11		ADVICE TO PREGNANT WOMEN FOR LNG/TABLETS		
	a	Should be taken regulary	37	92.5
	b	Shouldnot be taken	0	0.0
	c	Take when the symptoms occur	0	0.0
	d	Any other	1	2.5
	e	Donot Know	2	5.0
12		PERSUATION FOR TABLET CONSUMPTION		
	a	Yes	25	62.5
	b	No	15	37.5

13	MOTHER-IN-LAW'S ATTITUDE TOWARDS TABLET CONSUMPTION		
a	Benificial (positive)	25	62.5
b	Not benificial (negative)	1	2.5
c	Neutral	14	35.0

them to consume both iron rich foods and medicines. A Third of the women advised their daughters-in-law to eat greater quantities of food, and eat 'good food' like, badam, fruit and milk. Thirteen percent of the women said that they would not advise their daughters-in-law.

Most of the women (95%) were aware that iron tablets were available in their community. A majority of them (90%) also felt that they were beneficial, 3% of the women thought that they were not beneficial whereas 8% did not know whether they were beneficial or not.

Most of the women could state various beneficial effects of iron tablets. A fourth of them knew that the iron tablets increased blood, about a half of them stated that the tablets gave strength and decreased weakness, third of them thought it made mothers and child healthy, whereas 3% thought that they facilitated easy delivery. As many as 20% of the women, however, did not know the beneficial effects of iron tablets.

A majority of the women (90%) did not consider iron tablets harmful. However, some of them considered iron tablets to be 'hot'.

Most of the women said that they would advise their daughters-in-law to take the tablets regularly. However, of these 63% said that they would persuade their daughters-in-law to take tablets. The attitude of 63% of the women was positive, 3% had a negative attitude whereas 35% of the women had a neutral attitude towards tablet consumption.

Knowledge Of The AWW

The AWWs of the centres selected for anaemia specific education were interviewed for their knowledge regarding anaemia and are discussed in Table 4.08.

All of the AWWs interviewed had at least cleared secondary school certificate exams (SSC), and 12.5% had higher secondary education and 12.5% were graduates. All of them had attended the AW training and had 12 to 15 years of experience as AWWs.

As many as half of the AWWs attributed inadequate diet and more than third (38%) diet deficient in iron as causes of anaemia. A one fourth of the women stated many deliveries as causative factor, whereas a half of them gave other reasons like too much of hard physical labour, serious illness, tension, improper (monotonous) diet, diet deficient in food constituents or vomiting during pregnancy for causing anaemia.

When questioned regarding recognition of anaemia, more than a third (38%) of the AWWs stated decreased work capacity, 63% stated tiredness whereas all of them recognized pallor as symptom of anaemia. Oedema was also stated by 38% of the women, whereas 13% stated breathlessness. A majority of them (75%) also stated other symptoms like thin body, big stomach and thin limbs, dark body, body aches, weakness, frequent illness, dizziness, brown hair and white eye-lashes as other symptoms indicating anaemia.

TABLE 4.08 : KNOWLEDGE OF AWW

SR NO	RESPONSE	N	%
1	EDUCATION		
a	SSC	6	75.0
b	HSC	1	12.5
c	Graduate	1	12.5
2	EXPERIENCE		
a	< 10 Years	0	0.0
b	10-15 Years	8	100.0
3	CAUSES OF LNK		
a	Inadequate diet	4	50.0
b	Diet deficient in iron	3	37.5
c	Worm infections	0	0.0
d	Frequent blood loss	2	25.0
e	Too many Delivery	2	25.0
f	Any Other	4	50.0
4	RECOGNITION		
a	Decreased work capacity	3	37.5
c	Pale eyes/lips/nails (paleness)	5	62.5
d	Anorexia	8	100.0
e	Breathlessness	1	12.5
f	Irritability	0	0.0
g	Oedema	3	37.5
h	Koloichia	0	0.0
i	Lack of concentration	0	0.0
j	Any other	6	75.0
5	ADVICE FOR PREGNANT WOMEN WITH LNK		
a	Eat more food	1	12.5
b	Consume GLV	8	100.0
c	Consume iron rich food	1	12.5
d	Take iron folate tablets/syrup	8	100.0
e	c+d OR b+d	0	0.0
f	Refer to Doctor	3	37.5
g	Any Other	8	100.0

6		SHOULD LNK BE SERIOUSLY TREATED PROMPTLY		
	a	Yes	8	100.0
	b	No	0	0.0
7		IF PREGNANT WOMEN DOESN'T TAKE LNG		
	a	Nothing	0	0.0
	b	Inadequate weight gain	4	50.0
	c	Difficult delivery	3	377.5
	d	Small baby (LBW)	3	37.5
	e	Premature	1	12.5
	f	Increased Maternal Perinatal Morbidity	0	0.0
	g	Any other	8	100.0
8		WHAT DO YOU DO IF THE PREGNANT WOMEN DOESN'T TAKE IRON TABLES		
	a	Nothing	0	0.0
	b	Withhold services perceived benefits	1	12.5
	c	Persuade her	4	50.0
	d	Explain her reasons to take tablets	8	100.0
	e	Refer to Doctors	2	25.0
	f	Any Other	3	37.5
9		BENEFICIAL EFFECTS OF IRON TABLETS		
	a	Increased haemoglobin	3	37.5
	b	Decreased tiredness,breathlessness etc.	5	62.5
	c	Gives strength, decreases weakness	5	62.5
	d	Any other	6	75.0
	e	Doesn't know	0	0.0

10	DID YOU TAKE LNG WHEN PREGNANT		
a	Yes	5	62.5
b	No	3	37.5
11	IF "NO" WHY?		
a	Didn't know about the Tablets	3	37.5
b	Tablets Not Felt Necessary	1	12.5
12	ATTITUDE TO TABLET CONSUMPTION		
a	Beneficial (Positive)	8	100.0
b	Not Beneficial (Negative)	0	0.0
c	Neutral	0	0.0

When asked regarding the advice that they usually give to the pregnant women, all the AWWs said that they advised them to consume GLVs as well as take iron folic acid tablets or syrup. More than a third of the AWWs also advised the women to refer to a doctor for ANC, whereas 13% also advised them to eat greater quantities of food and consume iron rich foods. All the AWWs also advised the women to drink milk, eat vegetables, pulses, eggs, meat, carrots, tomatoes, sprouted pulses and seasonal fruits if possible. All of the AWWs believed that anaemia should be taken seriously and treated promptly.

When questioned regarding the consequences of avoiding iron tablets, as many as half of the women stated inadequate weight gain, a third (38%) difficult delivery, small (LBW) baby and 13% opined that it would cause an increase in maternal and perinatal morbidities. All of them stated other consequences like dizziness, body aches, weakness, tiredness, breathlessness, decreased work capacity, anaemia (literally, blood becomes water), post partum haemorrhage and need for a caesarian delivery if iron tablets are avoided during pregnancy.

All of the AWWs said that if the pregnant women in their community did not take iron tablets, they explained them the reasons to take tablets which included : easy delivery, decreased nausea, leucorrhea, dizziness, weakness and aches, iron tablets were required to remain healthy during pregnancy and to give birth to a healthy baby. Half of the AWWs also

said that they persuaded them to consume the iron tablets, a fourth of them said that they advised them to go for a medical checkup by a doctor, a third of them said that they encouraged such women to eat a lot of GLVs and milk daily, where as 13% of them said that they threatened to withhold services perceived beneficial by the women (like supplementary food).

As many as third of the AWWs perceived increase in Hb (increase in 'Lohtatva' in blood) as a benefit of consuming iron tablets, 63% perceived decrease in symptoms like tiredness and breathlessness, and increased strength as beneficial effects of consuming iron tablets. A majority of them (75%) stated other benefits like increased birth weight of the new born; decreased body ache, dizziness and listlessness and increased appetite.

A majority of the women (63%) reported consuming iron tablets or the tablets prescribed by the physician during their pregnancies. However, a third of the AWWs who did not consume them said that they were not aware regarding the iron tablets at that time. One of the women also did not feel the tablets necessary for herself since she was healthy. All the AWWs had a positive attitude regarding the consumption of iron tablets.

The results of the present study indicate inadequate knowledge of the pregnant women, their mothers-in-law and AWWs regarding anaemia, its causes, consequences and prevention.

Poor awareness regarding anaemia, its causes, consequences and prevention among women in the community are

also reported by Seshadri (1987), Sharma (1986) and NRTC (1990). Although the women did not perceive iron tablets as a cure for anaemia Seshadri (1987) reported that half of the women thought they gave "Shakti" (energy) to the body.

Studies in India by S eshadri (1987) and NRTC (1990) reported that a majority of the AWWs could state pallor as a symptom of anaemia and the benefical effects of the iron supplements were viewed as a preventive for a anaemia. The awareness regarding causes, symptoms, prevention and treatment was low. The AWWs however, had greater knowledge regarding all the aspects as compared to the community women. Similar low knowledge of AWWs regarding anaemia was also reported by Sharma (1986) in the NNAPP evaluation in Rajasthan, NIN (1989) in the NNAPP evaluation in Andhra Pradesh and Walia (1978) in Punjab.

The results of these studies are similar to the results of the present study and support the qualitative data on the awareness of women regarding anaemia. It indicates a need to educate the functionaries regarding anaemia as well as regarding communication skills to counsel the women on the importance of consuming iron tablets.

SECTION II RECEIPT AND CONSUMPTION OF IRON TABLETS BY THE WOMEN

A. Results of the Feasibility Trials of Linking the Distribution of Iron Tablets with Child Immunization

As already discussed in the first section of this chapter, the distribution of the tablets was linked with the child immunization system.

The subjects were enroled on or before 20 weeks of gestation, at a mean gestational age of 16.1 weeks and were followed uptil 32 weeks or till delivery. A few (n=11) subjects were enroled at 24 weeks of gestation. Since the subjects were enroled at different stages of gestation, they stayed in the study for different durations of 8 to 24 weeks, but a large majority of the subjects (138/149) stayed in the study for at least 12 weeks. Therefore, most of the data on receipt and consumption of iron tablets are analyzed on the basis of the number of months of the subjects' participation in the study.

In order to define coverage and compliance, a criterion had to be selected. Adequate compliance for iron tablets should be defined as appropriate number of tablets consumed for adequate length of time. According to De Maeyar (1989), ingestion of 250 tablets each containing 60 mg of iron should be considered to be adequate, if taken during pregnancy for the correction of anaemia in the population. However, the ICDS

system had a goal of providing at least 90 tablets to each of the beneficiary during pregnancy (ICMR 1989) at the time this study was conducted. It was recommended after the national evaluation of NNAPP (ICMR 1989) to increase the dose of iron to 100 mg of elemental iron and 0.5 mg of folic acid daily for pregnant women. However, the recommendation was not implemented immediately and the pregnant women were offered 90-100 iron tablets of 60 mg each during the study period. Since the alternative delivery system was tried out through the ICDS system, this recommendation was taken as the evaluation criteria. Therefore, ingestion of 90 tablets was defined as full compliance by the women in the present study.

Apart from the tablets received from the AWCs, the subjects also received iron tablets or prescriptions for them from government hospitals or private physicians. The AWCs and trust hospitals supplied iron tablets containing 60 mg of elemental iron, while the prescribed syrups or tablets had varying iron contents. In order to calculate the total amount of iron intake by the subjects throughout pregnancy, the later dose was calculated in terms of mg of elemental iron. This in turn was divided by 60 to convert it into the equivalent of 60 mg tablets used by the AWCs and was used for the comparison in the study.

Receipt of Iron Tablets from AWCs and Other Sources : The data on receipt and consumption of iron in term of 60 mg tablets are given in Table 4.09. A perusal of data indicated that the mean receipt of iron tablets varied between 55 and 81 tablets

Table 4.09 : Receipt And Compliance Of Iron Tablets From Various Sources For Different Durations Of Women's Stay In The Study - Mean ± SD.

	AWW/ANM			OTHER SOURCES			TOTAL		
Dur-ation	R	C	C as % R	R	C	C as % R	R	C	C as % R
8 W N=11	75 ±35.6	38 +19.9	51	20 ±16.6	14 ±5.8	68	96 ±35.4	52 ±22.5	54
12 W N=47	55 ±21.9	39 +14.8	70	47 ±21	40 ±12.0	85	103 ±28.3	79 ±21.7	77
16 W N=57	73 ±28.4	48 +15.9	65	53 ±19.7	45 ±12.6	85	126 ±31.6	93 ±20.6	74
20 W N=30	69 ±27.4	48 +12.0	69	47 ±16.9	37 ±7.9	79	116 ±31.5	83 ±15.6	72
24 W N = 4	81 ±22.5	34 ±12.4	41	76 ±18.1	65 ±16.0	86	157 ±30.1	99 ±17.7	63
MEAN TOTAL	67	44	65	48	40	83	115	84	73

1 Dose = 1 tablet of 60 mg of Iron

R = Receipt

C = Compliance

from the AW source by the women staying in the study for varying durations, the mean total being 67 tablets. The number of tablets received from the AWCs was not related to the length of the subject's stay in the study.

It is also evident that the total receipt from all the sources was satisfactory and the subjects staying in the study for a minimum period of 2 months received a sufficient dose of 96 tablets, the receipt of subjects staying for a longer duration being higher than the minimum level of adequate receipt of 90 tablets in all the instances.

Although the receipt of iron tablets from the AW source was much greater than the receipt from all other sources combined, it was by no means sufficient to bring the receipt from this source alone to the minimum recommended dose of 90 tablets, in spite of the changes in the existing delivery system. It, however, contributed about 60% of the total receipt of the tablets by the women.

The percentage of women receiving different levels of iron from all sources was analyzed, to evaluate the women receiving full, partial and negligible dose of iron throughout pregnancy.

As is evident from Table 4.10, 58% of the women received full dose (>=100% of expected receipt of 90 tablets) from all sources, of which 32% received full course from the ICDS alone. Eleven percent received full course of tablets from more than one source, but the primary one being the ICDS. So, the ICDS can be considered responsible for 43% of the women

Table 4.10 : Percentage Distribution Of Women According To Full And Partial Receipt And Consumption Of Iron From All Sources At Different Duration Of Women's Stay In the Study.

Duration	Negligible		Partial		Full	
	Receipt	Compliance	Receipt	Compliance	Receipt	Compliance
8 W N=11	0	36	36	45	64	18
12 W N=47	4	15	40	51	55	34
16 W N=57	5	9	25	35	70	56
20 W N=30	3	10	63	40	33	50
24 W N=4	0	0	0	25	100	75
MEAN TOTAL	4	13	38	42	58	46

* Negligible = 0 - 30 Tablets

* Partial = 31 - 89 Tablets

* Full = >= 90 Tablets

having adequate receipt of the tablets. Only 2% of the women never received any tablets. The minimum tablets received were 9 and the maximum was 350 from all sources.

Consumption of Iron Tablets From AWC and Other Sources : As is evident from the data in Table 4.09, the mean consumption of iron tablets ranged from 34 to 48 tablets from the AWC, the mean total being 43 tablets for the subjects' stay in the study or varying durations.

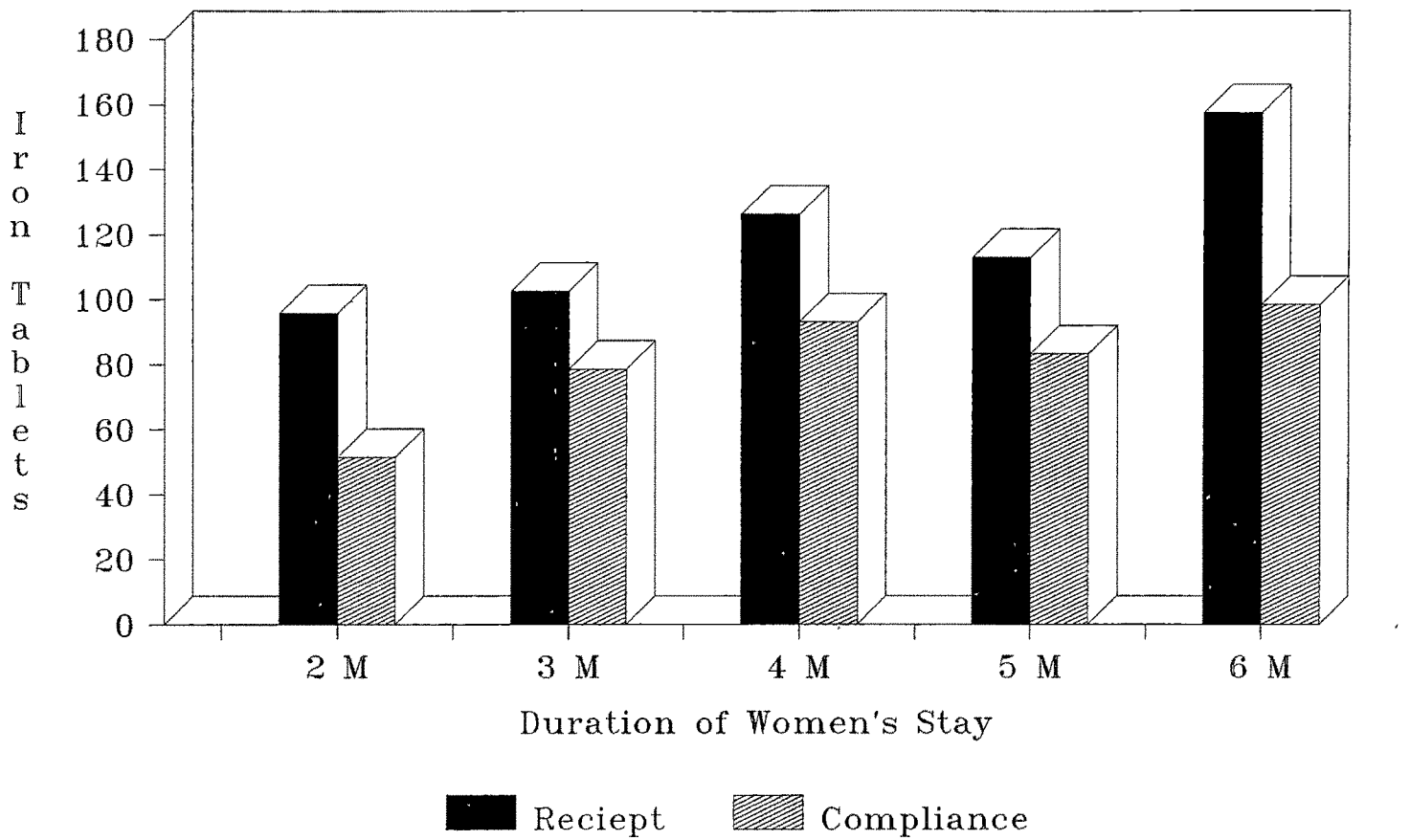
The consumption from other sources was lower, varying between 14 to 65 tablets, the mean total being 40 tablets. Although the subjects received adequate tablets (90) from all sources, if they stayed in the study for 2 months, a satisfactory compliance was obtained only if the subject remained under the study for at least 4 months (Table 4.09, Figure 4.01).

This indicates a need to offer the supplements to pregnant women as early in pregnancy as possible, instead of enrolling them only in the last trimester.

In spite of the fact that more tablets (67) were received from the AWW/ANM source, only 66% of these (44 tablets) were consumed (Table 4.09). However, it contributed to more than half of the total consumption. Compared to this the receipt of iron tablets from other sources was lower (48 tablets), but the compliance was much higher (40 tablets), being 83% of the receipt.

The data on percentage women receiving different dose levels of iron are presented in Table 4.10. On an average 46%

Fig. 4.01 Total Receipt And Complaince of Iron Tablets From All Sources



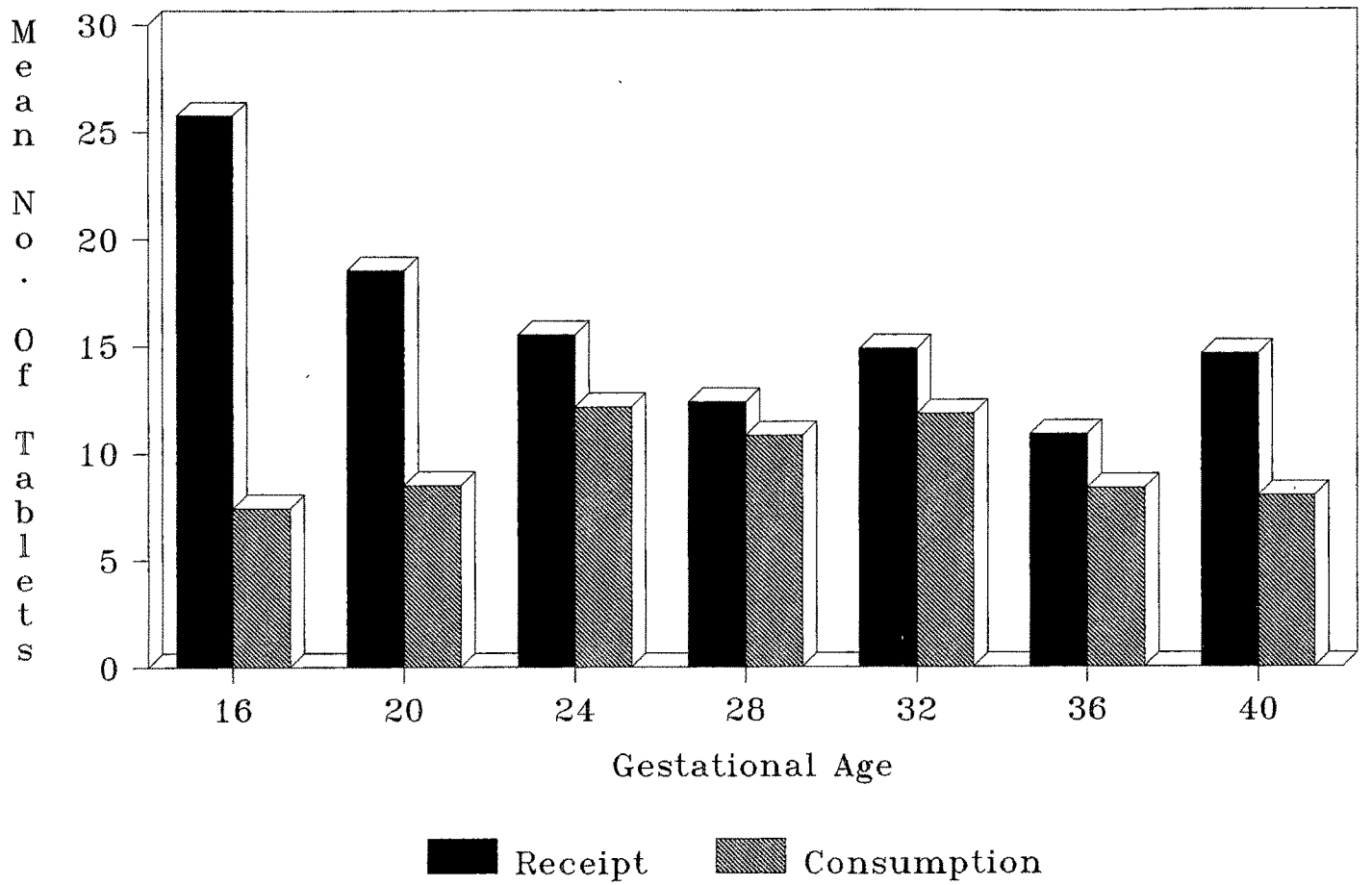
of the women consumed full dose of tablets from all the sources, of which 14% consumed the full dose from the AW source alone. Sixteen percent consumed the full dose from more than one source including the ICDS, so, the ICDS can be considered to be responsible for complete compliance by 30% of the subjects, since the contribution from the other sources was meagre (Table 4.10 and Figure 4.02). It is interesting to note that 17% women consumed <30 tablets i.e. less than a third of the expected dose of 90 iron tablets.

Receipt and Compliance For Iron Dose At Various Stages Of Gestation: As is evident from Table 4.11, the women received 4-12 tablets from the AWC before 20 weeks, ie. before enrolment in the study. The contribution of other sources was also low, being only 2-5 tablets before 20 weeks. This was much lower than the number of tablets received after enrolment in the study viz. 51-72 tablets from the AW source and 44-49 tablets from other sources, the receipt from AW source being higher than the other sources.

Women went for ANC only in the second trimester as discussed earlier, which explains the fact that practically more than 90% of the tablets received during the index pregnancy were received after 20 weeks of gestation from all the sources. These data indicated that enroling pregnant women prior to 20 weeks of gestation under the field conditions is currently difficult.

Figure 4.02 indicates the receipt and consumption of iron tablets from AWC at different stages of gestation. It is

Fig. 4.02 Receipt and Compliance of Iron Dose From AWW/ANM At Different Stages Of Gestation



1 Dose = 60 mg of iron

Table 4.11 : Receipt And Compliance of Iron Tablets from various Sources at Different Stages of Gestation.

Group		AWW		Government		Private Doctors	
		Receipt	Comp.	Receipt	Comp.	Receipt	Comp.
I n=66	< 20W	11.8	3.9	0.5	0.4	1.5	1.2
	20-32W	50.8	38.4	15.7	11.9	27.8	24.9
II n=54	<20W	11.7	2.3	0.8	0.64	4.0	3.1
	20-36W	57.7	43.5	32.4	25.8	16.7	15.7
III n=7	< 20W	4.3	4.3	0	0	0	0
	20-40W	72.3	45.6	26.3	20.3	18.8	14.3

* Group I = Women Staying in the Study Till 32 Week

* Group II = Women Staying in the Study Till 36 Week

* Group III = Women Staying in the Study Till 40 Week

evident that compared to the recommended dose of 30 tablets per month, the number of tablets received each month by women at different stages of gestation is about half from the AWW source, the consumption being less than the receipt. The proportionate consumption was higher between 24-32 weeks of gestation.

B. Role of Private Health Facilities in the Provision of Iron Tablets

It was evident during the FGDs that the women received iron tablets from the private practitioners apart from the ICDS source. Hence, similar data were collected to evaluate the receipt and consumption of iron tablets from private doctors.

Receipt of Tablets from Private Doctors : The data on receipt of iron tablets through private doctors are presented in Table 4.12. A perusal of data indicates that the mean receipt of iron tablets varies from a minimum of 15 and a maximum of 27 tablets by women staying in the study for different durations, the mean total being 24 tablets. This was only about a fourth of the expected receipt of 90 tablets.

The data in Table 4.13 are presented to see how many women receiving iron tablets from private doctors had adequate dose, ie full, partial or negligible amount of tablets (>=90, 31-90 and < 30 tablets).

A careful scrutiny of the data reveals that a very high proportion (74%) of the women received a third of iron dose or

Table 4.12 :Mean Receipt And Compliance For Iron Tablets* From Private Dr. At Different Durations Of Women's Stay In The Study.

Duration	Private Dr.			Total		
	R	C	C as % R	R	C	C as % R
8 W N=11	15.0 ±16.1	8.7 ±13.3	58	95.7 ±35.4	51.5 ±22.5	54
12 W N=47	24.4 ±17.9	23.6 ±17.1	97	102.5 ±28.3	78.7 ±21.7	77
16 W N=57	24.6 ±14.8	21.6 ±12.1	88	126.2 ±31.6	93.1 ±20.6	74
20 W N=30	27.3 ±13.3	21.4 ±10.0	78	115.9 ±31.5	83.2 ±15.6	72
24 W N=6	25.3 ±7.8	23.3 ±7.8	92	157.4 ±30.1	98.5 ±17.7	63
MEAN TOTAL	24.4	21.3	87	115.3	83.6	73

Values are Mean ± sd

* 1 tablet = 60 mg of Iron

R = Receipt

C = Compliance

lower, ie. < 30 tablets. Most of them were received by the women who stayed in the study for 3-5 months. Only 13 women out of 149 (9%) received adequate dose of iron tablets from the private doctors.

Consumption Of Iron Tablets From Private Doctors : The mean consumption of iron tablets by the women staying in the study for different duration ranged between 8-24 tablets, the mean being 21 tablets. This formed 10-26% of the expected receipt of the tablets. Though the mean number of tablets received and consumed was low, the compliance rate of 87% was fairly good.

The distribution of women consuming different levels of iron dose from private doctors (Table 4.13) reveals that receipt from only this source cannot be relied upon to fulfil the iron needs of pregnancy. As many as 76% of the women consumed less than a third of the expected dose of tablets from this source. Only 7% of the women consumed adequate dose of iron from this source alone. Similar trend is seen from Figure 4.03, indicating receipt and consumption of iron tablets at different stages of gestation. Thus, the results indicate that the contribution of the private sector to the control of anaemia was important but was not enough by itself.

C. Coverage and Compliance Under the Government or Trust Sources

Another important agency distributing iron tablets to pregnant women, apart from private doctors is the government and trust governed hospitals. To evaluate their role, similar

Table 4.13 : Percent Distribution of Women According to Full and Partial Receipt And Consumption of Iron From Private Doctors At Different Duration Of Women's Stay In the

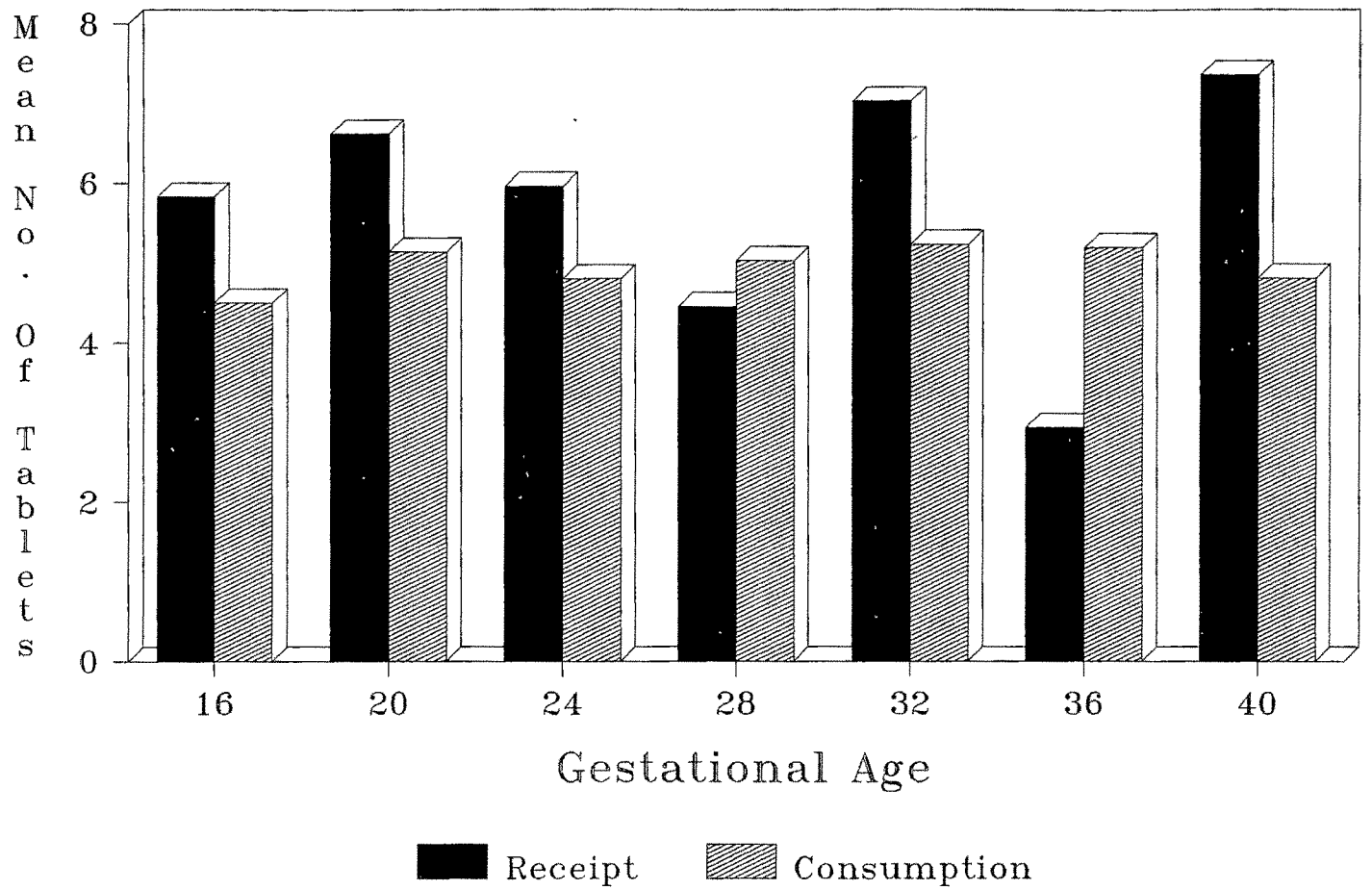
Dur-ation	Negligible		Partial		Full	
	Receipt	Compliance	Receipt	Compliance	Receipt	Compliance
8 W N=11	82	91	18	9	0	0
12 W N=47	79	77	11	13	11	11
16 W N=57	77	77	12	16	11	7
20 W N=30	57	67	40	30	3	3
24 W N=4	75	75	0	0	25	25
MEAN TOTAL	74	76	17	17	9	7

* Negligible = 0 - 30 Tablets

* Partial = 31 - 89 Tablets

* Full = >= 90 Tablets

Fig 4.03 Receipt And Compliance Of Iron Doses From Private Source At Different Stages of Gestation



1 Dose = 60 mg of iron

data were collected.

Receipt of Iron Tablets from Government Sources : The data on receipt of iron tablets from the government sources are presented in Table 4.14. These depict a trend similar to that observed in case of private doctors. The mean receipt of iron tablets from government/trust hospitals ranged from 6-50 tablets for women staying in the study for different durations, the total mean being 24 tables, same as that received from private doctors and as much as one-third of that received from the AW source (71).

The data in Table 4.15 depicts the number of subjects receiving different levels of iron (ie full, partial or negligible dose) from the government source.

A careful study of the data indicates that a majority of the women (77%) received less than a third of the recommended dose of iron. Only 8% of the subjects received the full dose of tablets (>= 90 tablets).

Compliance for Iron Tablets From Government Sources : It is important to note that, as in case of private doctors, most of the tablets received from the government source were consumed the percentage compliance being 79% of the receipt. The mean number of tablets consumed by the women staying in the study for different durations ranged from 5-42, the total mean being 19 tablets. The subjects staying in the study for 6 months received and consumed iron tablets from the government source to a greater extent.

The compliance for the iron tablets was lower than the

Table 4.14 : Mean Receipt And Compliance For Iron Tablets From Government Sources At Different Duration Of Women's Stay In The Study.

Duration	Government			Total		
	R	C	C as % R	R	C	C as % R
8 W N=11	5.5 ±5.9	5.2 ± 5.8	95	95.7 ±35.4	51.5 ±22.5	54
12 W N=47	22.9 ±14.8	16.4 ±12.0	72	102.5 ±28.3	78.7 ±21.7	77
16 W N=57	28.6 ±15.4	23.7 ±12.6	83	126.2 ±31.6	93.1 ±20.6	74
20 W N=30	19.9 ±11.9	14.2 ±7.9	71	115.9 ±31.5	83.2 ±15.6	72
24 W N=4	50.8 ±18.7	41.8 ±16.3	82	157.4 ±30.1	98.5 ±17.7	63
MEAN TOTAL	23.9	18.5	77	115.3	83.6	73

Values are Mean ± sd

R = Receipt

C = Compliance

Table 4.15 : Percent Distribution Of Women According To Full And Partial Receipt And Consumption Of Iron From Govt. Source At Different Duration Of Women's Stay In The Study.

Duration	Negligible		Partial		Full	
	Receipt	Compliance	Receipt	Compliance	Receipt	Complianc
8 W N=11	100	100	0	0	0	0
12 W N=47	79	81	11	13	11	6
16 W N=57	72	76	19	19	9	5
20 W N=30	77	80	20	20	3	0
24 W N=4	50	50	25	25	25	25
MEAN TOTAL	77	79	15	16	8	5

* Negligible = 0 - 30 Tablets
* Partial = 31 - 89 Tablets
* Full = >= 90 Tablets

receipt, ranging from 5-46% of the defined criterion of 90 tablets, for adequate compliance.

The consumption of iron tablets in terms of percent of the critarion is depicted in Table 4.15. The consumption of iron tablets from government source was also very inadequate, with as many as 79% of the subjects consuming less than a third (30 tablets) of the recommended dose of iron. Only 5% of the subjects consumed the full dose of tablets from this source.

A similar trend is seen from Figure 4.04, indicating the receipt and compliance with iron dose at various stages of gestation.

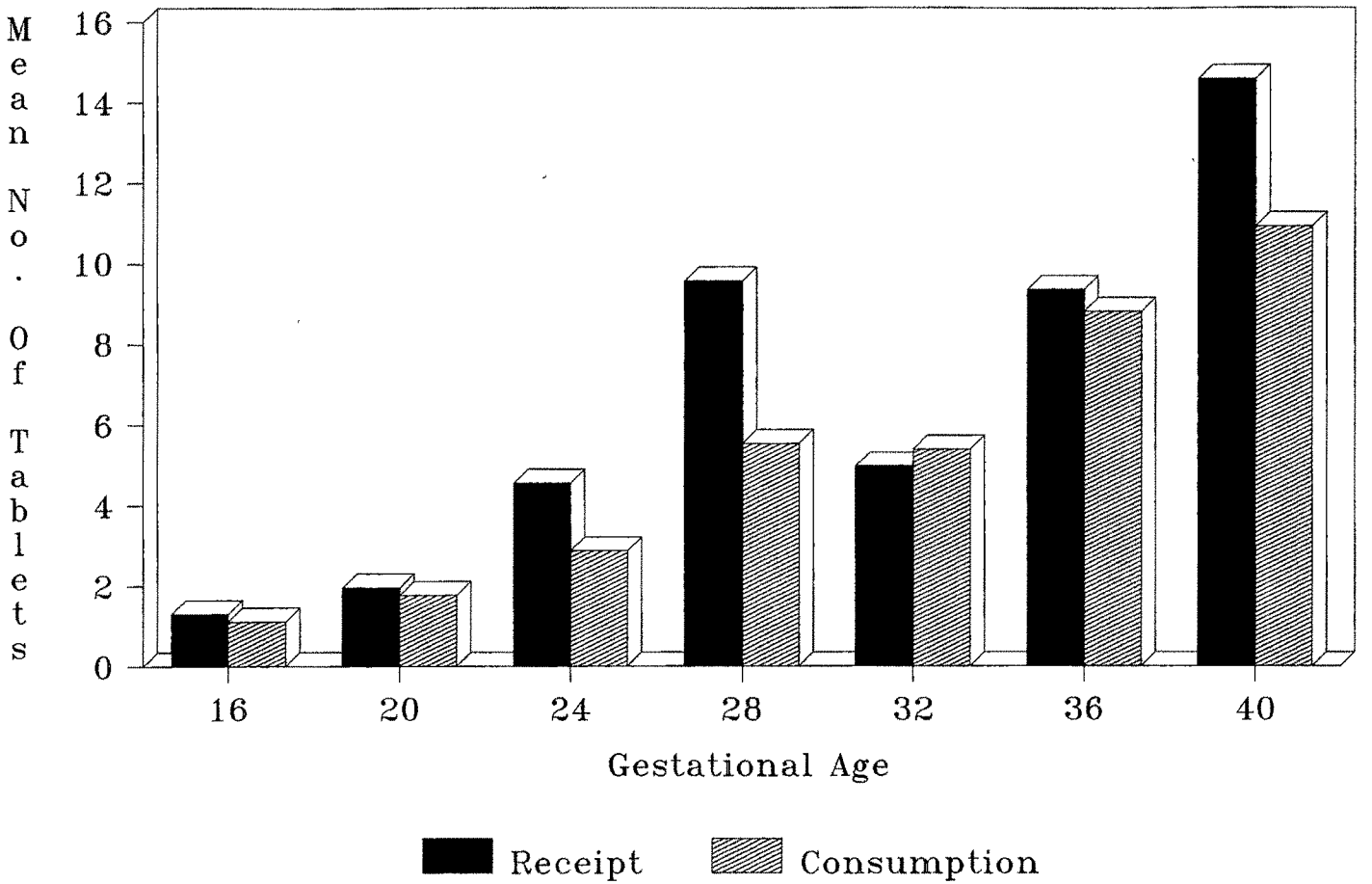
Thus, the results indicated that the government source, like the private sector, played an important role in the control of anaemia in pregnant women but could not be relied upon as the only source.

Summarizing the results on compliance, it is apparent that out of the 46% women who consumed 90 or more tablets, 14% received this number of tablets from ICDS, 7% from private and 5% from other government sources. For another 16%, the ICDS formed the main source of tablets.

Reasons for Non-Compliance for Iron Tablets

Since the full consumption of iron tablets was only 46%, women who avoided taking iron tablets for at least the previous one month were questioned regarding the reasons for the same (Table 4.16). The most frequently mentioned reasons

Fig 4.04 Receipt And Compliance Of Iron Doses From Govt. Sources At Different Stages Of Gestation



1 Dose = 60 mg of iron

Table 4.16: Reasons For Non-Compliance For Iron Preparation By The Subjects At Differnent Stages Of Pregnacy (%)

Reason	Gestational Age (Weeks)						
	<= 16 N= 58	16-20 N=117	20-24 N=119	24-28 N=127	28-32 N=140	32-36 N= 70	>=40 N= 9
1	2 (3)	0 (0)	0 (0)	1 (2)	1 (1)	0 (0)	0 (0)
2	2 (3)	7 (6)	7 (6)	17 (13)	6 (4)	4 (6)	2 (22)
3	13 (22)	16 (14)	14 (12)	10 (8)	13 (9)	7 (10)	0 (0)
4	1 (1)	0 (0)	2 (1)	2 (2)	3 (2)	0 (0)	0 (0)
5	4 (7)	0 (0)	5 (4)	2 (2)	3 (2)	2 (3)	1 (11)
6	4 (7)	19 (16)	8 (7)	5 (4)	6 (4)	3 (4)	0 (0)

1. Expensive
2. Side Effects
3. Feel Not Necessary
4. No Improvment
5. Irregular Supply
6. Any Other

Figures in paranthesis are percentages

were "Don't feel that iron tablets are necessary", "I have never taken tablets","Do not like taking tablets" or "Mother-In-Law does not allow". A few women also experienced side effects or felt that the free tablets distributed by ICDS were not suitable and the prescribed tablets were better but expensive. This number was however small (1-22%). Some of the women did not feel an improvement in health after consuming iron tablets. In a few cases, women did not get the routine dose of tablets because of lack of supply for a short time. Due to one or more of these reasons, 2 to 5% of the women had never consumed any iron tablets throughout the pregnancy and some did not complete the full course of tablets.

Role Of Side-Effects In Decreasing Compliance

Very few women stopped taking the tablets due to side effects. Side effects like nausea and vomitting were the most consistently mentioned side effects (Table 4.17 and Figure 4.05). Belching, heart burn, intestinal gas, drowsiness, dizziness, headache, constipation etc. were also mentioned by some of them. None of the women complained for loss of appetite, black stool, diarrhoea or abdominal pain as reasons to avoid or stop consuming iron tablets. Some of the women continued to take tablets in spite of experiencing side effects. This suggests that the side effects experienced due to the consumption of iron tablets is not the major reason for non-compliance of iron tablets among pregnant women. However, the women either did not feel the need to consume iron tablets

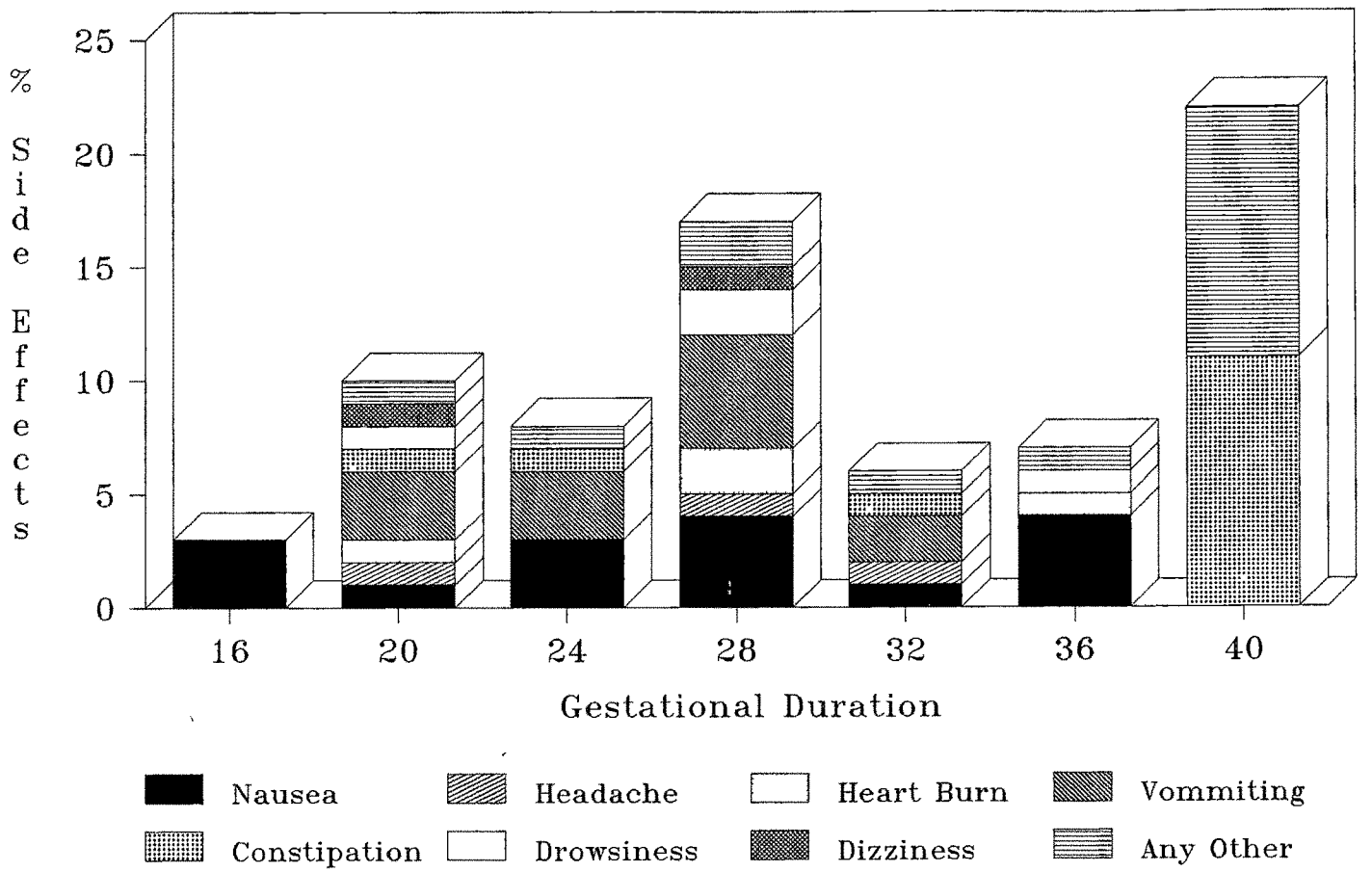
Table 4.17 : Various Side Effects Experienced By Women At Different Stages Of Pregnancy

Effect	Gestational Age (Weeks)						
	<= 16 N= 58	16-20 N=117	20-24 N=119	24-28 N=127	28-32 N=140	32-36 N= 70	>=40 N= 9
1	2 (3)	1 (1)	3 (3)	5 (4)	2 (1)	3 (4)	0 (0)
2	0 (0)	1 (1)	0 (0)	1 (1)	1 (1)	1 (1)	0 (0)
3	0 (0)	1 (1)	0 (0)	2 (2)	0 (0)	1 (1)	0 (0)
4	0 (0)	3 (3)	3 (3)	6 (5)	3 (2)	0 (0)	0 (0)
5	0 (0)	1 (1)	1 (1)	0 (0)	1 (1)	0 (0)	1 (11)
6	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)	0 (0)	0 (0)
7	0 (0)	1 (1)	0 (0)	2 (2)	0 (0)	1 (1)	0 (0)
8	0 (0)	1 (1)	0 (0)	1 (1)	0 (0)	0 (0)	0 (0)
9	0 (0)	1 (1)	0 (0)	1 (1)	1 (1)	0 (0)	0 (0)
10	0 (0)	1 (1)	1 (1)	3 (2)	1 (1)	1 (1)	1 (1)

* Fig in parenthesis are percentages

1. Nausea
2. Belching
3. Heart Burn
6. Intestinal Gas
7. Drowsiness
8. Dizziness

Fig. 4.05 Various Side Effects Experienced By Women
At Different Stages Of Gestation



All Side Effects Are In Percentage

regularly as was also brought out by the FGDs with the women. Hence, it is more important to create a "need" among pregnant women to take iron tablets by convincing them regarding the benefits of taking these tablets regularly. However, changing the behaviour of the people by providing them knowledge or education is the most difficult task. The women may know the benefits of consuming the iron tablets but still avoid consuming them due to their strong beliefs.

Beneficial Effect Reported By the Women

Various beneficial effects were mentioned by the women who consumed iron tablets each month. Some of the women did not experience any beneficial effects, while many had more than one beneficial effects each month (Table 4.18). The most frequently and consistently mentioned effects were general good feeling, improved appetite, decreased dizziness, feeling energetic and less tired and decreased pain in limbs. Less frequently mentioned benefits were decreased breathlessness, decreased backache, improved work capacity and others like decreased headaches, decreased feeling of tingling and numbness in the limbs, decreased sleeplessness, decreased listlessness and so on. These beneficial effects experienced by the women can be emphasized while convincing them to improve their compliance.

More than 50% of the coverage for the distribution of the iron tablets was achieved from the AW setup. Neither the government nor the private sector achieved adequate coverage

Tables 4.18 : Beneficial Effect Of Iron Supplements As Perceived by Women At Different Stages Of Pregnancy

Effect	Gestational Age (Week)						
	<= 16 N= 58	16-20 N= 117	20-24 N= 119	24-28 N= 127	28-32 N= 140	32-36 N= 70	>= 40 N= 9
1	15 (26)	32 (27)	44 (37)	59 (46)	79 (56)	33 (47)	4 (44)
2	5 (9)	22 (18)	19 (16)	31 (24)	33 (24)	22 (31)	2 (22)
3	8 (14)	14 (11)	19 (16)	30 (24)	29 (21)	18 (26)	1 (11)
4	8 (14)	18 (15)	31 (26)	27 (21)	26 (19)	15 (21)	2 (22)
5	0 (0)	3 (3)	3 (2)	3 (2)	8 (6)	1 (1)	0 (0)
6	1 (2)	2 (2)	4 (3)	2 (1)	6 (4)	4 (6)	1 (11)
7	3 (5)	6 (5)	9 (8)	8 (6)	11 (9)	8 (11)	1 (11)
8	0 (0)	3 (3)	5 (4)	6 (5)	9 (6)	4 (6)	0 (0)
9	10 (17)	11 (9)	17 (14)	13 (10)	20 (14)	4 (6)	0 (0)
10	7 (12)	11 (9)	6 (5)	10 (8)	6 (4)	3 (4)	0 (0)

1. General Good Feeling
2. Feeling Energetic
3. Feeling Less Tired
4. Improved Appetite
5. Decreased Breathlessness
6. Descresed backache
7. Decreased Leg Pain
8. Improved Work Capacity
9. Decreased Dizziness
10. Any Other

* Figures In Paranthesis are Percentages

for distributing the iron tablets, although the rate of consumption was higher from the latter sources.

A careful perusal of the results of the data provide important insights into the coverage and compliance for iron tablets by pregnant women.

Linking the distribution with immunization has provided encouraging results especially in terms of receipt of iron tablets, since the AW source alone was responsible for the receipt of more than two thirds of the total receipt and consumption of the tablets from all sources. In spite of this the total mean receipt of iron tablets and mean consumption indicated sufficient iron intake by only 46% of the women, according to the target by the NNAPP. The fact that only 10% of the subjects received less than 50% of the recommended dose and that the proportion of the subjects who never received any tablets throughout pregnancy was even lower (2%) are positive features of the proposed distribution system. A majority of the subjects ie. 58% had been offered full course of tablets from all sources.

Some women sought health care from either doctors in private practice or in government hospitals and as part of this they received iron tablets. The private physicians prescribed a small dose that is equivalent to 15-30 tablets as either proprietary preparation or as syrup with instruction to return for the next follow-up visit. However, as the pregnant women in the present study approached private doctors for only specific ailments, they as a routine did not go back for the

follow-up visit resulting in the rather inadequate course of iron received from this source. When the consumption of iron tablets was compared to the actual receipt, high percentage of compliance with tablet consumption when received from this source was observed. This was due to the fact that the prescribed tablets were well packed in attractive packs but they were also expensive. The women and their family members did not like to throw away or waste the tablets bought by hard earned money. The loose tablets freely distributed by the AWW, which frequently deteriorated on storage did not receive the same attention and utility. This fact was brought out in the FGDs. The fact that the private sector may be effective because it has more credibility in countries where public health-care system is inefficient and that paying some nominal fee for treatment may actually increase compliance by giving the treatment economic value to the patient (Galloway and Mc Guire 1994) also holds true for the present study.

The compliance of 46% for iron tablets by the subjects in the present study, though not satisfactory, is far better than that reported from the existing system. The evaluation of the existing NNAPP, only 2 years prior to the beginning of the present study indicated a coverage of only 19%. Twenty six percent of pregnant women who received the supplements discontinued the consumption of tablets before completion of the recommended course (ICMR 1989). Similarly, NIN (1989) reported inadequate coverage of only 1.6% in Bihar and 16% in Utter Pradesh, whereas in Andhra Pradesh a majority (64%) of

women received less than 30 tablets throughout pregnancy, which is much lower than the results of the present study.

Sharma (1996) reported the receipt of full course of 90 tablets from all sources by 37% and consumption of full course of by 34% of the pregnant women in Baroda in the existing system, which is lower than the figure of 43% receipt from ICDS alone and 58% from all sources and similar to the compliance of 30% from the ICDS source alone and lower than the 46% compliance of full dose of tablets from all the sources in the present study indicating improved coverage and compliance by the alternative system of tablet distribution.

The results of the present study are in agreement with those reported by Edward Raj (1994) among pregnant women in Baroda, when compliance was estimated in terms of iron tablets received in the group supplemented with 60 mg iron per day through home delivery, packed in autoseal plastic bags. It must be pointed out here that the full course of tablets would be easier to complete if they are supplemented with more than one tablet of 60 mg iron as is evident from the results of that study in which women were supplemented with one, two and three tablets of 60 mg per day. In order to make the number of tablets equal in the three groups, the 60 mg group was given additional two tablets of folic acid per day. The intake of total number of tablets was high, 97% consuming more than 90 tablets in that group. However, the number of iron tablets consumed in that group were similar to the present study. Hence, the dose level of iron should be increased to double

the present dose in order to achieve higher compliance as is pointed out by Edward Raj (1994).

In a collaborative study by Charoenlarp et al in Burma and Thailand, a dropout rate of 10-35% was reported in spite of supervised supplementation. The rate of compliance was 65-90% in different places.

Sood et al (1975) reported 70% compliance in Indian pregnant women, when the supplements were administered personally by a health nurse. Compliance of 42% by women in the present study is encouraging compared to this.

Though the higher proportion of consumption of tablets from private doctors may tempt us to consider entrusting the responsibility of distributing the iron tablets to private doctors, the qualitative data, personal observations and data in Table 4.12 reveal that this may not be feasible, since the coverage by the private doctors was low. Also, no data are available to indicate that, given the full course of tablets, compliance would remain higher. However, private sources could be integrated with the existing system or used as a support system to promote the consumption of iron tablets already provided by the ICDS and explain them the benefits of these freely distributed tablets. Support and counselling from the doctors who are trusted by the women may help in increasing the compliance for iron tablets received by pregnant women from the ICDS.

It is imperative, therefore, that more efforts should be directed towards improving the distribution of the tablets

through the ICDS centres. This can be achieved by better training of the AWWs, especially in the interpersonal counselling and periodic follow-ups.

SECTION III ANALYSIS OF FACTORS AFFECTING COMPLIANCE

Qualitative Data

In view of the fact that several factors affecting compliance were evident during routine data collection, they were also qualitatively obtained through informal conversation with the women during regular field visits. These conversation provided valuable insights regarding factors affecting compliance and complemented the quantitative data obtained earlier. Six categories of factors which influenced the women's willingness for consuming iron tablets were evident.

(A) Factors related to the individual characteristics of the subjects, such as their perception regarding impact of supplements and beliefs of subjects regarding medicines and religious beliefs.

(B) Factors related to anaemia/belief regarding anaemia and its severity vs other diseases.

(C) Attitude and support of "more experienced" women who had undergone several pregnancies, ie the mother-in-law and peer group women.

(D) Logistical factors like supply, spoilage and loss of tablets.

(E) Factors related to the field-level government functionaries, counselling and follow-up visits done by her.

(F) Factors related to the Doctors, like regularity of AN

clinics, faith in doctors by women, doctor's follow-up, enquiry about side effects, concern shown by doctors. These factors are discussed below, as indicated in Table 4.19 and Figure 4.06

(A) Factors Related to The Individual Characteristics of the Subjects

(A.1) Perceptions Regarding Impact of Supplementation : The women did not perceive the need to consume iron tablets. Lack of knowledge regarding the beneficial effects of the supplement was one of the reasons for non compliance for iron tablets. The most frequent response was :
"what is the need to take tablets?" or "the tablets are good, but there is nothing wrong with my health - I don't need to take them".

(A.2) Subject's Belief System : Many women in the present study believed that allopathic medicines were "hot". This was mainly reported by women who were perviously advised by physicians to drink a lot of milk with medicines, for example, while receiving treatment for illness like malaria and typhoid. Women believed that milk was advised by the doctors to counter the "hot" effect of the tablets.

Some women were given tablets of various colours, size and shape : iron (red), calcium (white), multi Vitamin (orange) and Vitamin B complex (yellow) from the government hospitals free of cost. These women expressed the belief that a combination of more than one type of tablets together might

Table 4.19 : Influence of Various Factors Influencing Complinace of Iron Tablets By The Women

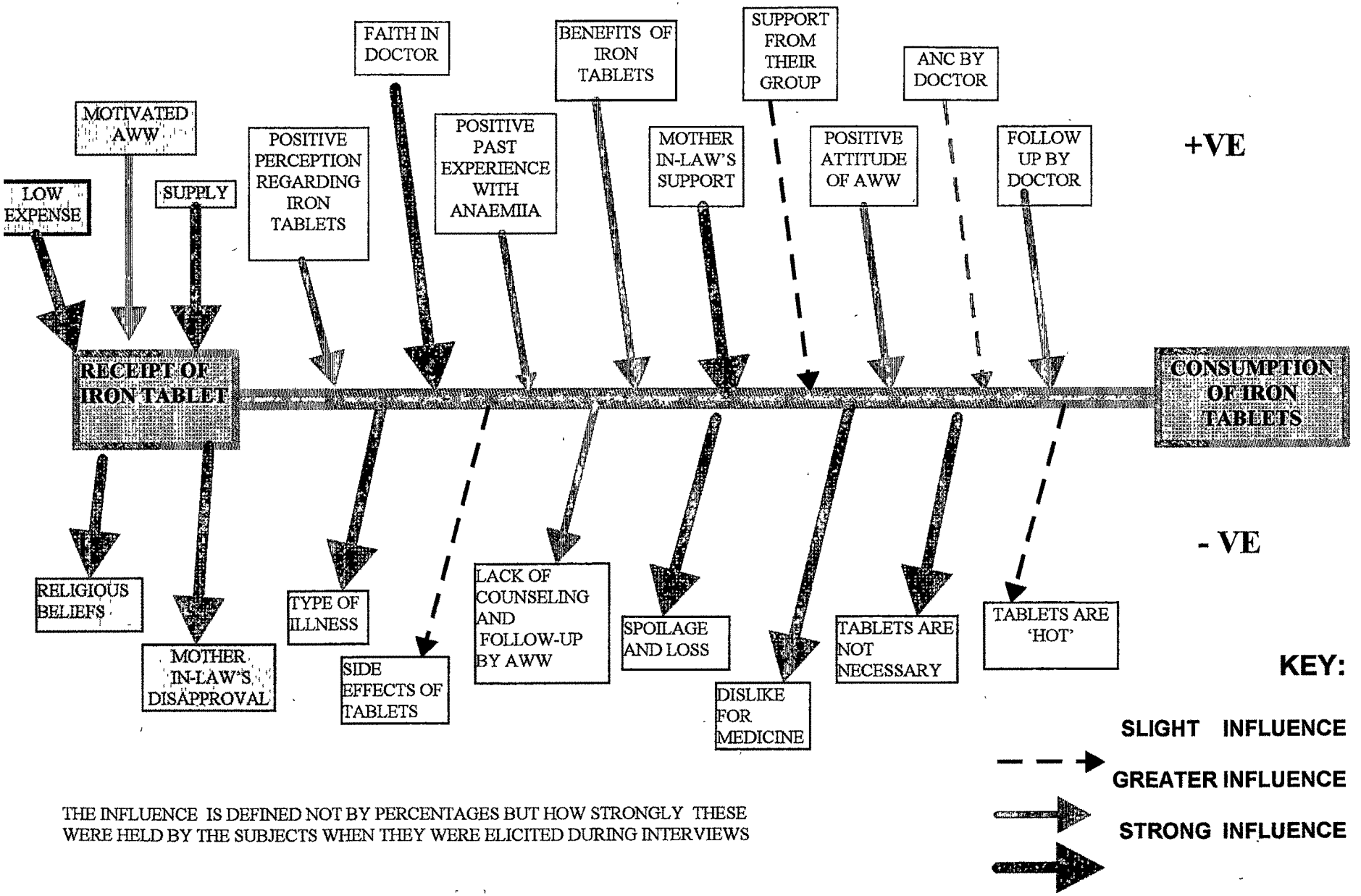
SrNo	Factors	Influence
1.	Supply	+++
2.	Low Cost	+++
3.	Religious Beliefs	+++
4.	Mother-in-Law's Approval	+++
5.	Faith In Doctors	+++
6.	Type of Illness	+++
7.	Spoilage and Loss	+++
8.	Dislike for Tablets	+++
9.	Tablets not considered necessary	+++
10.	Positive Perception Regarding Impact of Iron Tablets	++
11.	Past Experience With Anaemia	++
12.	Benefits Of Fe Tablets	++
13.	Positive Attitude Of AWW	++
14.	Follow-up by Doctors	++
15.	Humoral Beliefs	+
16.	Lack of Counselling and Follow-up by AWW	++
17.	Influence of Peer Group	+
18.	S.E. of Tablets	+
19.	ANC by Doctors	+

\+ : Slight Influence

++ : Greater Influence

+++ : Strong Influence

FIG 4.06 PATHWAY ANALYSIS ON FACTORS AFFECTING COMPLIANCE



THE INFLUENCE IS DEFINED NOT BY PERCENTAGES BUT HOW STRONGLY THESE WERE HELD BY THE SUBJECTS WHEN THEY WERE ELICITED DURING INTERVIEWS

cause "hot" effect causing miscarriage or other complications, although individually these "shakti" preparations were considered to be harmless. Hence, none or part of the tablets were consumed.

A few women avoided iron tablets due to religious beliefs. These women had conceived after many years of marriage and believed that their pregnancy was due to a religious "badha" or vow and their prayer. They perceived that taking tablets of any kind or any medical intervention for example, blood, urine or physical examination might harm their child, since they said that "It would be an insult to the goddess (divine mother)" with whose blessings they had conceived. A few stated "Mother (divine mother/ goddess) will take care of my health". These women also opted for home delivery.

(B) Factors Related to Anaemia/Beliefs Regarding Anaemia and its Severity Vs Other Diseases

(B.1) Types of Illness and its Effects : It was observed that women took health care and medicines when the disease was severe, ie the symptoms hampered their routine tasks or they were aware of the negative consequence of the illness.

Pregnancy was considered to be a natural event and women were culturally expected to bear the minor discomforts of pregnancy. Tiredness, breathlessness and decreased ability to work were viewed by pregnant women to be due to the pregnancy per se, since

"All pregnant women experienced these during pregnancy".

They were told by the experienced women that "These symptoms would disappear after delivery".

Thus, anaemia was not perceived to be "severe" illness or health disorder requiring any intervention.

(B.2) Past Experience with Anaemia/Belief of Iron Supplements: The women who had already experienced severe anaemia during their previous pregnancies and had benefited from iron tablets accepted the tablets more readily as compared to the women who did not have such earlier experience.

However, some of the women who experienced the benefits of consuming iron tablets stopped consuming them as soon as improvement in their health was evident and symptoms of anaemia had disappeared. The reason stated by these women was "Now there is nothing wrong with my health, so why should I continue consuming the full course of iron tablets?". Thus, it is important to counsel these women to continue iron tablets, otherwise the symptoms may return.

In a few women, side effects determined whether or not they could continue the consumption of tablets. In the present study, there were a few women who experienced side effects and yet continued consuming the iron tablets if their feeling of well being out weighed the discomforts due to side effects, whereas a few who experienced side-effects discontinued the tablets believing that these tablets did not suit their body.

(C) Attitude and Support of "More Experienced" Women

The mother-in-law's attitude towards iron tablets was observed to be a very important factor affecting compliance.

Women were receptive to the advice of their mother-in-law; especially during the first pregnancy. Their acceptance of iron tablets depended on the mother-in-law's positive attitude towards the daughter-in-law, and her problems and financial considerations.

In some cases, where physicians had prescribed iron preparations, a few women did not purchase all medicines prescribed by the doctor and also did not complete the course of medicines due to the mother-in-law's suggestion that the tablets were too expensive to be affordable.

Pregnant women were observed to be influenced by the advice from experienced peer group women regarding health care. Positive experiences described by the peer group women encouraged the pregnant women to accept iron tablets, while their negative attitudes discouraged them.

(D) Logistics

Lack of supply of iron folic acid tablets for 4-5 weeks was observed in three centres at different times during the study period due to which a few women beneficiaries did not receive iron tablets at that time.

Spoilage and loss was also a factor causing poor compliance. As the tablets were handed out loose or wrapped in paper, they were stored as such or in open cups by a few women. These tablets were hygroscopic and became discoloured, specially in humid climate and were not consumed.

Loss of tablets was also observed due to spilling or misplacing these loose tablets. Some of the women avoided

going to the AWC for replacement of such tablets due to a fear of being scolded by AWWs. One of the women said

"Ben will say that it would be difficult for her to meet the demands for all women if all of them wasted the tablets. Also, now I'am all right, so I did not ask for more tablets".

Thus, spoilage and loss resulted in poor compliance. Packaging the tablets appropriately might improve compliance among women who are otherwise willing to consume the tablets.

(E) Factors Related to the field Level Functionaries (AWWs)

(E.1) Inadequate Knowledge of AWW : A lack of adequate knowledge regarding anaemia and importance of iron tablets were key constraints in persuading the women to consume iron tablets. The AWWs who had inadequate knowledge regarding anaemia and importance of iron tablets were observed to enrol less number of pregnant women from the community and showed a poor coverage of pregnant women with respect to provision of iron supplements. Further more, the AWWs who were themselves not convinced of the need to take iron tablets were irregular in distributing them, whereas those with a more positive attitude on the other hand achieved a better coverage in the community.

(E.2) Lack of Proper Counselling : Absence of counselling and poor counselling skills perhaps also contributed to partial compliance by the women.

The AWWs were observed to compromise on counselling due to "overburden of work". The only counselling observed was necessity for regular consumption of iron tablets. The nature

of advice given by the AWWs discouraged the women to consume the supplements. It was mentioned by the AWWs to the women that consumption of iron tablets would result in healthy babies. Some of the women perceived this as causing difficult deliveries, which might also require cesarian sections, about which they were apprehensive. Some of the women said,
"If the child is small, we get quicker relief during delivery, otherwise sometimes operations are necessary".

Another type of advice given by the AWWs which was not convincing to the women was that non-compliance of iron tablets might lead to miscarriage, still born or weak child. The women observed that this was uncommon in their community. Some of the women stated
"So many women are delivering babies every year, and most do not take tablets. Do all of them experience miscarriage or have weak babies or dead child?" and
"In older days, there were no medicines and each woman had so many children .... nothing happened to them or their children".

Appropriate counselling with real life examples and convincing explanations related to the present discomforts experienced might encourage the women to consume the tablets.
(E.3) Irregular Follow-ups : According to the AWWs, they were too busy with their routine tasks to enquire whether given tablets were consumed and if not, why. It was evident during data collection that even questioning the women as to how many tablets were consumed and why some were not, made the women

think and gave them an opportunity to discuss their problems regarding non-consumption. This also encouraged the women who "forgot" to feel responsible and remember to consume them regularly. However, regular follow-ups and intense counselling and support were necessary to motivate the women to continue tablet consumption till delivery. Such follow-ups were not done by the AWWs or the ANM.

(F) Factors Related to the Doctor

(F.1) ANC Given by the Doctors : As already stated, women visited the doctors only when they experienced miscarriage threatening morbidities. Doctors prescribed several medicines including iron preparations and ask them to return for next routine checkup. However, the women purchased only a part of the prescribed preparations and avoided going to the doctor once they experienced relief from symptoms. Furthermore, the visits to the doctors were expensive. Hence, irregularity of visits by the women also led to irregular consumption.

(F.2) Faith in Doctors : Women reported seeking health care from a particular doctor if they had faith in him or if their past experience with treatment given by the doctor was positive or especially, life saving. In that case, they followed the prescription religiously. However, if they felt uncomfortable with the doctor, they avoided buying the prescribed medicines or going to him altogether.

(F.3) Follow-up by Doctors : It was observed from the women's reports that they were more likely to buy and consume the prescribed medicines if the doctors regularly inquired

regarding consumption of tablets. However, most women reported that the doctors handed over the prescription without explaining the reasons or importance of following the prescription. Patients were also advised against taking too many medicines for minor aches and pains since they may be harmful during pregnancy. Yet, they prescribed many preparations. The women could not distinguish between pain killers and iron tablets and so avoided all medicines including iron tablets.

The above discussion clearly highlights that the major factor likely to affect compliance are :-

- Women's perceptions that anaemia is a normal condition and iron tablets are not necessary.
- Women's dislike for medicines.
- Support of family member, especially mother-in-law.
- Adequate supply.
- Type of counselling given by the AWWs and the doctors also determine whether the women consume the full course of tablets.

Since these factors were evident during the qualitative phase of data collection, during quantitative data collection, some of these factors were assessed. The highlights of the quantitative data regarding compliance to iron tablets discussed in the previous chapter are :

(1) The overall compliance from all sources was 46% after the distribution was linked with immunization. While this was an improvement over the existing system, it was still not

satisfactory since more than 50% women did not consume iron tablets.

(2) The primary reason was that women did not perceive the need to consume the tablets. The most consistently mentioned reasons by the women who did not consume the tablets at different stages of gestation were "do not feel that the tablets are necessary" or "do not like to take the tablets".

(3) The contribution of side-effects to non-compliance was negligible, with only 3 to 5% women reporting side-effects at different stages of gestation.

A simple linear regression and a stepwise regression were run on the quantitative data based on the women's interview schedules using 16 variables viz.

(1) Women's education
(2) Receipt of iron tablets
(3) Size effects
(4) Beneficial effects
(5) Initial Hb levels
(6) Parity
(7) Pregnancy complications
(8) Husband's education
(9) Infectious morbidities experienced
(10) Percapita income
(11) Family Size
(12) Cost (free/purchased)
(13) Source of tablets
(14) Subject's knowledge regarding anaemia
(15) Attitude towards tablet consumption
(16) Mother-in-law's attitude towards tablets

However, none of the factors were found to have a significant correlation with compliance, although at individual level, they were found to affect compliance from

the qualitative data. One of the reasons for this can be the fact that some of the factors considered for the regression analysis were dichotomous. Also, many of the variables qualitatively suggested to affect compliance could not be quantified or ranked for the present study due to lack of frame work for such analysis. It would be interesting to consider the effect of the factors if these inherent difficulties in the model are improved in future studies. Continued efforts should be made to evolve quantitative models for studying the various factors using the variables shown to affect compliance from the qualitative data and pathway analysis.

Various studies have reported different reasons for non-compliance to prescribed medicines in general and iron tablets in particular in different parts of the world.

Raman (1992) reported that the first and the foremost reason as to why the women do not "feel the need" to treat anaemia is that unless it is severe, anaemia does not create any perceivable problem to which the women or other members of the community are sensitive. Fatigue, lack of concentration, poor work capacity - all are usually attributed to other health problems especially to the pregnant situation per se and could also be features of general malnutrition. This is in agreement with the results of the present study.

Side-effects are stated as a major cause of non-compliance by Sood et al (1975), Christensen (1978), Mamdani and Walker (1986), Charoenlarp et al (1988), Reddiah et al (1989) and

Lokeshwar et al (1992), although in the present study only 2% subjects reported side effects at different stages of gestation as reasons to avoid iron tablets. Similarly Schultink et al (1993), in their study on iron supplements in Jakarta reported that few women complained of side effects, although only 3% of the women reported side effects.

Pregnancy related factors hamper consumption of iron tablets according to several studies. Due to factors like low clinic coverage and inadequate monitoring of anaemia at antenatal clinics, the iron supplements programmes implemented by the health services in all the English speaking Caribbean countries were considered to be unsatisfactory and inconclusive in a paper developed by PAN American Health Organization (1981).

Factors like irregular attendance of pregnant women to the antenatal clinic, inadequate knowledge of health personnel regarding iron deficiency anaemia, iron supplementation prescribed as a curative measure and the belief of the villagers that any kind of supplementation to improve the maternal health will result in "big babies" and thus, difficult labour were reported by Valyasevi (1958). Apart from these, absence of health worker on the drug distribution day, failure to maintain the register, inadequate supervision of drug distribution and inadequate health education were reported by Taylor and Mutambu (1987) for malaria chemoprophylaxis. Similar factors were also reported by Charonlarp et al (1988) in their iron supplementation studies

in Burma and Thailand.

Galloway and Mc Guire (1994) reviewed literature regarding compliance with iron supplements and reported that iron therapy is a specific case of medical compliance. According to the review, reasons for non-compliance with iron deficient treatment included inadequate programme support, insufficient service delivery, unavailability of tablets and patient- factors like misunderstanding instructions, side effects, frustration about the frequency and number of pills taken, migration, fear of having big babies, personal problems, nausea due to pregnancy and the subtelty of anaemia decreasing the demand for treatment.

Some of the studies report or review compliance to drug therapy or malaria chemoprophylaxis. These factors were relevant for iron supplementation also, since it is based on drug therapy.

Chritensen (1978), Hull (1979), Dudly (1979), Nyazema (1984) and Mamdani and Walker (1986) have reported several factors affecting drug therapy compliance, such as : clarity of instruction given to the patients, physician-patient relationship, complexity of the medical regime, nature of drug and duration of treatment, traditional belief, side effects, type and severity of illness, degree of self-regulation, prescribing practices, patients' characteristics, psychosocial characteristics, social support, positive benefits from physicians, cost, positive past experience with the illness, low psycho-social disruption, patient's attitudes, belief and

education as well as setup of the waiting area, conflicting priorities, transportation cost and status differentials. Some of these factors are also observed in the present study to affect compliance for iron supplements by pregnant women.

In the paper for discussion on socio-cultural aspects related to the introduction of essential drugs programme in the third world (Essential Drug Programme 1985), four catagories of factors which influenced decissions regarding drug usage were highlighted. These were :

(1) People's aetiologies of disease causation and significance of symptoms.

(2) Strategies and priorities used to seek treatment.

(3) Expectation as to appropriate treatment.

(4) Perceptions of health-care provider. Also, factors influencing a patient's pattern of resort to treatment included economic and geographic accessibility, social structures and patient's status in the family. The patient's perception regarding the use of the drug and the understanding of the disease and the drug were reported to affect its use. None of these factors were assessed in the present study.

Ugalde et al (1986) indicated from their study on prescription compliance in the Dominican Republic that patients were not able to recall the dosage, interval time and duration for half of the prescribed medicines. They recommended better communication between the physician and patients, whereas dissatisfaction of the patient with the

western medical help was one of the important reasons reported by Katz (1982) for postponing or discontinuing the prescribed treatment.

The qualitative data by Kanani et al (1994) also support the findings of the present study. Their studies in Baroda Slums indicated that the major reason why women delayed treatment for "weakness" (anaemia) were : they ignored general ill health, condition (weakness) not considered serious and financial problems.

Moore et al (1991) also reported in the results of their qualitative investigation on factors influencing consumption of iron tablets by pregnant women in West Java that maternal anaemia was not perceived as a health problem by pregnant women, their families and medical care providers. Low knowledge regarding anaemia and its impact on health, side effects and social support were also reported to affect compliance.

Cultural data by Nichter (1980) indicated that in South Kanara, villager's perception of medicines influenced the use of therapy. The cost of treatment, the "power" of the practitioner's hand and the form in which the medicines were given influenced compliance. Injections were considered to be more powerful than tablets or pills. Liquid medicines were considered appropriate for pregnant women. Black pills were appropriate for vomiting, fever and fits but not for digestive disorder, weakness or "bloodlessness". Similar reasons were also reported by Nichter and Nichter (1983) for rejection of

iron tablets by pregnant women in South India. Black iron tablets were rejected since women perceived tablets inappropriate for pregnant women. Also, these were considered to weaken the blood and interfere with digestion.

The preference for medicines governed by the size of the pill, its shape, colour, taste and consistency was also reported by Bledso and Goubond (1985) in their study on the perceptions of traditional people regarding western pharmacheuticals. According to them, white medicines were considered preferable for fever. Therefore, apart from chloroquine, heart stimulants, low BP medications and anti-diarrhoeals could be accepted for fever. Similarly, western medication bitter in taste were accepted for treating worms and red coloured foods and medicines like iron tablets, diuretics, pile tablets and folate were considered suitable for improving blood.

Logan (1973) reported that if the concept of "hot" and "cold" elements was not taken into account in the prescribed treatment the compliance for modern medicines decreased in their study in the highlands of Guatemala.

The results of the present study as well as other studies on factors affecting compliance have underlined a number of factors to be considered for increasing the compliance for successful implementation of iron supplementation programmes.

The fact that the women in the present study, as also in the other studies just "forgot" to take their iron tablets or did not like to consume them indicate a lack of motivation and

understanding regarding the importance of iron tablets. However, as the present data indicate, some of the women knew the purpose of taking iron tablets but avoided taking them.

Thus, adequate supply of tablets, effective training and nutrition education to the health functionaries for proper counselling, reliable monitoring and support to convince the pregnant women for adequate consumption of iron tablets are necessary. Also, constant feedback with culturally acceptable guidance are consistently found necessary in order to convince the women to continue consumption of iron tablets regularly.

SECTION IV IMPACT OF IRON SUPPLEMENT ON MATERNAL INFANT OUTCOME PARAMETERS

A. BASE LINE DATA

Description of Field Setting and Enrolment Profile of the Subjects

Number of centres selected and the number of pregnant women enroled are shown in Table 4.20.

As the data in Table 4.21 depicts, initially 268 subjects enroled on or before 20 weeks of gestation. Out of these, 119 subjects (44%) dropped from the study, half of whom were in the enrolment group of less than 24 weeks of gestation.

Reasons for dropout are shown in table 4.22. Temporary migration or shifting to mothers' place for delivery accounted for about a third of the total subjects dropping out from the study. Ten percent were not available for the follow-up due to various reasons like not available at home at the time of contact, non-cooperative, ill health whereas 8% delivered before 34 weeks of gestation, making their complete data unavailable for the study. Other reasons for dropouts were miscarriage (3%), pregnancy not confirmed (0.7%), permanent migration (4%) and premature births (3%).

Similar dropout rates have been reported in other studies on pregnant women. Edward Raj (1994) in a supplementation study carried out in Baroda on pregnant women, reported a 30% dropout rate. However, more subjects were reported to be

Table 4.20 : The Selection Of Centres For The Study.

Centre Selection	Ahmedabad	Baroda
Total No of ICDS Centers	200	154
Population of the Centres	200,000	154,000
No. of Centers Selected for present study	15	12
Population Covered in the Study	15,000	12,000
No. of Pregnant Women Enrolled.	183	85
Pregnant Women as % of Total Population.	1.2	0.7

Table 4.21 : Enrolment Profile Of The Subjects And Dropouts

Enrolment Profile	Number (%)
1. Mean Gestational Age At Enrollment.(Weeks)	16.11
2. No of Dropped Cases.	119 (44)
3. Gestational age of dropped cases	
a. Prior to 24 weeks	53 (20)
b. 25-28 weeks	23 (8)
c. 29-32 weeks	43 (16)
4. No of Subjects fully Followed	149 (56)
5. Mean Gestational Age At Enrollment of Subjects Remaining In the Study.(Weeks)	16.55

* Figures In Parenthesis are Percentages

Table 4.22 : Reasons For Dropouts Of The Subjects.

Reasons	Number of Dropouts	Percentage	
		of 119	of 268
1. Gone to Mother's Place/out of town, temporarily.	37	31.1	14.0
2. Not Available/ Gone For Work.	28	23.5	10.0
3. Delivered Before 34 Weeks.	22	18.5	8.0
4. Migrated.	10	8.4	4.0
5. Premature Birth.	7	5.9	3.0
6. Miscarried/Abortion.	8	6.7	3.0
7. Non cooperative.	5	4.2	1.7
8. Pregnancy not confirmed.	2	1.7	0.7
TOTAL	119.0	100.0	44.4

non-cooperative (9.4%) and fewer dropouts due to pregnancy complication than in the present study. Sood et al (1975) also reported a dropout rate of 30% mainly due to resistance to draw blood samples. Other reasons were premature delivery, leaving the study area and side effects of tablet consumption. Charloenlarp et al (1988) also reported a dropout rate of 16% in spite of supervised supplementation. Side effects, migration, lack of motivation of tablet distributors and fear that the treatment might cause obesity were some other reasons for dropping out.

A dropout rate of 45% has been reported by Brunego et al (1988) in iron supplementation trials on Nigerian women while Kuizon et al (1979) observed a dropout rate of 51% in an iron supplementation study on pregnant Philipino women. No information regarding reasons for dropout was provided in both these studies.

The reasons for dropouts in these studies are similar to those of the present study. It is evident from the dropout rate of the present study that, not considering the 40% dropouts due to temporary or permanent migration, about 60% of the women may be available for supplementation. Again, women who migrate from the community could be provided with full dose of supplements with adequate counselling before leaving the community. So, with careful follow-up through the centre-based delivery system, actual non-cooperative subjects would be only 4% from whom more intensive persuasion would be required.

Socio-Economic Status of the Subjects (SES)

Data on SES of the subjects are discussed for the total number of subjects enroled viz. 268 and are presented in Table 4.23.

Family Size : The family size ranged from 2-14, about half of the subjects (43%) had 4 to 6 members in the family; overall mean family size being 6.5.

Income : Sixty-eight percent of the subjects had their total monthly income of more than Rs. 1000, only 54% have a per capita income between Rs. 200 and Rs. 500; only 17% having income greater than Rs. 500. This indicated that high family income of Rs. 1000 is due to more number of earning members in the family. The mean per capita income was Rs. 353.

The poverty line was defined on the basis of the minimum Caloric requirement of 2100 Cals per day per capita for urban people according to the 1993-94 National Statistical Survey (NSS) estimations (Mehta 1996). According to this criterion Rs.264 was considered to be the cutoff for the urban people. In view of this fact, the mean per capita income in the present study was higher than the poverty line. However, as many as 44% women still remained below the poverty line with their per capita income being less than Rs. 264 per month.

Education : Greater number of women were illiterate (37%) as compared to their husbands (16%). Moreover, women finished their education at primary level, while their spouses continued their education upto secondary, higher secondary and college levels. Thus, greater proportion of men were educated

Table 4.23 : Socio-Economic Profile Of The Subject (All Subjects, N= 268)

No.	SOCIO-ECONOMIC CHARACTERISTIC	NO. OF SUBJECTS	PERCENT
1.	FAMILY SIZE		
	a. 1 - 3	50	18.7
	b. 4 - 6	116	43.3
	c. 7 - 9	64	23.9
	d. >= 10	38	14.2
	MEAN FAMILY SIZE	6.5	
2.	TOTAL MONTHLY INCOME OF FAMILY		
	a. 101 - 300	4	1.5
	b. 301 - 500	11	4.1
	c. 501 - 1000	70	26.1
	d. > 1000	183	68.3
3.	PER CAPITA INCOME		
	a. < 100	7	2.6
	b. 100 - 150	42	15.7
	c. 151 - 200	27	10.1
	d. 201 - 500	146	54.5
	e. > 500	46	17.1
	Greater than Poverty Line (Rs.264)	150	56.0
	MEAN PER CAPITA INCOME	353.14	
4.	EDUCATION OF WOMEN		
	a. Illiterate	99	36.0
	b. Can Read And Write	3	1.1
	c. Primary (1 - 7)	108	40.3
	d. Secondary (8 - 10)	49	18.3
	e. Higher Secondary (11 - 12)	8	3.0
	f. Intermediate (Incomplete Coll.)	0	0.0
	g. Graduate	1	0.4
5.	EDUCATION OF HUSBAND		
	a. Illiterate	43	16.0
	b. Can Read And Write	5	1.9
	c. Primary (1 - 7)	77	28.7
	d. Secondary (8 - 10)	99	36.9
	e. Higher Secondary (11 - 12)	22	8.2
	f. Intermediate (Incomplete Coll.)	5	1.9
	g. Graduate	17	6.3

6.	OCCUPATION OF WOMEN		
	a. Unskilled Labour	20	7.5
	b. Skilled Labour	1	0.4
	c. Service	4	1.5
	d. Petty Trade	11	4.1
	e. Self Employed	38	14.2
	f. House Wife	194	72.4
	g. Any Other	0	0.0
7.	OCCUPATION OF HUSBAND		
	a. Unskilled Labour	97	36.2
	b. Skilled Labour	41	15.3
	c. Service	72	26.9
	d. Petty Trade	49	18.3
	e. Self Employed	9	3.4
	g. Any Other	0	0.0
8.	POWER TO SPEND OWN INCOME		
	a. Yes	17	6.3
	b. No	57	21.3
	c. N.A.	194	72.4
9.	POWER TO SPEND POOLED INCOME		
	a. Yes	63	23.5
	b. No	205	76.5
10.	HOURS OF WORK		
	a. < 5	54	20.2
	b. >= 5	20	7.7
	c. NA	194	72.4
	MEAN HOURS OF WORK OUT SIDE HOME	4.43	
11.	TYPE OF WORK		
	a. Heavy	31	11.6
	b. Moderate	32	11.9
	c. Light	11	4.1
	d. NA	194	72.4
12.	RELIGION		
	a. Hindu ST/SC/BC	248	92.5
	b. Hindu Advance	6	2.2
	c. Muslim	10	3.7
	d. Christian	4	1.5
	e. Any Other	0	0.0
13.	TYPE OF HOUSING		
	a. Hut	17	6.3
	b. Kutcha House	36	13.4
	c. Semi Pukka House	85	31.9
	d. Pukka House	130	48.5

14.	SOURCE OF DRINKING WATER		
	a. Individual Tap	164	61.2
	b. Common Tap	94	35.1
	c. Hand Pump	8	3.0
	d. Any Other (Unsafe)	2	0.7
15.	TOILET FACILITY		
	a. Individual Toilet	147	54.9
	b. Public Toilet	62	23.1
	c. Open Defecation	51	19.0
	d. Any Other	8	3.0
16.	SANITATION OF THE HOUSE		
	a. Very Good	90	33.6
	b. Good	110	41.0
	c. Average	55	20.5
	d. Poor	13	4.9

as compared to their wives.

Occupation : Most of the women (72%) were housewives. About 14% women were involved in petty trade including stitching at home by hand or machine or looking after a small provision shop owned by the family just near the house. The remaining women went either for unskilled or skilled labour or served as maid servants.

As many as 36% of men were engaged in unskilled labour, while about a fourth (27%) went for some service whereas the rest of them either went for skilled labour or had some petty trade like making or repairing shoes, owning a tea, snack or vegetable lawry or small provision shop.

Though about 28% of women contributed to the household income, only 6% had control over spending their own income. Generally, the decision makers in the household were the mothers-in-law who in turn bought the supplies, food, clothing and other household requirements. The daughters-in-law had to ask them for money to buy any thing including medicine and mothers-in-law decided whether to give money and how much. About 23% of the women either working or non-working had power to spend the pooled income mainly because they stayed in nuclear families or their mothers-in-law were not alive.

Twenty-eight percent of the women were engaged in paid occupation outside the house. Of these 12% of the women did heavy work and another 12% of women did moderate work. Only 4% of the women were engaged in doing light activities.

The type of work was coded as under :-

Light work : Working while sitting like stitching by hand, sewing chappals, embroidery, knitting etc. in addition to their own housework.

Moderate work: Working as maid servant doing household work like cleaning, mopping, washing clothes and utensils; stitching on machine, sweeping on roads or working as a helper in the AW apart from their own household work.

Heavy work : Doing energy demanding tasks like manual labour and construction work apart from their own household work.

Religion : About 95% of the subjects were Hindus. The rest were Muslims or Christians. Regardless of the religious groups the population was ethnically and occupationally diverse. It comprised of weavers, mochis (shoe makers), rabaris (cowherds), harijan (SCs), bhaiyas (migrated from Uttar Pradesh) and marwadis (migrated from Rajasthan).

Housing : About a half (49%) of the subjects stayed in the pukka houses and about a third (32%) of them in semi pukka houses. An interesting finding was that many women could convert their kutcha houses in to semi-pukka houses with a nominal rent for few years, some initial investment and self labour due to government aid. Hence, only a small number lived in kutcha houses or huts. A typical house (semi-pukka) consisted of one or two rooms, a verandah with toilet, bathroom, water and electricity. They had dung flooring and cement sheeted or thatched roof. Many of the subjects being construction workers had gradually converted their semi-pukka houses into pukka houses.

Water and Sanitation : Almost all the subjects (99%) had access to safe drinking water mostly from individual or common municipal taps while a small proportion got it from hand pumps. Since the women who owned their houses in the government schemes had drainage facilities, more than half of them had their own toilets and a fourth had a public toilet facility. Still about 20% of the women had to opt for open defecation.

Environmental sanitation was graded as very good, good, average and very poor, according to the guidelines indicated in the SES schedule (Appendix VII). Some of the women living in slums had no facility even of running water, electricity, toilet or waste disposal, making the surrounding unclean. Yet, about a third of the women could maintain very good sanitation within their houses and 41% had good sanitation within their houses. Only 5% of the houses had very poor hygienic conditions within the house. However, most of the subjects could not maintain good hygienic conditions outside the house.

Utilization of Health Services Prior to Enrolment

Utilization of health services by the women is described in Table 4.24.

Immunization : As many as 84% of the women had taken at least one shot of Tetanus Toxoid immunization (TT) at the time of enrolment i.e. by 20 to 24 weeks of gestation. By full term, 84% of the women completed their TT schedule, i.e. at least two TT injections during current pregnancy. The mean

Table 4.24: Utilization Of Health Services Prior To Enrollment (N = 149)

No.	UTILIZATION OF SERVICES BY WOMEN	N	%
1.	RECEIVED TT IMMUNIZATION AT 1ST CONTACT		
	a. Received >= 2 TT	83	56
	b. One TT	42	28
	c. No TT	24	16
2.	MEAN GESTAIONAL AGE AT FIRST TT IMMUNIZATION. (WEEKS)	22	
3.	RECEIVED IRON SUPPLEMENTATION PRIOR TO ENROLLMENT		
	First Trimester		
	a. Yes	21	14
	b. No	128	86
	Second Trimester		
	a. Yes	30	20
	b. No	119	80
4.	ANTENATAL CHECK UP		
	a. Yes	113	76
	b. No	36	24
5.	ANTENATAL CHECK UP		
	a. % Women with >= 4 ANCs	58	39
	b. % Women with < 4 ANCs	55	37
6.	MEAN NUMBER OF ANC	2.5	
7.	SUPPLEMENTARY FOOD		
	a. Yes	77	52
	b. No	72	48
8.	SHARED SUPPLEMENTARY FOOD		
	a. Yes	57	38
	b. No	21	14
	c. NA	71	48

NA = Not Applicable

gestational age of taking the first TT shot was 22 weeks. Five percent of the subjects took only one shot of TT, on the advice of the doctors as they had a birth interval of less than 24 months. The percent of pregnant women in the present study protected against Tetanus was 90% which was higher than the 77% immunization coverage reported by UNICEF (1994) for rural and urban India and is similar to that reported by Edward Raj (1994) in Baroda (93%).

Supplementation with Iron Tablets : Prior to enrolment, only 14% of the women had received iron supplements and 20% in the second trimester. Thus, the coverage was low prior to 24 weeks which was the time limit of enrolment in the present study.

Antenatal Check-ups (ANC): It was revealed that 24% subjects had never gone for an ANC. The mean number of check-ups was 2.5. A total of 4 ANCs during a pregnancy was considered desirable as per the criteria by the Ministry of Health and Family Welfare. By this criterion, about 40% of the pregnant women in the present study had utilized antenatal services satisfactorily. The coverage for ANCs in the urban setting as seen in the present study is more encouraging than in the rural areas. Gopaldas et al (1991) reported only 3% of the women to have received 3 or 4 health check-ups during their current pregnancy in the USAID sponsored ICDS evaluation project in Gujarat and Masharastra. Gopalan (1989) also reported only one or two ANC by women in rural and tribal areas of India.

Supplementary Food : Only half of the subjects took

supplementary food from the ICDS at the time of enrolment. About 20% of the women enroled in the programme later. However, 25% of the women never participated in the supplementary feeding programme provided by the ICDS.

Past Obstetric History of the Women

Data on the past obstetric history of the women are presented in Table 4.25.

Age of the Mother and Age At Menarche : Ninety-nine percent of the women were more than 18 years of age at the time of enrolment, their mean age being 23 years. The mean age at menarche was 14.5 years which is similar to the mean age of 14.3 years reported by Edward Raj (1994). Sixty-two percent were between 13 to 15 years of age at the onset of menarche.

Age at Marriage : The mean age at marriage of the women was 17 years. However, about a third of them (32%) were between 15 to 17 years at the time of the marriage and 17% were less than 15 years of age. This is in agreement with that reported by Edward Raj (1994) and the report on Country wide Census (Census of India,1981).

Age at First Pregnancy : More than half of the subjects (61%) were above 18 years of age at the time of first pregnancy. However, 17% were less than 18 years at the time of her first pregnancy. Twenty one percent of the women were primiparous.

Parity : Parity included all full term children dead or alive, still-born and previous miscarriages after 20 weeks of gestation. Most of the women (72%) had delivered less than 5

Table 4.25 : Past Obsteteric History Of Women (N = 149).

NO.	OBSTETERIC HISTORY OF WOMEN	TOTAL NO OF SUB.	PERCENT
1.	AGE OF MOTHER (YEAR)		
	a. < 18	1	0.7
	b. >=18	148	99.3
	c. Do not know	0	0.0
	d. Mean Age At Enrollment (Year)	23.3	
2.	AGE AT MENARCHE (YEAR)		
	a. <=10	2	1.3
	b. 11 - 12	15	10.0
	c. 13 - 15	92	61.8
	d. > 15	37	24.9
	e. Do not know	3	2.0
	MEAN AGE (YEAR)	14.5	
3.	AGE AT MARRIAGE (YEAR)		
	a. <= 10	4	1.5
	b. 10 - 15	43	16.0
	c. 15 - 17	87	32.5
	d. >= 18	129	48.1
	e. Do not know	5	1.9
	MEAN AGE (YEAR)	17.3	
4.	AGE AT FIRST PREGNANCY (YEAR)		
	a. < 18	23	15.4
	b. >= 18	97	65.1
	c. Not Applicable	27	18.1
	d. Do not know	2	1.3
	MEAN AGE (YEAR)	19.5	
5.	MEAN GESTATIONAL AGE AT ENROLLMENT (WEEK)	16.1	
6.	PARITY		
	a. 1	45	30.2
	b. 2	37	24.8
	c. 3 and 4	33	22.1
	d. >=5	7	4.7
	e. Not Applicable	27	18.1
	f. Mean Parity	1.8	

7.	BIRTH INTERVAL		
	a. 1st Pregnancy	27	18.1
	b. < 24 Month	62	41.6
	c. > 24 Month.	60	40.3
8.	PREVIOUS HISTORY OF MISCARRIAGE		
	a. Yes	24	16.1
	b. No	125	83.9
9.	PREVIOUS HISTORY OF STILL BORN CHILD		
	a. Yes	2	1.3
	b. No	120	80.5
	c. Not Applicable	27	18.1
10	PREGNANCY HISTORY OF PREMATURE		
	a. Yes	15	10.0
	b. No	107	71.8
	c. Not Applicable	27	18.1
11	PREVIOUS CAESERIAN		
	a. Yes	12	8.0
	b. No	110	73.8
	c. Not Applicable	27	18.1
12	LOW BIRTH WEIGHT BABY		
	a. Yes	29	19.5
	b. No	61	40.9
	c. Not Applicable	27	18.1
	d. Donot Know	32	21.5

children at the time of enrolment. Only 5% of them had 5 or more children. The mean parity was 2.2 which is greater than the mean parity of 1.4 reported by Edward Raj (1994) for the women in Baroda in a similar study.

Birth Interval : A birth interval of less than or equal to 24 months was reported by 41.6% of the women, whereas 40.3% of the women had a birth interval greater than 24 months. Remaining 18% of the women were in their first pregnancy. Edward Raj (1994) reported a birth interval of less than 24 months in 23% of the subjects whereas 52% had their birth intervals greater than 24 months.

Previous History of Miscarriage, Still-Born and Premature Births : Previous history of miscarriage was reported in 16% of the women, whereas only 13% of the women reported having a still-born child. Ten percent reported a history of premature deliveries and 19.5% reported having LBW babies. Caesarian section deliveries were reported by 8% of the women.

These values are lower than the values for miscarriage and premature reported by Edward Raj (1994) among urban underprivileged women in Baroda and higher for still-born children viz 20% of the women with previous history of miscarriage, 9% of the women with a previous history of still-born child, and 16% women with premature deliveries.

Bhatia et al (1985) reported a prevalence of full term LBW to be 29.85% in rural pregnant women in India which was higher than that reported by the present study.

Stein et al (1987) reported 2.97% LBW infants and 2.97%

women having premature babies which is lower than the values of the present study.

Anthropometry

The mean anthropometric measurements and mean Hb are shown in the Table 4.26.

Height : The mean height of the women who completed the study was 152.2 cm. It ranged from 138.5 cm to 169.5 cm. As many as 94% of the subjects had height more than 145 cm. The mean height is in close agreement with 151.15 cm reported by Edward Raj (1994) in Baroda, 151.1 cm of urban slum dwellers as reported in ICMR survey of 1972, 151 cm reported by Prema (1978) and 151 cm and 149 cm reported for women in Panchmahals and Chandrapur respectively by Christian et al (1988).

Weight : The mean weight of the women at the time of enrolment was 44.5 kg the range being 33 to 75 kg. It was also observed that only 36% of the women weighed more than 45 kg. About two-thirds (64%) of the women weighed < 45 kg and 17% weighed < 40 kg at the time of enrolment.

Although the mean weight of the subjects in the present study is very near to 43.7 kg reported by Edward Raj (1994), 41.6% of the women in that study had more than 45 kg weight. A higher proportion of women having weight less than 45 kg in the present study could be due to a difference in the mean gestational age at enrolment which was 16.6 weeks in the present study whereas it ranged between 21.3 to 21.5 weeks in the study by Edward Raj (1994). Similar mean weight of 45.2 kg

Table 4.26 : Mean Gestational Age, Anthropometry And Hb Of Subjects At First Contact.

Characteristics	Mean Values	N (%)
Height (cm)	152.2	
Height >= 145 cms		140 (93.96)
Height < 145 cms		9 (6.04)
Weight (Kg)	44.5	
Weight >= 45		53 (35.57)
Weight < 40		29 (17.40)
Weight < 45		96 (64.42)
Haemoglobin (g/dl)	9.0	
Hb >= 11 g/dl		17 (11.89)
Hb < 11 g/dl		126 (88.11)
Gestational Age (Weeks)	16.6	

was also reported by Prema (1978) for LIG pregnant women in Hyderabad.

Bhatia et al (1985) reported a mean weight of 42.2 kg of Indian rural pregnant women which was slightly lower than the present study. They also reported 79% of the women having less than 45 kg, which was more than in the present study.

Many studies reported an increase in birth weight with an increase in maternal pre pregnant weight and height (Dougherty and Jones 1982, NIN 1983b, Anderson et al 1984, Bhatia et al 1985, Brown et al 1986). Studies by NIN (1983b) have shown that subjects weighing less than 40 kg at 20 weeks of gestation were at a greater risk of delivering LBW babies.

Tyagi et al (1985) reported an increase in percent LBW with a decrease in maternal weight below 45 kg and height below 150 cm. Thus as many as 64% of the women at baseline may be considered to be in the risk category by the cutoff of 45 kg as suggested by Tyagi et al (1985) and 17% being at the risk of having a LBW baby by the 40 kg cutoff suggested by NIN (1983b).

Haemoglobin Levels : The mean Hb levels of the subjects in the present study was 9.0 g/dl at the time of enrolment (the mean gestational age being 16.6 weeks) the range being from 3.5 to 12.8 g/dl.

The frequency distribution of the subjects is shown in fig.1. As many as 74% of the women were moderately anaemic with Hb content between 7 and 11 g/dl and 13% of the women were severely anaemic having their Hb levels less than 7 g/dl.

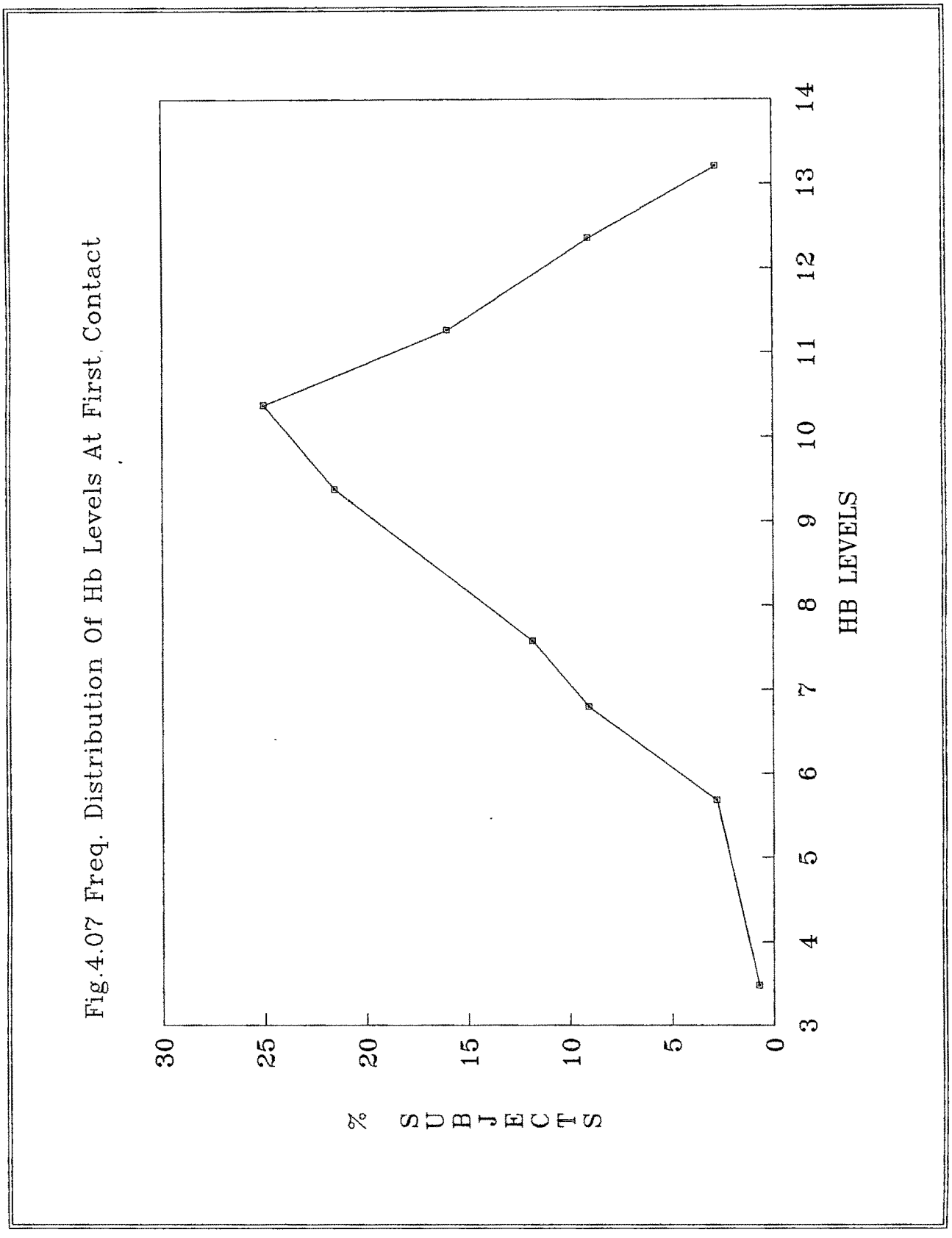


Fig.4.07 Freq. Distribution Of Hb Levels At First Contact

In all 87% of the pregnant women were found to be anaemic. This agrees with the Hb contents reported by Edward Raj (1994) in Baroda (9.1 g/dl) and that reported by ICMR (1989) in the national evaluation of NNAPP (9.1 g/dl).

The mean Hb level of the LIG pregnant women in Hyderabad was reported to be 10.0 + 1.32 g/dl which was higher than the present study (NIN 1983b).

The prevalence of anaemia of 87% was similar to a prevalence of 88.3% reported by Edward Raj (1984) in a similar study in Baroda, but higher than that of 72% reported by Sharma (1996) in Baroda. However, the prevalence of severe anaemia (Hb < 7 g/dl) in the present study (13%) was higher than the 6% reported in the study by Edward Raj (1994) and 2% reported by Sharma (1996), but is similar to the 13.6% (Hb < 8 g/dl) reported by Prema et al (1981a) and 12.6% reported by ICMR (1989).

Prasad (1991) reported an incidence of 76% in tribal and 70% in non-tribal pregnant women in Chotanagpur, which is less than that reported in the present study. NIN (1983b) also reported a 70% prevalence in LIG pregnant women at term in Hyderabad, whereas a 90% prevelance of anaemia was reported by Christian et al (1988) in pregnant women in Panchmahals and Chandrapur.

Since even mild or even moderate form of anaemia is considered to be hazardous during pregnancy, it is important to note that a vast majority of women fall in the high risk category.

B. IMPACT OF IRON FROM ALL SOURCES ON Hb LEVELS, WEIGHT GAIN AND GESTATIONAL DURATION AND MORBIDITY PROFILE

In order to assess the effect of consuming iron tablets as described under Section III, quantitative data were collected regarding the haemoglobin content and weight of the subjects at different stages of gestation till delivery. These data are presented in the following section.

Haemoglobin Levels

Haemoglobin levels of the subjects were tested at monthly interval from 16 weeks of gestation. These data are analyzed and presented in the Tables 4.27.

Prevalence of Anaemia at Different Gestational Ages : As can be seen from Table 4.27, the prevalence of anaemia was very high among the pregnant women. As many as 82% of the women were anaemic at 16 weeks of gestation. The prevalence increased till 28 weeks when 90% of the women were anaemic and reduced to 69% at 36 weeks of gestation. A drop in number of severely anaemic women from 8% to 5% was also observed till 36 weeks of gestation. A large majority of women varying from 65-79% still suffered from mild to moderate form of anaemia during the study period.

Figure 4.08 indicates the prevalence of anaemia at first and final contacts. As many as 87% of the women were anaemic at the time of enrolment. Out of these, 13% were severely anaemic, while 74% had mild or moderate anaemia.

Table 4.27 : Precent Prevelance of Anaemia Among Pregnant Women At Different Stages Of Gestation.

G.AGE (WEEKS)	N	SEVERE	MILD	NORMAL	Mean Hb g/dl*
16	51	7.8	74.5	17.7	9.3 ±0.9
20	107	16.8	69.2	14.0	8.9 ±0.6
24	66	7.6	78.8	13.6	9.2 ±1.0
28	114	11.4	79.0	9.7	9.2 ±0.6
32	116	6.9	70.7	22.4	9.6 ±0.7
>=36	68	4.4	67.7	27.9	9.9 ±0.9

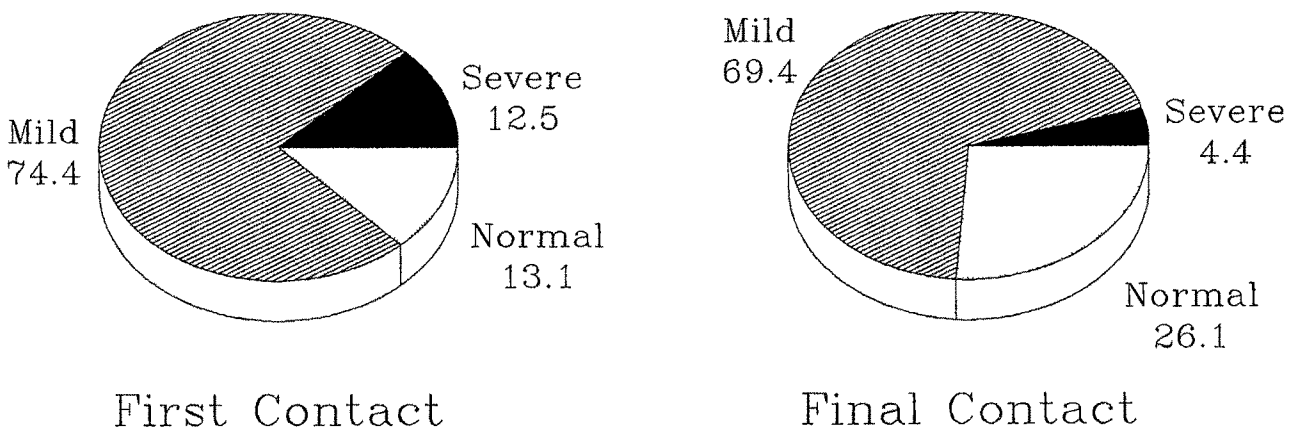
SEVERE = Hb < 7.0 g/dl

MILD = Hb 7.0 to 10.9 g/dl

NORMAL = Hb >= 11.00 g/dl

* Values are mean ± SE

Fig. 4.08 Prevalence Of Anaemia Among Women



At the final contact, ie. 32 to 36 weeks of gestation the prevalence of anaemia decreased to 74% of which 5% were still severely anaemic. The percent of initially anaemic subjects who showed a positive improvement in Hb during the course of the study was 62 in the severely anaemic group while the percent of subjects in normal range doubled the initial values.

The frequency distribution of the subjects before and after supplementation is shown in Figure 4.09. Initially, only 5 subjects (3.5%) had their Hb > 12 g/dl, which doubled to 7.5% after supplementation. The incidence of severely anaemic subjects decreased to 5% at final contact.

The Hb levels of < 6 g/dl were observed at first contact in 3% of the subjects. However, none had very severe anaemia at final contact. The least Hb of 6.4 g/dl and a maximum of 13.6 g/dl was observed after supplementation. A clear shift to the right of the frequency distribution was observed indicating the beneficial effects of iron supplements.

Mean Hb Levels : The mean Hb levels of the women at different stages of gestation are shown in Table 4.27. The mean Hb levels at 16 weeks was 9.3 g/dl, which showed a declining trend upto 28 weeks and rose beyond that ie. at 32 weeks and 36 week. The mean Hb at 36 weeks was 10 g/dl.

The mean Hb level at first contact was 9.1 g/dl, irrespective of the gestational ages. The total gain of 0.72 g/dl for all the subjects taken together was significant ($p <= 0.001$). Figure 4.10 indicates the number of women showing

Fig.4.03 Freq. Distr. Of Hb Levels At First & Final Contact

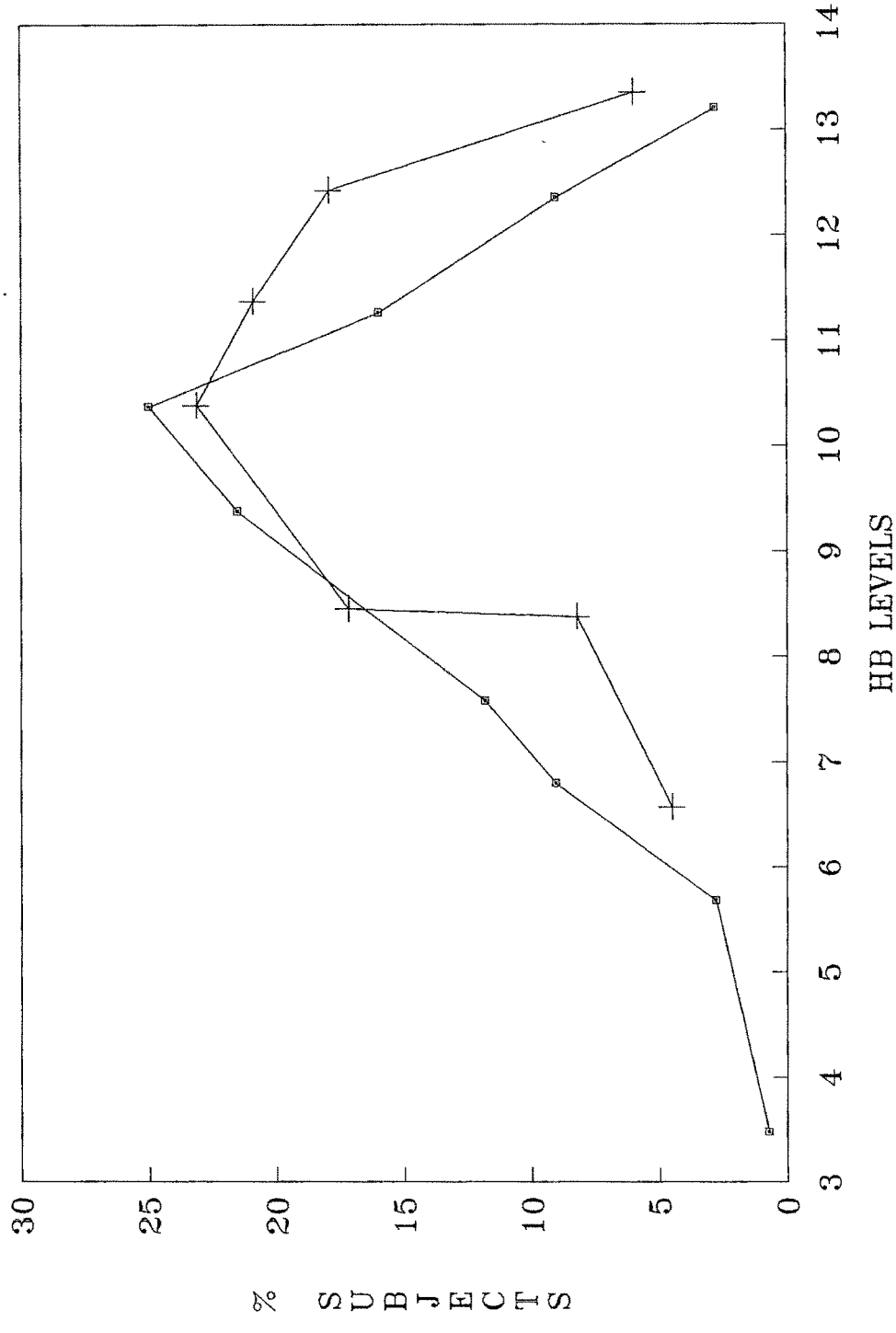
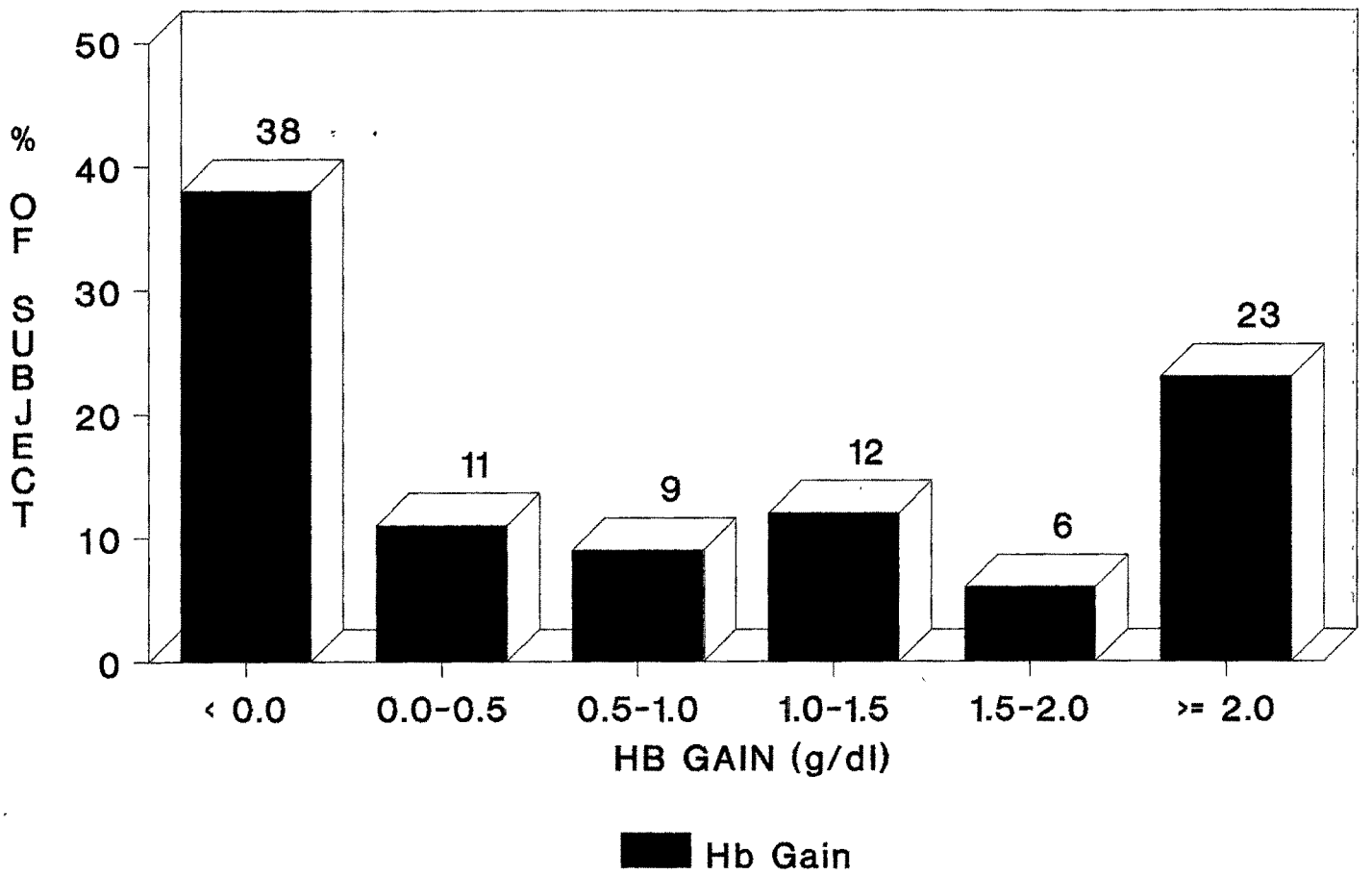


Fig. 4.10 HB Gains Of Women From Initial To Final Contact



different levels of gain from first contact till delivery. It can be seen that 39% of the women experienced a loss in their Hb content. On the other hand, 23% of the women gained more than 2 g/dl. The remaining 38% of the subjects experienced a rise in the Hb levels ranging from 0 to 1.9 g/dl.

Effect of Iron Dosage on Hb content : It would be interesting to see the extent of effect of consumption of iron tablets on the Hb content of the subjects. Figure 4.11 depicts the consumption of iron (mean number of tablets) and mean Hb levels of the subjects at different stages of gestation. Though the amount of iron consumed each month increased mean Hb contents decreased slightly between 16 and 20 th week of gestation, slowly increased and remained constant between 24 and 28 weeks and then reached a maximum of about 10 g/dl at 36 weeks of gestation. This indicates that with the increase in the consumption of iron, the Hb content of the blood improved, in spite of the mean monthly consumption being much less than the expected receipt of 30 tablets.

A close perusal of data in Table 4.28 reveals the mean Hb of the women consuming different doses of iron ie full, partial, negligible. It indicates that mean Hb gain of the women consuming negligible (<30 tablets) was 0.5 g/dl. Of the 18 women consuming less than 30 tablets, 56% experienced a gain in their Hb content. This trend is also observed in the other groups consuming partial dose (31-90 tablets) and full dose (> 90 tablets). Sixty one and 69% of the women experienced a rise in Hb the mean gains being 0.67 and 0.97

Fig 4.11 Mean Hb And Compliance For Iron Tablets Different Stages Of Gestation

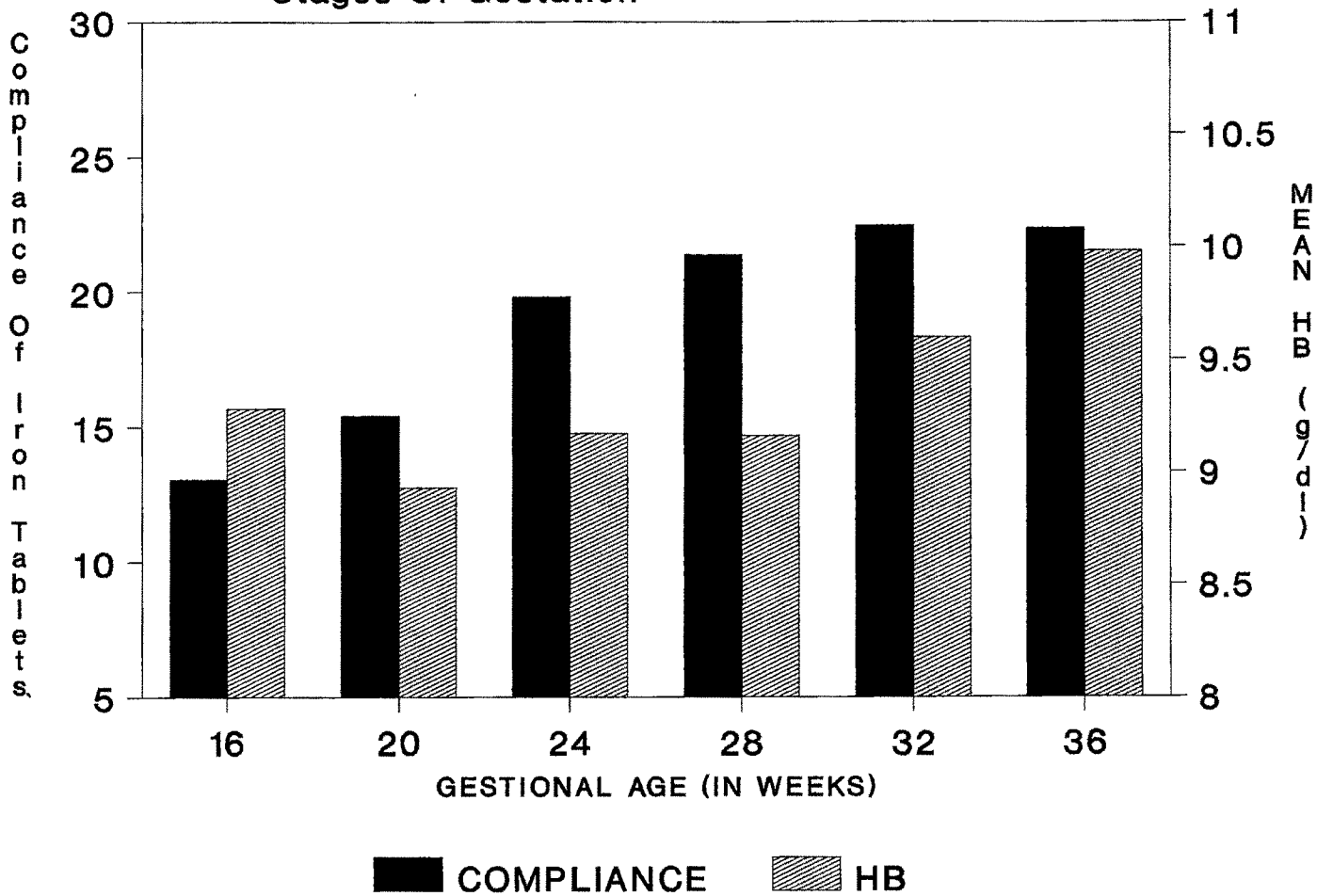


Table 4.28 : Effect Of Number Of Tablets Consumed On the Haemoglobin Level Of Women

No.Of Tablets Consumed	Number of Women	Mean Hb Gain g/dl	FALL	RISE
<=30	18 (14)	0.50	8 (44)	10 (56)
31-90	57 (44)	0.67	22 (39)	35 (61)
>=90	54 (42)	0.97	17 (31)	37 (69)
Total	129 (100)	0.72	47 (36)	82 (64)

Figures in parenthesis are percentages

Comparision of group means :

Group 1 Vs 2 t = -0.31 NS

2 Vs 3 t = -0.97 NS

1 Vs 3 t = -0.85 NS

Group 1 = Women Consuming <= 30 tablets

Group 2 = Women Consuming 31-90 tablets

Group 3 = Women Consuming >= 90 tablets

g/dl in their respective groups. The remaining women experienced a fall in their Hb levels, in all the groups, bringing down the group average of Hb gain considerably. The difference in Hb gain is not statistically significant among the groups probably due to this reason.

Hb Gain in Relation to Different Initial Hb Levels : The subjects were further grouped according to their initial Hb levels. As evident from Table 4.29, the subjects who had normal Hb levels to begin with, had proportionately less gain in Hb. In fact 67% of the subjects experienced a decline in their Hb content till delivery. Compared to this, only 35% of the moderately anaemic and about 12% of the severely anaemic ones experienced a decline in Hb till delivery. The more severely anaemic subjects showed a larger rise in Hb, consistent with the findings reported in the liturature.

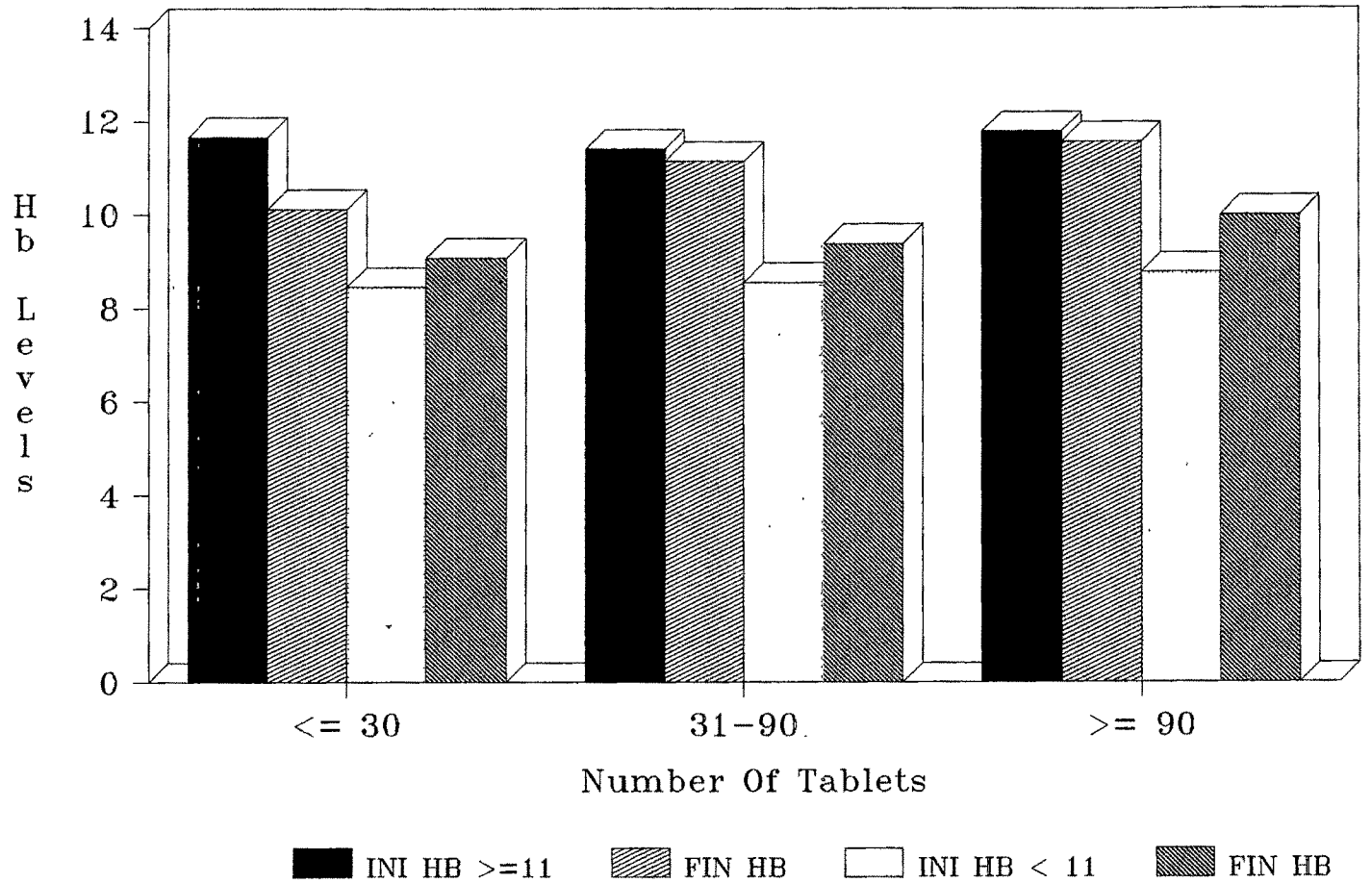
In order to visualise the impact of consuming different levels of iron tablets (full,partial or negligible) on initially anaemic and non-anaemic women, the data were analyzed further and are presented in Figure 4.12. Of all women who had normal Hb levels at enrolment, (n= 18 women), 12 experienced a fall and 6 women experienced a rise in Hb levels. However, maximum fall in Hb was observed in women consuming 30 tablets or less, whereas for those consuming greater number of tablets, a fall in Hb was smaller. In spite of a higher number of women experiencing a fall in Hb in this group, even those who consumed partial dose of iron (30-90 tablets) had a mean Hb level of greater than 11 g/dl. It also

Table 4.29 : Gain In Haemoglobin Content Of Subjects With Different Levels Of Haemoglobin At First Contact

Hb level At First Contact	N	Hb Gain					
		< 0	0.0-0.5	0.5-1.0	1.0-1.5	1.5-2.0	>= 2.0
>= 11 g/dl	18	12 (66.7)	2 (11.1)	2 (11.1)	1 (5.6)	0 (0)	1 (5.6)
7-11 g/dl	94	33 (35.1)	13 (13.8)	12 (12.8)	12 (12.8)	6 (6.4)	18 (19.1)
< 7 g/dl	17	2 (11.8)	0 (0)	1 (5.9)	3 (17.6)	3 (17.6)	8 (47)

Figures in parenthesis are percentages

Fig 4.12 Mean Hb Levels Of Women Consuming Different Levels Of Iron At First And Final Contact



implies that a higher fall of Hb in women with initially normal Hb levels can be attributed to a lower dose of iron tablets consumed by the women as seen from Table 4.28.

A substantial gain in Hb was observed in all the anaemic women consuming different levels of iron, ranging from 0.62 g/dl to 1.22 g/dl, even partial consumers experienced a substantial Hb gain of 0.81 g/dl. Only 35 of the 111 anaemic subjects experienced a fall in the Hb. However, this higher Hb gain, was not substantial enough to bring all of the anaemic women to the normal range. Also, 6 of these women remained severely anaemic at delivery.

In a supplementation study by Edward Raj (1994) in the under privileged women in Baroda, the prevalence of anaemia was 88% which was similar to that observed in the present study. The incidence of severe anaemia was 2.4% in group receiving 60 mg iron. It was also reported that the prevalence of anaemia was 55% in the women in the 60 mg group against the prevalence of 74% in the present study at the end of supplementation. A mean Hb gain of 1.3 g/dl was reported in the 60 mg group by Edward Raj which was higher than the mean gain of 0.72 g/dl observed in the present study. However, 23% of the women showed a higher Hb response (>= 2 g/dl) due to iron therapy in the present study compared to only 15% in the 60 mg group in the study by Edward Raj (1994), which may be attributed to the larger number of women in the present study with lower Hb levels.

Sharma (1996) reported a decrease in prevalence of

anaemia from 72% to 66% among pregnant women in Baroda supplemented by the existing anaemia control programme offering >= 90 tablets of 60 mg iron to the pregnant women. Though the prevalence of anaemia at both contacts is lower than the present study, a greater reduction from 88% to 74% is observed in the present study. Moreover, a mean gain in Hb of 0.2 g/dl was reported as compared to that of 0.78 g/dl observed in the present study.

In study by NIN (1983), a mean Hb of 10.5 ± 1.26 g/dl was observed as against 9.3 ± 0.93 g/dl in our study on pregnant women at first contact. Sood et al (1975) in their study on iron supplementation reported an initial mean Hb of 9.34 g/dl which is consistent with the results of the present study. A final mean Hb level of 10.32 g/dl was observed for women supplemented with 60 mg of iron, folic acid and vitamin B12. A gain in Hb value by 0.98 g/dl was reported which was higher than the gain of 0.72 g/dl reported in the present study. They also reported a fall in Hb of 22% of women receiving compared to 36.4% women in the present study.

A 70% prevalence of anaemia in low income group (LIG) pregnant women near term has been reported by NIN (1983) which was lower than the present study, while Sood et al (1975) reported a prevalence of anaemia as high as 88% in Delhi and 87% in Vellore among pregnant women before their supplementation. Most of the women who did not receive iron showed a fall in Hb. All other groups receiving iron showed a rise in Hb, the best results being in group receiving 250 mg

of iron in which 90% of the subjects experienced a rise in Hb. However, even after supplementation, as many as 74-88% of the women in various supplementation groups which is similar to the present study, where 74% of women remained anaemic at the end of the study.

In a study conducted by Batu et al (1976) in Burma on pregnant women attending their first antenatal visit, 4 treatment regimes were given from 22 to 25 weeks of pregnancy for 16 weeks with or without iron, folic acid and placebo twice daily under supervision. At the end of supplementation, Hb concentration increases by 0.7 and 0.4 g/dl respectively in the groups receiving 60 mg iron with and without folic acid, while it decreased in groups not receiving iron. The findings are consistent with the present study indicating a gain in Hb of 0.72 g/dl.

Wallenburg and Eijk (1984) supplemented pregnant women with 105 mg elemental iron daily. The women had a mean Hb content of 8.4 g/dl at the beginning of the study (16 weeks). They observed a fall in Hb till 28 weeks with a gradual increase till delivery in the control group. However, no significant changes were observed in the iron supplemented group at delivery. Similar trend of change in mean Hb levels during pregnancy has been reported by Prema et al (1981a). These results are consistent with the results of the present study. The fall in Hb in both these studies was attributed to haemodilution.

A decrease in prevalence of anaemia and an increase in

mean Hb levels of subjects supplemented with different dose levels of iron was reported by Toe and Than (1982) in Burma, Charoenlarp et al (1988) in Burma and Thailand, Reddiah et al (1989) and Vijayalakshmi and Usha (1981) in India, Batu et al (1976) in Burma and Srisupandit et al (1983) in Thailand.

Higher gain in Hb among the subjects with lowest Hb levels and among anaemics compared to those with normal Hb levels have been reported by Sood et al (1975) and De Maeyer (1989), which is similar to the observation in the present study.

A failure to achieve a decrease in prevalence of anaemia to two thirds the original prevalence (in accordance to one of the goals in NNAPP) as in the present study is also indicated by other studies (Charoenlarp et al 1988, Baker and De Maeyer 1979, Schultink et al 1993).

A low Hb response in the women in the present study many be due to various reasons. Firstly, many women may have consumed iron tablets less than what they have reported. This fact is also supported by other studies outside India (Schultink et al 1993, Bonnar et al 1969).

Secondly, a few studies have also indicated that the dose of 60 mg elemental iron per day for 90 days is inadequate to bring Hb to normal during pregnancy in anaemic women (Sood et al 1975, WHO 1989, Reddiah 1989, Edward Raj 1994). The present study results also indicate that the dose of 60 mg iron per day was not sufficient to bring about a satisfactory Hb response in most women. Similarly, Sood et al (1979) and

Schultink et al (1993) observed that the dose of 60 mg iron per day was inadequate to bring about a increase in Hb to normal range in anaemic subjects.

Third reason for a low Hb response may be impaired iron absorption. In population consuming a mixed vegetarian diet, the probability of having a greater proportion of iron absorption inhibitors is high (Gopalan 1972, Bothwell et al 1979). This may hamper iron absorption if tablets are taken with or immediately after the meal, which is the usual instruction given by the functionaries to the women. Yusufji (1973), Molina et al (1974), Sood et al (1975), Kuizon et al (1979) and Schultink et al (1993) attributed a low Hb response of the haematinic in lower class pregnant women to impaired iron absorption rather than failure to take supplementation.

The fourth possible factor hindering in the improvement in iron status among women may be low serum retinol levels as suggested by Schultink et al (1993). This has been supported by Vijayalakshmi and Devadas (1987) in their study on impact of Vitamin A along with iron to expectant mothers.

A low protein content of the diet of pregnant women can be yet another reason for a high prevalence of anaemia in spite of supplementation with iron as suggested by Kuizon (1979) and Sood (1975) who indicate that due to the poor quality of diet and low food intake, the already inadequate protein in the diet may be used to meet the extra energy requirements due to demands of pregnancy rather than be used for the synthesis of the globin part of haemoglobin.

Thus, the results indicate that any supplementation program should provide at least a dose containing 120 mg elemental iron per day with possibly better quality and quantity of food to effectively decrease the prevalence of anaemia.

Impact of Iron on Weight Gain

The mean weight and weight gain of women at different stages of gestation is shown in Table 4.30, 4.31 and 4.32. The mean weights of the women as seen in Table 4.30, at 16 weeks of gestation was only 44.12 ± 0.91 (mean ± SE) kg, which increased by about a kg per month, the mean weight of the subjects being 50.82 ±0.88 kg at 36 weeks of gestation. The mean weight was 50.33 ± 2.33 kg at 40 weeks, however,the number of subjects was too less to make any reliable conclusions.

The mean weight of all the subjects at the first contact was 44.64 ± 6.59 kg, irrespective of their gestational age (Table 4.31). At the end of supplementation the mean weight of the subjects increased to 49.75 ± 7.12 kg, showing highly significant mean weight gain of 5.11 (± 3.25) kg from about 16 weeks of gestation till delivery.

When the weight gain of the subjects was analyzed on the basis of different levels of weight gain (Figure 4.13), 4 subjects (2.7%) showed a weight loss during pregnancy. Almost half (46%) of the subjects showed a weight gain up to 5 kg while about a fourth of the subjects showed a weight gain

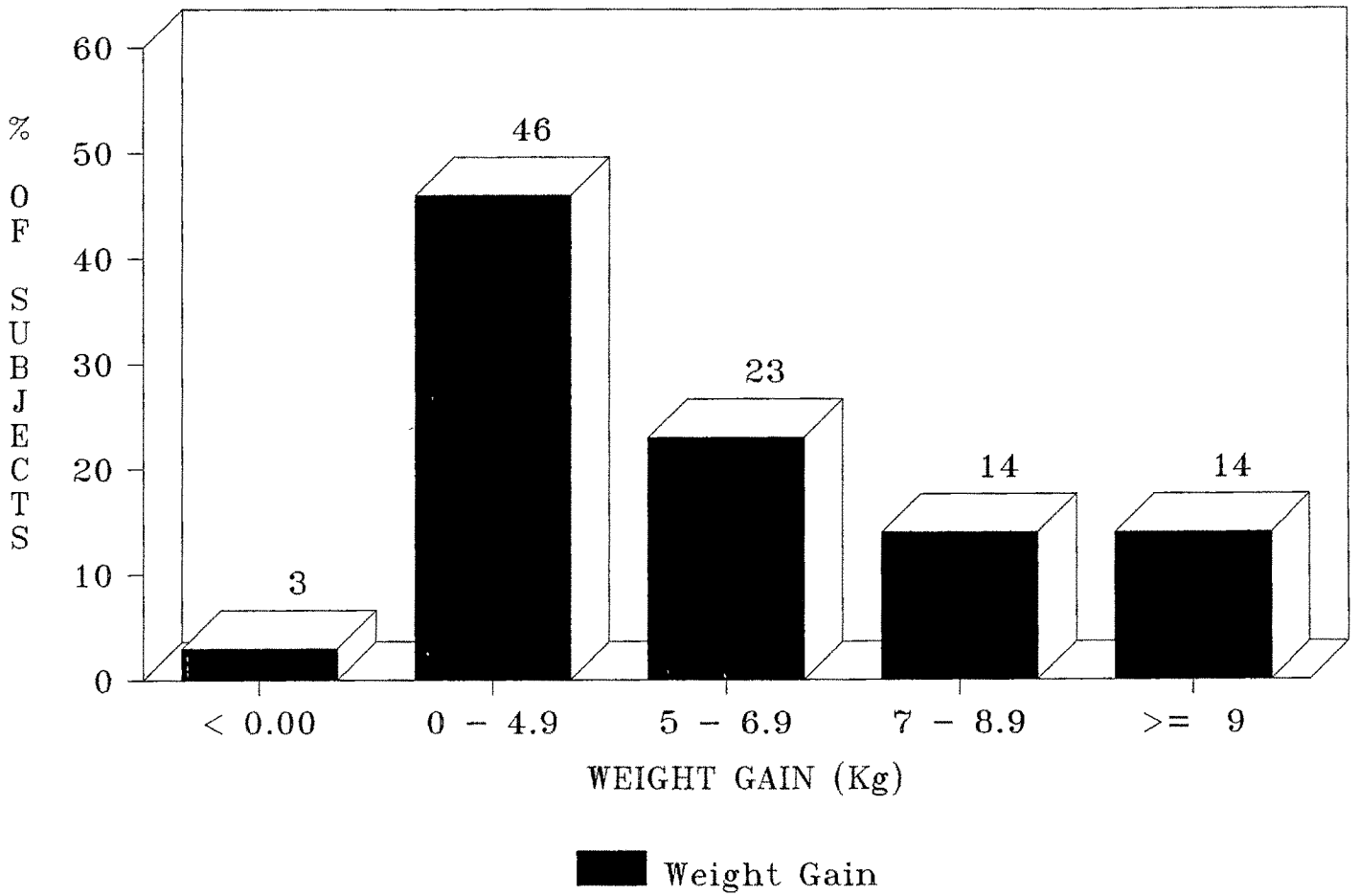
Table 4.30 : Mean Weight Of Pregnant Women At Different Stages Of Gestation

G.AGE	16	20	24	28	32	36	40
N	54	116	104	123	134	69	6
WT (kg) ±SE	44.12 ±0.91	45.00 ±0.55	46.46 ±0.76	47.68 ±0.58	49.37 ±0.61	50.82± 0.88	50.33 ±2.33

Table 4.31 : Mean Weight Gain (kg) Of All The Fully Followed Subjects

INITIAL	44.64 ± 6.6 kg
FINAL	49.75 ± 7.1 kg
GAIN	5.11 ± 3.3 kg

Fig. 4.13 Weight Gain Of The Women Till Delivery



between 5 to 7 kg, 14% gained >= 9 kg, of weight from about 16 weeks of gestation till delivery considered to be adequate weight gain during pregnancy.

As the subjects remained in the study for varying duration and since pre-pregnant weights of the subjects were not available the total pregnancy weight gain could not be computed. However, rate of weight gain per month or per week has been shown to be a reasonably satisfactory indicator, as some studies have demonstrated the weight gain to be linear in the last 2 trimesters. Therefore, mean weight gains were computed separately on per week basis.

The total weight gain per week was 0.33 kg. In order to assess the impact of consuming iron tablets on pregnancy weight gain, data were analyzed according to the number of tablets consumed by the women during pregnancy compared to the weight gain.

The total weight gain as well as weight gain per week were higher for the women till 28 weeks of gestation. Women consuming more than 30 tablets gained greater weight than those consuming <30 tablets (Table 4.32 and 4.33). The difference between the groups were not significant. Four subjects showed a fall in weight, half of them consuming less than 30 tablets during pregnancy. Thus consuming greater number of tablets is shown to be beneficial in terms of pregnancy weight gain.

The mean weight gains in the Indian studies are similar to those reported in this study. However, researchers outside

Table 4.32 : Weight Gain In Relation To Different Levels Of Tablet Consumption

No.Of Tablets Consumed	Mean Wt Gain (16-28W)	Mean Wt Gain (28-40W)	Total Weight Gain
<= 30	2.5	1.5	4.2
31-90	3.2	2.0	5.3
>=90	3.1	1.9	5.1

* Weight Measured in kg.

Table 4.33 : Weight Gain Per Week In Relation To Different Levels Of Tablet Consumption

No.Of Tablets Consumed	Mean Wt Gain/W (16-28W)	Mean Wt Gain/W (28-40W)	Total Weight Gain/W
<= 30	0.28	0.3	0.27
31-90	0.36	0.34	0.35
>=90	0.36	0.28	0.33

* Weight Measured in kg.

India have reported higher weight gains among pregnant women.

A weight gain of 5.6 kg from enrolment (20-24 weeks) till delivery was reported by Edward Raj (1994) in the pregnant women supplemented with 60 mg of iron in Baroda, which is slightly higher than the 5.11 kg in the present study.

Similiar weight gains ranging from 4.8 to 7.3 kg were reported by Vijayalakshmi and Usha (1981) and Vijayalakshmi and Shobhana (1982) in pregnant women supplemented with iron with or without folic acid, food supplements and placebo; whereas a weight gain of about 6 kg was reported by Gopalan (1972) and NIN (1981) in urban LIG population. However, taking into account the weight loss of about 2 kg in the first trimester the actual weight gain during pergnancy was considered to be 7 to 8 kg by NIN (1981).

NIN (1983) reported maternal weight gain during pregnancy to be less than 6 kg in 45% of the women in their study whereas about 15% gain >9 kg weight during pregnancy. The results of both these studies are in agreement with the present study.

Anderson et al (1984) reported a mean weight gain of 12 kg in Canadian women whereas Abrams et al (1989) reported a mean gain of 14.3 kg with a mean rate of 0.36 kg per week. Rees et al (1992) reported mean weight gain of 14.5 kg from 15th week of gestation in adolescent mothers and recommended higher weight gains of 0.588 kg per week for favourable outcome in adolescent pregnant women. Jonston and Kandell (1992) reported mean weight gains ranging from 15 to 16 kg

with a weight gain rate of 0.5 kg per week in the second and third trimester. These weight gains are much higher than the present study.

In the study by Abrams et al (1989), multivariate analysis of the data indicated that the risk of spontaneous preterm birth increased by 60% in women with low rate (< 0.27 kg per week) of weight gain compared to those with an average rate ranging from 0.27-0.52 kg per week. In the present study, 36% of the women had weight gain < 0.27 kg per week and were at risk of preterm delivery according to this criterion.

Hediger et al (1989) reported that early inadequate weight gains (<4.3 kg) by 24 weeks of gestation were associated with a significantly increased risk of having small for gestational age infants whereas late inadequate gains (<400g/week) were associated with significantly higher preterm deliveries whether or not the total gain was adequate for gestation. In the present study subjects, 65% of the subjects had a weight gain less than 400 g/week, indicating that most of the subjects were at risk of IUGR or preterm births. The mean weight gain of 330 g/week was highly inadequate according to this criterion in the present study subjects.

Impact of Iron on Birth Weight

Birth weight is shown to be closely associated with risk of morbidity to the infant. Hence, it is important to identify the factors affecting birth weight.

In the present study, a mean birth weight of 2910 g was

found of the infants born to the subjects on whom the complete data are available (N=118). Eighteen percent infants were LBW (Weight <2500g).

Table 4.34 depicts the mean birth weights of the infants in relation to iron dose consumed by their mothers during index pregnancy. The mean birth weights of the infants born to the women consuming negligible (less than or equal to 30 tablets) and partial consumers (30-90 tablets) was less (2908 g and 2835 g respectively) than those consuming full dose of 90 or more tablets (2997 g). The differences were however not significant.

Effect of Hb Levels On Birth Weight : Since anaemia is known to affect birth weight of infants, the mean birth weight of the infants born to women with different Hb levels at first and final contacts were compared and are presented in Tables 4.35, 4.36 and 4.37.

As is evident from Table 4.35, the mean birth weights of infants born to severely anaemic women at first contact was lower than those with mild and moderate anaemia whereas highest mean birth weights of 3075 g were recorded of women with normal Hb levels. The differences were however, not significant due to higher Sd from the mean.

Similar trend was not observed when the prevalence of anaemia of women at last contact (before delivery) were compared to the birth weight of their infants (Table 4.36). The severely anaemic women had the heaviest infants but the number was too small (n=4) to make any definite conclusions.

Table 4.34 : Effect Of Number of Tablets Consumed By The Women On Birth Weight Of The Infants

Number of Tablets	N	Mean Birth Weight
<= 30	15	2908.20
31-90	55	2835.18
>=90	48	2996.96

Comparision of group means :

Group 1 Vs 2 t = 0.29 NS

2 Vs 3 t = -1.35 NS

1 Vs 3 t = -0.57 NS

Group 1 = Women Consuming <= 30 tablets

Group 2 = Women Consuming 31-90 tablets

Group 3 = Women Consuming >= 90 tablets

Table 4.35 : Effect Of Prevelance Of Anaemia At 1st Contact On Infant Birth Weight

	SEVERE (1)	MILD (2)	NORMAL (3)
NUMBER	13	85	14
MEAN BW	2873 ±462	2879 ±506	3075 ±658

All Values are mean ± sd

Table 4.36 : Effect Of Prevelance Of Anaemia At Last Contact On Infant Birth Weight

	SEVERE (1)	MILD (2)	NORMAL (3)
N	4	72	27
MEAN BW	3187.50 ±462	2872.68 ±549	2743.64 ±480

All Values are mean ± sd

Table 4.37 : Relation Between Prevelance Of Anaemia And LBW

PREVALENCE OF ANAEMIA	SEVERE	MILD	NORMAL
First CONTACT (N= 20)	3 (2316.7)	16 (2111.6)	1 (2000.0)
Last CONTACT (N=18)	0 (0.00)	14 (2103.6)	4 (2215.0)

Severe : Hb < 7 g/dl
Mild : Hb 7-11 g/dl
Normal : Hb >= 11 g/dl

The mean birth weights of the infants born to the women with normal Hb levels was higher than those born to women with mild and moderate anaemia. Here also the differences were non-significant.

A total of 18% (21 out of 118) of infants had birth weight less than 2500 g (LBW). The mean birth weight of LBW infants (BW <2500 g) were distributed according to the mothers having different levels of Hb at first and last contact and are given in Table 4.37. The data indicate that when anaemia at last contact was considered, highest mean birth weights were found for infants born to women having normal Hb levels. Similar trend was not found in infants' birth weights when prevalence of anaemia at first contact was compared to mean birth weight. However, the number of infants were too small in the severely anaemic and normal categories to be of any significance.

Factors Affecting Birth Weight : A simple linear regression analysis and a stepwise regression was performed of factors affecting birth weight and are presented in Table 4.38a and 4.38b.

It was found that the sex of the child (with birth weight of males being heavier than the females), initial (weight at 16 or 20 week), weight gain (from enrolment till delivery) and malaria showed a significant correlation with birth weight; but malaria was significant at 11% level, and the number of women having malaria during pregnancy was too small. When malaria was removed from stepwise regression, sex of the

Table 4.38a : Factors Affecting Birth Weight - Regression Analysis

INDEPENDENT VARIABLE	REGRESSION COEFFICIENT	STD	T-TEST	F-TEST
SEX OF INFANT	-0.36566785 E+03	0.89775615 E+02	-0.40731311 E+01	0.16590397 E+02
MALARIA	-0.99444669 E+02	0.61116281 E+02	-0.16271388 E+01	0.26475805 E+01
INITIAL WEIGHT	0.26076449 E+02	0.64935984 E+01	0.40157162 E+01	0.16125977 E+02
WEIGHT GAIN	0.15229872 E+03	0.55369836 E+02	0.27505721 E+01	0.75656466 E+01

* All factors considered in step-wise regression

Table 4.38b : Factors Affecting Birth Weight Regression Analysis

INDEPENDENT VARIABLE	REGRESSION COEFFICIENT	STD	T-TEST	F-TEST
SEX OF INFANT	-0.38607617 E+03	0.89570648 E+02	-0.43102978 E+01	0.18578667 E+02
INITIAL WEIGHT	0.24970962 E+02	0.65070314 E+01	0.38375352 E+01	0.14726676 E+02
WEIGHT GAIN	0.16740539 E+03	0.55000707 E+02	0.30436952 E+01	0.92640806 E+01

* Excluding malaria in step-wise regression

child, initial weight and weight gain still entered the equation and were shown to significantly affect the birth weight of the infants.

Vijayalakshmi and Usha (1981) reported highest mean birth weight being 3.3 kg of infants born to women supplemented with 200 mg of FeSO4 and 500 mcg of folic acid in addition to food supplements. This was similar to the present study.

Edward Raj (1994) in a supplementation study on underprivileged women in Baroda reported a mean birth weight of 2.7 kg in the group supplemented with 60 mg/day, which is slightly less than that of the present study. The incidence of 22% LBW in that study however, was higher than that of the present study. Multiple regression analysis on factors affecting birth weight indicated sex of the baby and weight of the women at the entry to significantly affect BW, similar to the present study.

Sharma (1996) in the study in evaluation of existing NNAPP reported BW to range from 2.7 kg for women consuming full dose (100 tablets) of iron, 2.6 kg for partial and 2.4 kg for non-consumers, all the values being much lower than that of the present study, whereas Grover (1982) reported a mean birth weight of 2905 g in infants born to mothers in Haryana, de Paredes et al (1979) reported a mean total birth weight of 2979 g in infants born to LIG Columbian women which are similar to the present study. Prema (1978) reported a birth weight of 2.7 kg in pregnant women in Hyderabad and Bhatia et al (1983) reported similar birth weight of 2.7 kg in Varanasi

which is lower than the present study.

Birth weights higher than 3 kg were reported by Mitchell and Lerner (1992) in Cleveland, Anderson et al (1984) in Canadian women whereas Horon (1983) reported a mean birth weight of 3051 g for infants born to adolescents and that of 3093 g for infants born to 20-24 year old women which are higher than the present study infants. Brown et al (1986) reported a birth weight range of 3500 to 4000 gm to represent lowest risk of infant mortality. The mean birth weight of 2910 gm in the present study is much lower than this.

Horon et al (1983) reported low birth weight ratios to be 13.3% for adolescents and 11.8% for older group of women whereas Mitchell and Lerner (1992) reported 8% LBW which are lower than the 18% prevalence in the present study. A higher incidence of 26% LBW was reported by Prema (1978) whereas that of 30% LBW was reported by Bhatia et al (1985) and Tyagi et al (1985).

The observation that mothers with lower Hb concentrations have children with lower birth weight suggests that maternal anaemia has a detrimental influence on foetal development and is supported by Yusufji et al (1973) and Prema et al (1981b).

Regression analysis on factors affecting birth weight indicated gestational duration, weight gain, total antenatal check-ups and sex of the baby to be significantly associated with birth weight in the study by Sharma (1996) whereas Anderson et al (1984) indicated birth weight of the last sibling to be overall the most powerful predictor of birth

weight in addition to pre-pregnancy weight, weight gain during pregnancy, maternal calf circumference and smoking.

In the study by Horon et al (1983), gestational age was the most important predictor of birth weight in addition to race, pre-pregnancy weight, change in weight during pregnancy and number of antepartum visits. Similar predictors were also reported by Dougherty and Jones (1982), Bhatia and Tygi (1984), Brown et al (1986), Stein et al (1987), Hediger et al (1989), Hediger et al (1990) Kirksey et al (1991) and Singh et al (1992).

Morbidity Profile of the Women

As stated earlier various morbidities that the women experienced were noted, every month.

Gastrointestinal Morbidities : As indicated in the Table 4.39, acidity was the most frequently mentioned of the gastrointestinal morbidities especially between 20-36 weeks of gestation. Only 2- 7% of the women experienced diarrhoea at different stages of gestation. About 2-8% of women had constipation, but hardly 1% had piles during pregnancy.

Pregnancy Related Morbidities : Abdominal pain (32-56%), perverted appetite (12-26%) and cramps (31-51%) were the most frequently and consistently mentioned complains by women throughout pregnancy (Table 4.40). Many women (4-22%) also mentioned nausea, mostly till 28th week of gestation, 4-13% of women mentioned morning sickness, mostly up to 20th week of gestation. Increased frequency of micturition was mentioned by

Table 4.39 : Number Of Women Experiencing Gastro Intestinal Morbidities.

MORBIDITY	GESTATIONAL AGE (WEEKS)						
	16	20	24	28	32	36	40
N	55	116	119	127	140	69	9
ACIDITY	12 (22)	38 (33)	36 (30)	40 (32)	46 (33)	22 (32)	5 (56)
DIARRHOEA	1 (2)	2 (2)	4 (3)	5 (4)	6 (4)	5 (7)	0 (0)
CONSTIPATION WITH PILES	0 (0)	1 (1)	1 (1)	0 (0)	1 (1)	0 (0)	0 (0)
CONSTIPATION WITHOUT PILES	2 (4)	7 (6)	9 (8)	6 (5)	3 (2)	5 (7)	0 (0)

Figures in paranthesis are percentages

Table 4.40 : Number Of Women Experiencing Pregnancy Related Morbidities

MORBIDITY	GESTATIONAL AGE (WEEKS)						
	16	20	24	28	32	36	40
N	55	116	119	127	140	69	9
MORNING SICKNESS	7 (13)	5 (4)	0 (0)	1 (1)	3 (2)	3 (4)	0 (0)
NAUSEA	12 (22)	19 (16)	10 (8)	13 (10)	6 (4)	6 (9)	0 (0)
INCREASED FREQ. OF MICTURITION	3 (6)	18 (16)	7 (6)	10 (8)	13 (9)	4 (6)	1 (11)
ABDOMINAL PAIN	24 (44)	37 (32)	38 (32)	43 (34)	61 (44)	29 (42)	5 (56)
PERVERTED APPETITE	14 (26)	30 (26)	25 (21)	22 (17)	29 (21)	8 (12)	2 (22)
BACKACHE	0 (0)	7 (6)	14 (12)	13 (10)	6 (4)	0 (0)	0 (0)
CRAMPS IN LIMBS	17 (31)	51 (44)	53 (44)	65 (51)	62 (44)	24 (35)	3 (33)
IRREGULAR FOETAL MOVEMENTS	1 (2)	1 (1)	4 (3)	1 (1)	2 (1)	1 (2)	0 (0)

Figures in paranthesis are percentages

6-16% of women at various stages of gestation, more so between 20-32 weeks of gestation. Chronic backache was mentioned by 4-12% of women only between 20-32 weeks. Irregular foetal movements were experienced by only 1-3% of the women during different time during pregnancy.

Anaemia Related Morbidity : From Table 4.41 it can be observed that women between 35-56.1% reported experiencing general weakness during pregnancy, while 49-67% of women reported tiredness, 22-49% experienced breathlessness on exertion especially while climbing steps, washing cloths and such other energy demanding tasks. Eleven to 56% of women experienced giddiness, their number declining steadily from 16 weeks till 40 weeks. This may be due to an improvement in iron status due to consumption of iron tablets.

Urinary/Genital Tract Infection : In Table 4.42 are given the morbidity due to urinary tract infections. These are defined as burning sensation during micturition and associated fever. Four to 18% of the women suffered from urinary tract infections at various states of gestation. Incidence of leucorrhoea was very high between 27-44% of the women. However, itching in vaginal region was not common and was reported by only 2-8% of the women. Spot bleeding was experienced by only 1% of women before 32 weeks of gestation. Thus, of the genital tract infection symptoms, leucorrhoea was the most common.

Infectious Morbidities : It is evident from Table 4.43 that upper respiratory infections (cold, cough, sore throat) were

Table 4.41 : Number Of Women Experiencing Anaemia Related Morbidities.

MORBIDITY	GESTATIONAL AGE (WEEKS)						
	16	20	24	28	32	36	40
N	55	116	119	127	140	69	9
GIDDINESS	31 (56)	44 (38)	38 (32)	30 (24)	26 (19)	9 (13)	1 (11)
GENERAL WEAKNESS	28 (51)	58 (50)	61 (51)	67 (53)	55 (39)	24 (35)	5 (56)
TIREDNESS	37 (67)	61 (53)	59 (50)	71 (56)	75 (54)	34 (49)	6 (67)
BREATHLESS-NESS	27 (49)	49 (42)	54 (45)	54 (43)	61 (44)	26 (38)	2 (22)

Figures in paranthesis are percentages

Table 4.42 : Number Of Women Experiencing Urinary/Genital Tract Related Morbidities

MORBIDITY	GESTATIONAL AGE (WEEKS)						
	16	20	24	28	32	36	40
N	55	116	119	127	140	69	9
BURNING IN MICTURITION	10 (18)	18 (16)	14 (12)	15 (12)	9 (6)	3 (4)	0 (0)
LEUCORRHOEA	20 (36)	44 (38)	34 (29)	38 (30)	38 (27)	20 (29)	4 (44)
ITCHING IN VAGINAL REGION	2 (4)	6 (5)	9 (8)	9 (7)	3 (2)	4 (6)	0 (0)
SPOT BLEEDING	1 (2)	1 (1)	1 (1)	1 (1)	0 (0)	0 (0)	0 (0)

Figures in paranthesis are percentages

Table 4.43 : Number of women experiencing infectious morbidities.

MORBIDITY	GESTATIONAL AGE (WEEKS)						
	16	20	24	28	32	36	40
N	55	116	119	127	140	69	9
UPPER RESPIRATORY INFECTIONS	15 (27)	28 (24)	27 (23)	16 (13)	29 (21)	15 (22)	3 (32)
FEVER	3 (6)	5 (4)	6 (5)	5 (4)	7 (5)	4 (6)	0 (0)
MALARIA	2 (4)	5 (4)	7 (6)	7 (6)	10 (7)	3 (4)	2 (22)

Figures in paranthesis are percentages

the most common of all the infectious morbidities- 13-32% of women experienced it at various time during pregnancy. Fever and malaria were not so common. Less than 6% of women had fever, whereas 4-22% women suffered from malaria sometime during pregnancy.

Miscellaneous Morbidities : As indicated in Table 4.44 headache was a common complain among women and between 11-31% of the women complained of it at different stages of gestation. Eleven to 28% of the subjects had oedema at ankles which increased as pregnancy progressed. Night blindness was not so common, only a small number of women experienced nightblindness during pregnancy.

According to NIN (1983) there are no significant differences in the prevalence of maternal Hb levels in relation infectious morbidities like respiratory infections, fever, diarrhoea, skin infection, eye or ear infection, leucorrhoea and other infections either in second or third trimester of pregnancy. Also the types of infectious morbidities did not differ in relation to the different Hb levels. Thus the prevalence of morbidities due to infection are not related to maternal Hb levels in the urban LIG population. The prevalence of non-specific symptoms like headaches, backaches, abdominal pain, weakness, giddiness, breathlessness, chest pain, tingling numbness etc. were assessed in pregnant lactating and non-lactating women. There was a significant difference in the prevalence of non-specific symptoms in relation to the maternal Hb levels. Backache and

Table 4.44 : Number Of Women Experiencing Miscellaneous Morbidities.

MORBIDITY	GESTATIONAL AGE (WEEKS)						
	16	20	24	28	32	36	40
N	55	116	119	127	140	69	9
HEADACHE	17 (31)	23 (20)	18 (15)	26 (20)	19 (14)	14 (20)	1 (11)
OEDEMA	6 (11)	12 (10)	13 (11)	17 (13)	31 (22)	19 (28)	2 (22)
NIGHT BLINDNESS	3 (6)	4 (4)	3 (3)	7 (6)	1 (1)	3 (4)	1 (11)

Figures in paranthesis are percentages

leg pain were most common, followed by abdominal pain and leg pain. The women in the population were undernourished, over worked and therefore the high prevalence of these symptoms which increased due to the additional stress of pregnancy.

NIN (1981) reported that the prevalence of infective morbidity was higher in pregnant women in the second and third trimester of pregnancy. Proportionately greater number of pregnant women experienced more than one infective morbidity during the third trimester, the most common among them being URI, the prevalence of which markedly increase during the third trimester. Increase in vaginal and skin infections was observed during the third trimester. However, the prevalence of other infections like diarrhoea was not different from the non-pregnant women. However in the present study, only about a fourth of the women experienced URI at various stages of gestation. Fewer women experienced other morbidities like fever, malaria or diarrhoea. Greater number of women complained of non-specific symptoms like acidity, abdominal pain, cramps, perverted appetite, general weakness, giddiness, tiredness and leucorrhoea.