ANAEMIA AMONG PREGNANT WOMEN ATTENDING THE ANTENATAL CLINIC AT THE MAIN HEALTH CENTRE IN KUALA SELANGOR

BY

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INTRODUCTION

Anaemia is one of the most frequently observed medical disorder in the world today. The causes of anaemia are multiple, but women and children are without doubt specially affected.

Women in the reproductive ages and young children are the two main vulnerable groups with regards to anaemia. Combined with socio-economic stress factors such as poverty and ignorance, the situation in these two groups can be critical.

Women in the reproductive years are at special risk in two ways. Firstly, when not pregnant or lactating, regular menstrual loss constitutes a continuing drain of nutrients which have to be replaced.

On the average, a healthy woman loses about 40 ml of blood each month which is equivalent to an average daily iron loss of 0.6 mg. To cover such losses a daily

absorption of 2.7 mg of iron is required (Technical Report Series No. 432, 1970).

Secondly, during pregnancy there is an increase in the requirements of the women's body to meet the needs of the growing foetus. In addition to this, during lactation there is further loss of iron and folate which are passed to the baby via the breastmilk.

However, the amounts needed to cover for these requirements may often exceed the quantities of iron and folate available from the daily diet. This is especially so when the diet contain few animal products or is entirely vegetarian.

Anaemia in its severest form can lead to death. This is however rare, more frequent being the mild and moderate degrees of anaemia which are more or less well tolerated.

Nevertheless they lessen the resistance to fatigue and affect work capacity under conditions of stress.

In pregnancy, anaemia has been shown to be associated with an increased risk of maternal and foetal morbidity and mortality (Llewellyn-Jones, 1965. Paul M. Tan, 1971. Lawson and Stewart, 1967).

Among the nearly 500 million women living in developing countries (other than China), about half the non-pregnant women and nearly two-thirds of the pregnant women have haemoglobin concentrations that are indicative of anaemia (E. Royston, 1982).

For pregnant women the proportion with anaemia is highest in Asia, followed by Africa and Latin America. The situation is also the same with regards to non-pregnant women (E. Royston, 1982).

In Malaysia, several studies have been done on anaemia in pregnancy (Carle WH, 1930. Tasker, 1958. Lourdenadin, 1964.). The earlier studies were on cases of anaemia among Indian labourers working in plantations. These were followed in the late fifties and mid-sixties by studies on women attending antenatal clinics and maternity hospitals.

of health facilities and providing health care to the people particularly those in the rural areas, had introduced various measures to control the problem. These included health education, providing vitamin and iron supplements to all pregnant women as well as giving free supply of full cream milk to those with poor economic background.

Yet, inspite of these measures anaemia during pregnancy and its complications continue to be a problem in this district as well as in many other parts of the country.

There is therefore a need for the problem to be assessed from time to time so as to determine:

1) the prevalence of anaemia in pregnancy in a particular district
2) the role of various factors in influencing the prevalence of the condition
3) its effects on maternal and foetal well-being

Through such evaluations, the current status of the problem can be estimated, thus giving an idea as to the effectiveness of preventive measures that have been taken. From this, strategies can then be formulated to suit the local situation.

With these in mind, this dissertation will report on the problem of anaemia in pregnancy in the area served by the Main Health Centre in K. Selangor.

REVIEW OF LITERATURE

Definition of anaemia

The term anaemia is defined as a condition in which the concentration of haemoglobin is below the level that is normal for a given individual.

" Normal haemoglobin concentration " is difficult to define. However, it is recognized that there is a homeostatic mechanism that sets the haemoglobin level in each individual and it is this level that is accepted as " normal ".

The distribution of such normal values in the population can be derived from representative samples of healthy persons in whom the presence of nutritional deficiencies have been excluded. This distribution of normal values is likely to be the same throughout the world with allowance being made for factors such as age, sex, pregnancy and altitude.

In detecting and evaluating the problem of anaemia in a community, reference standards are necessary. Based on world-wide haematological investigations of apparently healthy normal persons, the World Health Organization (WHO) has suggested certain haemoglobin levels, below which would be suggestive of the existence of anaemia.

For pregnant women, WHO has recommended 11 gm % as the minimum normal haemoglobin level, below which anaemia is said to exist (WHO Technical Report Series, 1968).However, for this study the level of 10 gm % was taken as the cut-off point as this was the level used in the mangement of anaemia in pregnancy in the district of Kuala Selangor.

Aetiology

The most common cause of anaemia in pregnancy in many countries is considered to be iron deficiency, while the second most common cause being folate deficiency (WHO Technical Report Series, 1974).

Lourdenadin (1964) in a study in Malaysia noted that 76.27 % of the cases of anaemia in pregnancy were iron deficiency anaemia. This was folowed by 22.09 % with megaloblastic anaemia and 0.68 % with haemolytic anaemia.

In a later study, Tee E Siong (1984) also observed iron deficiency to be the most prevalent type of anaemia in pregnancy followed by folate deficiency.

Prevalence of anaemia in pregnancy

In Malaysia, Lourdenadin (1964) noted the differences in the prevalence of anaemia among pregnant mothers of the three main ethnic groups.

It was noted that pregnant Indian women had the lowest average haemoglobin level and generally suffer the most severe form of anaemia.

Chong and Lourdenadin (1968) noted that among urban pregnant Malaysian women, the prevalence of

anaemia was 20 % while Kwa and Gaw (1968) in their study in Singapore reported a prevalence of 33 %

H.C Ong (1973) in a study on anaemia among the Orang Asli, noted that the overall prevalence of anaemia was 25.5 % .However he found that among those Orang Asli staying in deep jungle the prevalence of anaemia was only 2.7 % as compared to 29.0 % among those living in the jungle fringes,near villages or towns.

Income status

Anaemia has always been thought to be related to poverty.However, studies that have been done on anaemia in pregnancy have failed to show consistent relationship to the income status.

Rachmilewitz et al (1966) in a study in Israel noted that 70 % of anaemic women came from the low income group.

On the other hand, Kwa and Gaw (1968) in Singapore found that there was no significant

difference in economic status among the cases to account for the increased liability to develop anaemia.

Age and parity

In Malaysia, Lourdenadin (1964) found that 94 % of the anaemic mothers were multiparous and only 6 % were primigravidas.

Among the Orang Asli, Ong HC (1973) noted that 54.9 % of the anaemic mothers were grandmultips and only 9.8 % were primigravidas.

With regards to maternal age, Rachmilewitz et al (1966) found that there was a positive correlation between maternal age and the prevalence of anaemia in pregnancy.

Effects of anaemia on maternal health

Anaemia in pregnancy can affect both the mother as well as the foetus. Devi PK (1966) in a study in India reported that anaemia was either directly or

indirectly responsible for 20 to 40 % of maternal deaths in most maternity hospitals.

The relationship between anaemia in pregnancy and the incidence of preeclampsia has been widely studied. Gatenby and Lillie (1960), Giles and Shutteleworth (1958) and Barnes (1965) reported that the incidence of preeclampsia was about three times as high as encountered in routine obstetric practice.

Lourdenadin (1969) noted a significant increase in incidence of preeclampsia among anaemic pregnant women. The incidence being 7.5 % in anaemic women as against 4.5 % in overall incidence of preeclampsia.

S.K. Chaudhuri (1970) also observed that the incidence of preeclampsia was significantly higher in anaemic women (25 %) as compared to that in non-anaemic women (11 %).

However, opinions on the actual relationship between anaemia in pregnancy and the incidence of

preeclampsia vary.Whether anaemia per se predisposes to the development of toxaemia or whether the anaemia is secondary to the toxaemia has not been definitely established.

Effects of anaemia on the foetus

Paul M. Tan (1968) found that mothers with lower prenatal haemoglobin levels had smaller babies. He also noted that the stillbirth and perinatal mortality rates were higher in the anaemic mothers.

Ratten and Beischer (1972) in Australia noted that the perinatal mortality rate in the anaemic cases was 3.8 % (21 out of of 568), which was double that of the non-anaemic cases.

Regarding prematurity, Paul M. Tan (1968) in his study did not observe any significant difference in incidence between non-anaemic and anaemic mothers. However, Ratten and Beischer (1972) found the incidence of prematurity to be higher in anaemic patients, with the rate being 20 % in anaemic patients and only 14 % in the non-anaemic cases.

OBJECTIVE

General objective

This is a study on anaemia among pregnant women attending the antenatal clinic at the Main Health Centre in Kuala Selangor.

Specific objectives

The specific objectives of the study are as follows:

1) to determine the prevalence of anaemia among pregnant women attending the antenatal clinic at the Main Health Centre in Kuala Selangor.
2) to determine the ethnic distribution of anaemia in pregnancy.
3) to study the association of anaemia in pregnancy with the following factors:
   - age
   - parity
   - family income

- level of education

- birth interval

4) to describe the relationship of anaemia in pregnancy with infant birthweight

5) to look into the association of anaemia in pregnancy with the incidence of stillbirth and perinatal death

METHOD

This is a retrospective study which was carried out in the district of Kuala Selangor. The population of concern were all the pregnant women who received antenatal care at the Main Health Centre in Kuala Selangor and delivered during the period from 1.1.1991 till 31.12.1991.

During this period, there were altogether 192 deliveries. The data for the study were obtained from;

1) antenatal care registration book
2) mothers' antenatal record
3) child health record

These records were available at the main health centre. Data from the mothers' antenatal records were counter-checked with the antenatal care registration book and the child health records so as to check for errors in recording by the staff in the health centre.

Haemoglobin levels

Throughout their pregnancy, the mothers had their haemoglobin levels measured at booking and then monthly till delivery. However, cases noted to have anaemia had their haemoglobin level checked more frequently depending on the severity of their condition.

All the haemoglobin measurements were done at the Main Health Centre in Kuala Selangor by a junior laboratory assistant using the colorimeter method.

Based on their haemoglobin levels, the pregnant women were divided into two groups. Those with haemoglobin levels of less than 10 gm % at any time during their pregnancy were called the anaemic group, while those whose haemoglobin remained at 10 gm % or more throughout their pregnancy were called the non-anaemic group.

Data processing

All the data collected were entered into a personal computer and were then compiled and tabulated using the DBase III programme. The manuscript for the dissertation was then prepared using the Wordstar Professional programme.

Schedule

The study was carried out with the following schedule:

1. Preliminary preparations
   - course in research methods (January - February 1992)
   - title of dissertation (13.1.92)
   - literature review and write up of introduction (10.2.92)
   - preparation of dummy tables for use in field work (23.3.92)
2. Field work - data collection (6.4.92 - 18.4.92)
3. Data analysis
   - data analysis (April - May 1992)
   - writing up of first draft (20.7.92)
   - writing up of second draft (12.9.92)
   - completion of final draft (31.10.92)

Error and limitations

1. Categorization of cases as 'anaemic' and 'non-anaemic'

In this study cases are grouped either as anaemic or non-anaemic based solely on their haemoglobin level at any particular time during their pregnancy. This would mean that cases with only one incident of haemoglobin level being less than 10 gm % would still be considered as anaemic since counterchecking on the accuracy of the measurement was not possible.

Further more, with this categorization it was not possible to differentiate the cases in the anaemic group with regards to the severity and chronicity of the anaemia.

2. Accuracy of data

The data for this study were obtained from records on deliveries and antenatal cards of individual women kept at the Main Health Centre in Kuala Selangor. As such, error can occur during

the recording of patients' particulars by the clinic staff. This could involve information such as age, income and level of education.

These informations even if properly recorded, may not be accurate. This could be due to reluctance of the subjects in giving out details concerning matters such as household income.

The inaccuracy could also arise as a result of having to recall particulars such as the date of the last menstrual period.

Another source of error is that concerning the measurement of haemoglobin levels. Accuracy of the measurements would depend upon the skill and care taken by the junior laboratory assistant in performing the tests.

The accuracy of the measurements would also be influenced by condition of the instruments and the reagents used. The colorimeter has to be in good working condition and correctly calibrated to give accurate readings. The reagents used must be properly stored to prevent decomposition and it has to be diluted in the correct proportions before use.

3. Missing and incomplete data

One of the limitation of this study is that in having to rely entirely on secondary data, certain aspects of the problem could not be looked into due to the unavailability of the relevant data.

4. Sample size

The study population consisted of those who delivered within a one year period, and from this the study focussed on those who developed anaemia during their pregnancy.

Since the number that delivered during the particular year was rather small, consequently the number of those with anaemia were also found to be small.

As a result of this, the areas of concern were getting smaller and smaller as the data were analysed. This could have been overcome by having larger study population either through lengthening the period under study or by including cases from other health centres in the district so as to

include more subjects into the study. This however was not possible due to time constraint and difficulty in retrieving the relevant records.

Another way by which a larger sample could be obtained is by doing a prospective study of pregnant women followed up at the health centre, whereby there will be full control in determining and subsequently in obtaining the desired number of subjects.

5. Aetiology

In this study it was not possible to determine the different types of anaemia encountered. This was because investigations for anaemia were not routinely done for all cases with anaemia.

Facilities for laboratory investigations such as for serum iron and folate levels were not available. Simpler investigations such as stool examination for detection of helminthic infestation

could not be extensively carried out due to lack of cooperation from the mothers to bring in their stool sample for examination.

Also it was not possible to determine the duration of anaemia in each case i.e whether it was chronic or of short duration. This was because not all of the cases were booked early in their pregnancy.

Further more there were a number of inconsistencies in haemoglobin levels, with values fluctuating widely during subsequent follo-ups. This also resulted in difficulty to assess the response to treatment in the anaemic women.

Many of these limitations could be overcome by having a well designed prospective study to look into the various types of anaemia.

6. Detailed evaluation of nutritional knowledge and practice

It was not possible in this study to look

into the nutritional aspect of the problem as the relevant data were not available in the antenatal records.

For a study of this nature, data pertaining to the knowledge and practice of nutrition of the subjects would be useful in providing a clearer picture of the problem and thus enable conclusions that are more accurate and rational to be made.

BACKGROUND OF THE STUDY AREA

The state and the district

This study was carried out in the Kuala Selangor district in the state of Selangor which is situated on the west coast of Peninsular Malaysia. It is one of the most developed state in the country.

The area selected was served by the Main Health Centre (Pusat Kesihatan Besar) in the town of Kuala Selangor. This health centre provides out-patient as well as maternal and child health services to a population of 36,484 people.

The population served by the Main Health Centre in Kuala Selangor consisted of Malays (58.6 %), Chinese (20 %), Indians (21.3 %) and others (0.1 %). Of these, 23.5 % resided within the town area (i.e under the Majlis Daerah) and they consisted of government srevants, office workers and shopkeepers.

The majoriy of the population served by the Main Health Centre in K. Selangor (about 76 %) were from

the surrounding villages and estates where they were mainly involved in agricultural activities such as fishing, coconut growing and workers in oil palm estates.

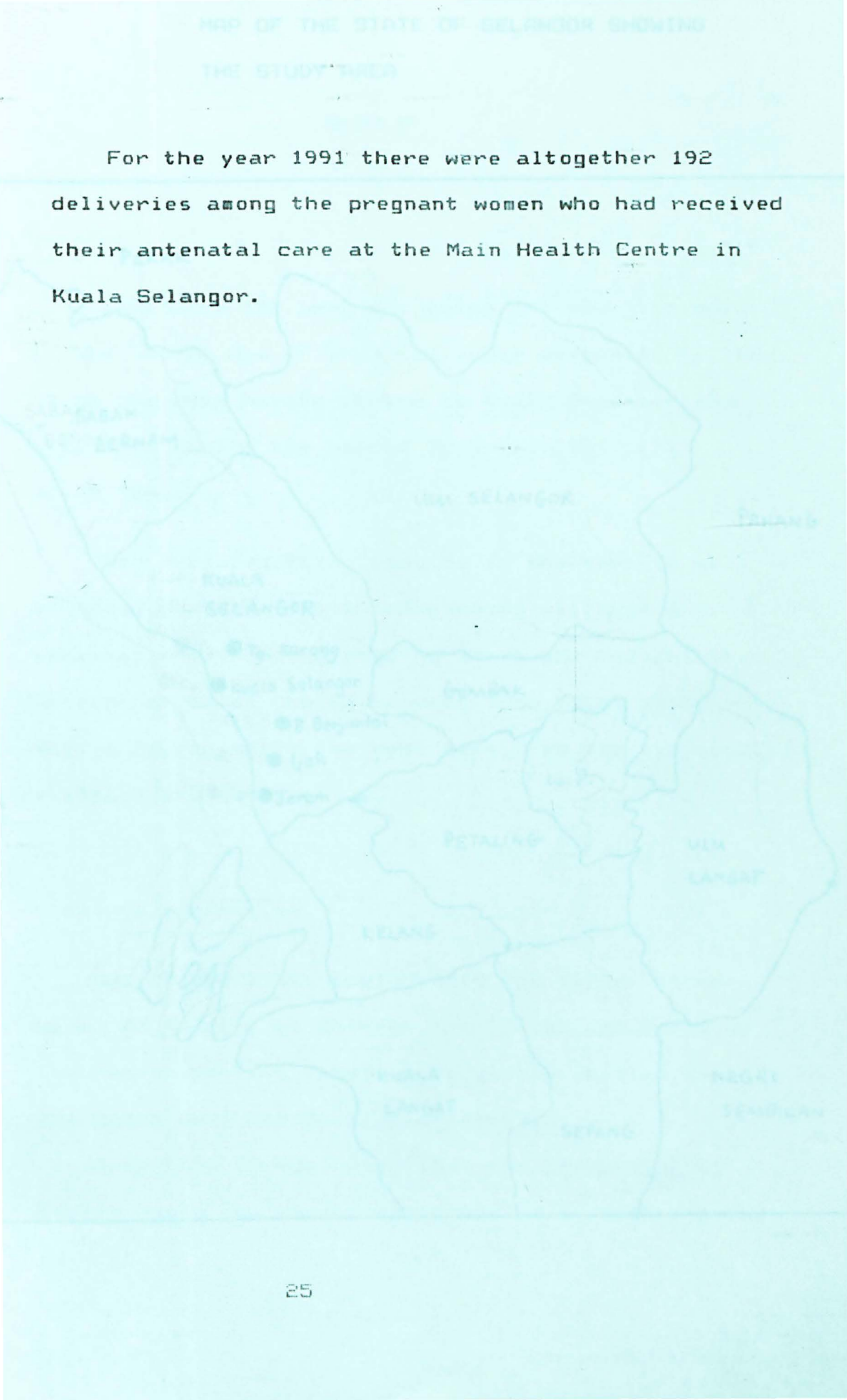
From the Main Health Centre in Kuala Selangor, high risk cases and cases with obstetrical problems were also referred to ;

1. Tanjung Karang District Hospital
2. Hospital Besar Tengku Ampuan Rahimah, Klang

for further management.

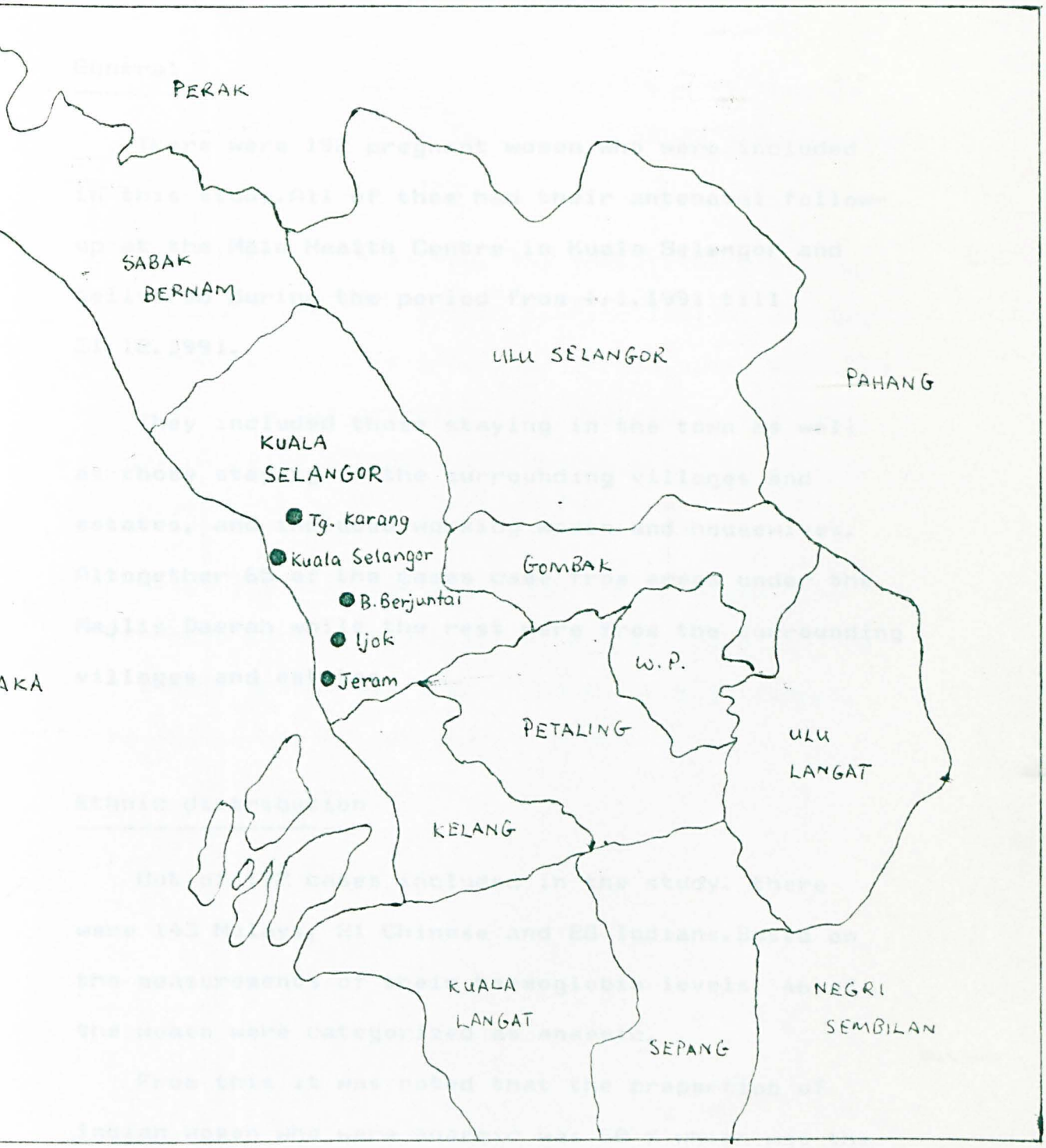
The staff in the Main Health Centre in Kuala Selangor were headed by a Medical and Health Officer, who in turn was assisted by a medical assistant, 3 staff nurses, 1 trained mid-wife, 3 assistant nurses, 1 pharmaceutical assistant and other auxillary staff.

For the year 1991 there were altogether 192 deliveries among the pregnant women who had received their antenatal care at the Main Health Centre in Kuala Selangor.



MAP OF THE STATE OF SELANGOR SHOWING

THE STUDY AREA



RESULTS

General

There were 192 pregnant women who were included in this study.All of them had their antenatal follow-up at the Main Health Centre in Kuala Selangor and delivered during the period from 1.1.1991 till 31.12.1991.

They included those staying in the town as well as those staying in the surrounding villages and estates, and included working women and housewives. Altogether 65 of the cases came from areas under the Majlis Daerah while the rest were from the surrounding villages and estates.

Ethnic distribution

Out of 192 cases included in the study. there were 143 Malays, 21 Chinese and 28 Indians.Based on the measurements of their haemoglobin levels, 46 of the women were categorized as anaemic.

From this it was noted that the proportion of Indian women who were anaemic was 50 % which was the

highest of the three ethnic groups, followed by 21.7 % for the Malays.There was only 1 case of anaemia among the Chinese women i.e 4.8 %

Applying the Fisher's exact test the difference in the prevalence of anaemia in the three ethnic group was found to be significant.

For further comparison, the three ethnic groups were divided into two groups i.e the Indians and the Non-Indians.With this grouping, it was noted that the difference in the prevalence of anaemia in the two groups was significant, with Chi-square = 12.17 and $p < 0.05$

Comparing only the Malay and Indian women, the difference in the proportion of anaemia cases in the two ethnic groups was also found to be significant, with chi-square = 9.83 and $p < 0.05$

Table 1. Ethnic distribution of pregnant women who delivered in 1991

Ethnic group	Non-anaemic	Anaemic	Total
Malay	112	31	143
Chinese	20	1	21
Indian	14	14	28
Total	146	46	192

chi-square = 15.07 d.f = 2

$p < 0.05$

Table 2. Distribution of cases in Indian and Non-Indian women

Ethnic group	Non-anaemic	Anaemic
Non-Indian	132	32
Indian	14	14
Total	146	46

chi-square = 10.59 d.f = 1

$p < 0.05$

Maternal age and parity

In the study population, their age range from 16 to 43 years.For the anaemic group the range was from 20 to 39 years.

The mean age for the non-anaemic group was 28.3 years with a standard deviation of 5.75 years.For the anaemic mothers, their mean age was 28.7 years with a standard deviation of 5.08 years.

The difference in mean age in the two groups was not significant with p) 0.05 (t-test).

With regards to the parity of mothers in both groups, the multiparas formed the major proportion. The difference in the parity distribution of women in the two groups was not significant, with chi-square = 0.535 and p) 0.05

Table 3. Age distribution in the anaemic and non-anaemic groups

Age	Anaemic	Non-anaemic
15 - 19	0	1
20 - 24	10	37
25 - 29	18	47
30 - 34	10	43
35 and above	8	18
Total	46	146

Table 4. Mean age for the anaemic and non-anaemic group

	Range	Mean	Std.deviation
Anaemic group	19	28.7	5.08
Non-anaemic group	27	28.3	5.75

t = 0.43 d.f = 190

p > 0.05

Table 5. Parity distribution in the anaemic and non-anaemic groups

Parity	Anaemic	Non-anaemic
Primigravida	10 (26.3 %)	28 (73.7 %)
Multipara (para 1 - 5)	32 (22.7 %)	109 (77.3 %)
Grand multipara (para 6 and above)	4 (30.8 %)	9 (69.2 %)
Total	46	146

chi-square = 0.57 d.f = 2

p > 0.05

Level of education

From the data obtained it was noted that in the anaemic group 23.9 % had either no formal education or only primary education.

Regarding those with secondary and tertiary education, in the anaemic group they made up 76.1 % and for the non-anaemic group it was 72.2 % .

The difference in the level of education in the two groups of pregnant women was not significant with chi-square = 0.27 and $p > 0.05$

Table 6. Level of education of mothers in the anaemic and non-anaemic groups

Level of education	Anaemic	Non-anaemic
No formal education and primary education	11	40
Secondary and tertiary education	35	104
Total	46	144 *

chi-square = 0.105 d.f = 1

$p > 0.05$

* Data on the level of education of 2 cases were not available.

Family income

This included income of all the family members, namely the pregnant women herself (if she is working) and that of her husband.

The mean family income in the non-anaemic group was $892.60, while that in the anaemic group was $881.72. The difference in the income distribution in the two groups was not significant, with chi-square = 1.49 and p > 0.05

Table 7. Income distribution in the anaemic and non-anaemic groups.

Income, $	Non-anaemic	Anaemic
200 - 599	50	17
600 - 999	46	14
1000 - 1599	36	8
1600 and above	13	6
Total	145 *	45 *

chi-square = 1.49 d.f = 3

p > 0.05

* Data on the income of 2 cases were not available, one from each group.

Interval from the last pregnancy

This was taken as the duration from the date of the last delivery (or abortion) till the date of delivery for the present pregnancy.

For the non-anaemic group the mean interval was 36.7 months, while for the anaemic group it was 35.2 months.

The difference in interval distribution in the two groups was not significant, with chi-square = 6.15 and $p > 0.05$

Table 8. Birth interval distribution in the anaemic and non-anaemic groups

Interval	Non-anaemic	Anaemic
less than 24	15	9
24 - 35	40	9
36 - 47	33	6
48 and above	27	12
Total	115 *	36 *

chi-square = 5.84 d.f = 3

p > 0.05

* 38 primigravida were not included, 10 from the anaemic group and 28 from the non-anaemic group. Also 3 cases from the non-anaemic group were not included as the relevant data were not available.

Stage of gestation at which anaemia was detected

From the study it was noted that most of the cases of anaemia among the pregnant women were first diagnosed during the second and third trimester of pregnancy. However the actual prevalence of anaemia could not be determined because of several reasons.

Firstly, not all of the cases were booked at the first trimester. As such cases that were detected to have anaemia may actually have had the problem earlier on in their pregnancy.

This was especially so in cases that were booked late i.e in the third trimester. Such cases could could still have been anaemic earlier on, either in the first or second trimester.

Secondly, the haemoglobin level for each woman was not routinely done for every antenatal visit. Cases with anaemia therefore, could have been missed. Further more there were those who had defaulted and were not attending their antenatal follow-up regularly.

Table 9. Stage of gestation during which anaemia was detected

Trimester	No. of anaemia cases
1	1
2	19
3	26
Total	46

Birthweight

Of the 192 cases under study, birthweights were recorded for 185 babies. The mean birthweight for the non-anaemic group was 3.27 kg while that for the anaemic group was 3.03 kg.

Although the mean birthweight was noted to be higher in the non-anaemic group, this difference however was not significant with $p > 0.05$

The proportion of babies with weights less than 2.5 kg was noted to be higher in the anaemic group as compared to that in the non-anaemic group (2.32 % and 2.1 % respectively).

However this difference was found to be not significant using the Fisher's exact test, with the exact probability of the observed table being > 0.05

Table 10. Birthweights of babies in the anaemic and non-anaemic groups

Birthweight	Non-anaemic	Anaemic
less than 2.5 kg	3	1
2.5 kg and above	139	42
Total	142 *	43 *

Fisher's exact test:

p = 0.656

Stillbirth and perinatal deaths

Out of the 192 births in this study, there were 186 livebirths and 6 stillbirths with no multiple birth. In both the non-anaemic and anaemic groups there were 3 stillbirths.

The stillbirth rate was higher in the anaemic group (65 per 1000), being more than three times that of the non-anaemic group.

Out of the 186 livebirths there were 5 early neonatal deaths in the non-anaemic group and 1 in the anaemic group. The perinatal death rate was found to be higher in the anaemic group (87 per 1000), which was 1.6 times that of the non-anaemic group.

However, the higher stillbirth and perinatal death rates in the anaemic group was found to be not significant using the Fisher's exact test.

Table 11. Incidence of stillbirth in the anaemic and non-anaemic and non-anaemic groups

	Non-anaemic	Anaemic
Stillbirth	3	3
Livebirth	143	43

Fisher's exact test:

p = 0.150

Table 12. Incidence of perinatal death

	Non-anaemic	Anaemic
Perinatal death	8	4
Alive	138	42

Fisher's exact test:

p = 0.316

DISCUSSION

Prevalence of anaemia in pregnancy

From this study, the prevalence of anaemia among pregnant women who received antenatal care at the Main Health Centre in Kuala Selangor and subsequently delivered during the year 1991 was determined to be 23.96 % .

Since there was no similar study done in the district before, it would not be possible to make a definite comparison of the present situation with regards to the trend in the prevalence of anaemia in the district.

However, this finding appears to be consistent with that of other studies on the subject.
Tee E. Siong et al (1984) in a study at the Maternity Hospital in Kuala Lumpur, reported a prevalence of 22.8 % while Chong and Lourdenadin (1968) noted a prevalence of 20 % .

In comparing with the findings of these studies as a general assesment of the situation, it would seem that the extent of the problem has not changed appreciably over the years.

This certainly would be an interesting observation in view of the fact that since gaining independence, the country had embarked on various programmes aimed at improving the health as well as the socio-economic condition of the general population.

The Ministry of Health through its various activities had identified women and children as a selected group, with special emphasis given towards improving and maintaining their health status.

Inspite of significant improvements in the levels of maternal and infant mortality, there appear to be no appreciable improvement with regards to the prevalence of anaemia among pregnant in the country. This would imply the need for a critical review of our understanding of the problem in this country and the effectiveness of measures taken to control it.

Nevertheless, in making such comparison with the earlier studies, the differences in the study population need to be taken into account. The studies mentioned were hospital-based and consisted of cases that were admitted to the wards.

As such, many cases with mild anaemia could have been treated as out-patients and therefore not included in the studies. This would suggest the possibility that the actual prevalence of anaemia then was much higher than what were reported.

Ethnic distribution

In this study, the prevalence of anaemia was found to be highest among Indian women whereby 50 % of them were found to be anaemic at one stage of their pregnancy. This was followed by the Malays and the Chinese.

Many of the earlier studies done in this country and in Singapore also reported similar findings. Tee E. Siong (1984) noted the highest prevalence of anaemia in pregnancy among Indian women i.e 36.5 %

In Singapore, Kwa and Gaw (1968) also found a higher prevalence of anaemia among Indian women as compared to the Chinese and Malay women.

Regarding the prevalence of anaemia in pregnancy among Indian women in other parts of the world, a similar situation had been noted in Fiji and South Africa (E. Royston, 1982), where the prevalence of anaemia among Indian women was noted to be higher than the other indigenous groups.

The higher prevalence of anaemia among Indian women as compared to the other races in this study as well as in other studies in West Malaysia, could be due to various factors.

One of these is socio-economic factor. In this study it was noted that the mean household income

among Indian women was $586, which was lower compared to that of the Malays and Chinese ($948 and $834 respectively).

Other factors that could have influenced the prevalence of anaemia among Indian women include factors such as age, parity and birth intervals. However in this study, these aspects were not found to be significantly different from the other races. This may be due to the small size of the study population. It would therefore be interesting to see the significance of these factors in a larger sample size.

In addition to this, the findings made regarding the higher prevalence of anaemia among pregnant Indian women strongly suggest the need for more detailed studies on the problem to be conducted to look into the various factors, notably the nutritional aspect.

Nutritional anaemia is still a major problem in this country as well as in many parts of the world (Tee E. Siong, 1983. E. Royston, 1982). With regards

to the problem of anaemia among the Indians, further research needs to be done to look into the various aspects of their nutrition.

The greater prevalence of megaloblastic anaemia among the Indian women (Kwa and Gaw, 1968) may be related to their dietary, either in the choice of food or the method of preparation.

Certain food substances have been shown to inhibit iron absorption. Substances such as phytates and phosphates found in vegetable foods and also tea are are believed to inhibit iron absorption (Bjorn-Rasmussen E, 1974. Dister P.B. et al, 1975).

Further more, being vegetarian or eating much less animal protein would result in lower body stores of vitamin B12 (Baker S.J. 1967).

Interval from the last delivery

Frequent and closely spaced pregnancies can lead to severe depletion of the body's iron stores. This in turn would result in the woman being more prone to develop anaemia.

The situation would be further aggravated by the physiological changes during pregnancy and also if the woman failed to replenish her iron stores after delivery and prior to the following pregnancy.

In this study, no significant relationship was observed between the interval from the last delivery and the prevalence of anaemia. This however, could be due to the fact that only a small proportion of women in the study (17 %) had birth interval of less than 24 months.

In addition to this, the effect of birth interval would be more critical for women with marginal nutritional status. Mothers with adequate diet and were

nutritionally fit, would therefore be able to replenish their iron stores and carry on with further pregnancies without developing anaemia, even if these were closely-spaced.

Further more this study only focussed on birth interval with respect to the last delivery only.Hence, one instance of short birth interval by itself may not show any significant predisposition to developing anaemia.A better measure of the effect on the prevalence of anaemia would be the birth intervals of all the previous pregnancies.

Level of education

There was no significant relationship observed between level of education and the prevalence of anaemia in this study. About 70 % of the subjects in both the anaemic as well as the non-anaemic groups had either secondary or tertiary education.

There was also no significant relationship noted between the level of education with characteristics such as parity and birth-spacing, both of which may influence the likelihood of developing anaemia.

These findings seem to imply that lack of education by itself may not be an important factor in the occurence of anaemia. Other factors such as attitude and social background together with religious and cultural influences may play an important role as well.

Household income

From the data collected in this study, it was noted that there was no significant relationship between household income and the prevalence of anaemia.

The findings in other studies varies. Rachmilewitz (1966), noted a significant association between family income and the incidence of anaemia.

On the other hand, Kwa and Gaw (1968) in Singapore noted that there was no significant difference in economic status of the subjects to account for the prevalence of anaemia observed.

In drawing conclusions regarding the relationship of household income to the prevalence of anaemia, it has to be viewed together with other factors such as the family size, dietary habits and the manner of food preparation.

It would also be necessary to take into account the actual proportion of the income spent on food and also in the manner that food is distributed within the family.

With these considerations made, a more realistic association can then be established between household income and the prevalence of anaemia.

Maternal age and parity

From the data obtained it was found that there was no significant relationship between maternal age and parity with the prevalence of anaemia. This could due to the fact that only a small proportion of the subjects in the study were 35 years and above (17.4 % in the anaemic group and 12.3 % in the non-anaemic group).

It would be expected that maternal age would have a significant association with the incidence of anaemia. As age increases, the number of children a woman will have would usually increase as well. Together with other factors such as inadequate spacing between pregnancies and poor nutritional status, this would render the woman more liable to develop anaemia.

Kwa and Gaw (1968) also noted that there was no significant relationship with maternal age. However in their study, they did observed a greater liability of developing anaemia with increasing parity.

Rachmilewitz (1965) in an earlier study in Israel was able to observe a positive correlation between maternal age and parity with the prevalence of anaemia.

Stage of gestation at diagnosis

The findings in this study showed that about 98 % of the cases of anaemia were first diagnosed during the second and third trimesters. Kwa and Gaw (1968) also noted similar findings in their study in Singapore.

The second and third trimesters appears to be the period when the pregnant women were most liable to develop anaemia. This could be due to the fact that the requirements for iron and folate are greatest during this stage of pregnancy, and also due to the physiological process of haemodilution which reaches its peak at around 30 weeks of gestation.

However, in this study it should be noted that not all of the cases were booked in the first trimester. This would mean that cases detected in the second and trimesters could still have been anaemic before they came for antenatal booking. Therefore the actual prevalence of anaemia according to the stage of gestation could not be determined.

Effects on the baby

1. Birthweight

In this study the birthweights of babies born to anaemic mothers were noted to be smaller than those born to non-anaemic mothers.However this difference was not statistically significant.

Also the proportion of babies with birthweights less than 2.5 kg was larger in the anaemic group as compared to that in the non-anaemic group (2.3 % and 2.1 % respectively).This difference was also not significant.

Nevertheless, these findings do imply the importance of anaemia in influencing birthweight.It would be interesting to see if a significant relationship could be established with a well-designed prospective study on the problem.

Other studies done on the subject have produced conflicting reports.Studies such as those by Llewellyn-Jones (1965) noted the relationship

between severe maternal anaemia and poor obstetrical performance.

Paul M. Tan (1971) was able to observe a significant correlation between the birthweights of babies with the maternal prenatal haemoglobin levels. His findings showed that the birthweights tended to be lower with decreasing maternal haemoglobin levels.

Lourdenadin (1969), in his study on the hazards of pregnancy in Malaysia, found that the weights of newborns of anaemic mothers were lower with 42 % being less than 2.5 kg.

However, Ratten and Beischer (1972) found that there was no significant increase in the proportion of infants weighing 2.5 kg or less in patients with anaemia as compared to those without anaemia.

With regards to this study, interpretation of the findings made would have been more meaningful if they were made in relation to the duration and severity of the anaemia.However this could not be done as it was

not possible to further analyse the cases with regards to chronicity and severity of the anaemia for reasons already mentioned.

In assesing the effect of anaemia on birthweight, other factors influencing intrauterine foetal growth need to be taken into account as well. These would include factors such as the general nutritional status of the mother, the birth intervals, the duration and stage of pregnancy that anaemia was present and the presence of complications such as preeclampsia.

2. Stillbirth and perinatal death

The stillbirth rate that was observed in this study was three times higher in the women with anaemia as compared to that in the non-anaemic women. Even though the statistical significance of this observation could not be tested because of the small sample size, it nevertheless indicate the importance of anaemia in pregnancy and its effect on foetal well-being.

More effort therefore is needed to look into this aspect of the problem, perhaps through a properly designed prospective study.

Regarding the perinatal death rate this was also noted to be higher in the anaemic group. Paul M. Tan (1968) made similar findings in his study whereby, the stillbirth rate in the anaemic patients was 16.3 as compared to 10.1 in the non-anaemic mothers. The perinatal death rate was also higher in the anaemic patients being 26.8 as compared to 17.5 in the non-anaemic mothers.

Ratten and Beischer (1972) in their study of deliveries in an Australian hospital, reported a perinatal mortality rate in anaemic mothers which was double that of the non-anaemic patients.

Similarly, Lourdenadin (1969) noted a higher perinatal mortality among anaemic mothers. Therefore reducing the prevalence and severity of anaemia will be an important aspect in the overall strategy to decrease the stillbirth and perinatal mortality rates.

Another area of concern with regards to the effect of anaemia on pregnancy outcome is the incidence of abortion. This problem however could not be looked into as the study was designed to focus only on deliveries during the year 1991. Again, it would be interesting to see the relationship of anaemia with the incidence of abortion through a well designed prospective study.

RECOMMENDATIONS

Anaemia among pregnant women in this country affects every community. Nevertheless certain ethnic group appear to be affected more than the others. In this study it was observed that the problem was most prevalent among Indian women. Other studies done in this country also noted a similar finding.

In view of this finding, further research will have to be done to look into the background of the Indian community. Such research will need to focus on factors and conditions existing within the community that may subject the women to higher risk of developing anaemia during pregnancy.

Community participation

The findings from this study also suggest the importance of other factors besides family income in influencing the prevalence of anaemia. As such, in

trying to bring the problem under control preventive measures to be carried out must place more emphasis on instilling greater awareness of the problem and its complications.

For this, a strategy emphasising community participation through the primary health care approach would be most effective. This is important in that long term measures to reduce the prevalence of anaemia in pregnancy would be better accepted if they were initiated within the community itself.

Studies done on anaemia among pregnant women have shown that it is still a problem in the country inspite of the socio-economic development that have taken place since gaining independence and also the various measures taken to control the problem. In view of this, a change in the approach to the problem is needed, taking into account the social and cultural characteristics of the community.

Most of the measures implemented had been initiated and carried out by government agencies, with the target group being merely passive recipients. A more active

participation of the comunity is needed to ensure a greater effectiveness of remedial measures introduced.

In a district like Kuala Selangor, organizations such as KEMAS, farmers association and women's group can be involved in promoting these measures. The role of health workers would be mainly in providing technical advice.

As suggested by the findings in this study, other factors such as socio-cultural factors appear to have significant influence on the occurence of anaemia among pregnant women. For this reason, the involvement of other sectors or agencies is vital.

These would include the Education, Agriculture and Welfare departments. Through their participation more resources would be available to tackle the various issues which the health workers would not be able to do.

The activities to be carried out should emphasize among other things the importance of good nutrition

and family planning. These activities can be carried out by the community themselves, with advice from the health workers.

Other relevant personnel can also be called in should the need arise. Agriculture officers for example can be called upon to give advice on of crops with good nutritional value.

Religious authorities can also play an important role in dealing with certain ambiguities that can arise with the introduction of measures such as family planning and immunisation.

The setting up of income generating projects within the community is another group of activities that should be encouraged. This would not only improve the economic status of the community, but also foster greater understanding and cooperation among the community members, which would be vital in ensuring continuing community participation.

Presently there are several projects of this nature being conducted in the district, such as the

Program Pembangunan Rakyat Termiskin (PPRT) and the IKHTIAR project.

The estate sector is another segment of the community where greater effort is needed for health promotion, notably for the women and children. The majority of the Indian women in this study were from the surrounding oil palm estates. It is in this aspect that the workers union and estate management should take a more active role in promoting and maintaining health related activities.

Comprehensive and continuing health care

It should be realized that the occurence of anaemia among pregnant women is influenced to a certain extent by the nutritional status of the women during the period before pregnancy itself.

As such women who have been identified to be at high risk of developing anaemia should be continuously monitored even after the puerperium and right up till

the next pregnancy. During this period regular home visits should be conducted with advice given on health related matters including good nutrition practice.

In order to ensure that the women are in good health and receiving adequate nutrition before embarking on another pregnancy, it is vital that effective family planning must be widely accepted. For this, advice on family planning should be regularly given and family planning services must be planned so as to be easily accessible.

In addition to this, all efforts carried with regards to health promotion for women should at the same time involve the menfolk. This is important since women in our society are to large extent still dependent on their husbands in making decisions including those pertaining to their own health.

SUMMARY

This is a retrospective study on the problem of anaemia among pregnant women who received their antenatal care at the Main Health Centre in Kuala Selangor. The subjects for the study were those who had their delivery during the period from 1.1.1991 till 31.12.1991.

From the data collected it was determined that the prevalence of anaemia among the pregnant women was 23.96 % and the prevalence was highest among Indian women.

The study did not show any significant association of factors such as age, parity, level of education, family income, and birth spacing with the prevalence of anaemia.

It was also noted in the study that 98 % of the cases of anaemia were diagnosed in the second and third trimesters.

Regarding the effect of anaemia on the foetus, it was observed that the birthweights of babies of anaemic mothers were lower than those of the non-anaemic mothers.Similarly the proportion of babies with birthweights less than 2.5 kg was larger in the anaemic mothers.However, these findings were statistically not significant.

The stillbirth and perinatal mortality rates were also found to be higher in the anaemic women.Even though this was not significant it was still an important finding and should be further looked into with a well designed prospective study.

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APPENDIX

Definition of terms used in the study

1. Anaemic - mothers whose haemoglobin level fall below 10 gm % at any time of their pregnancy
2. Non-anaemic - mothers whose haemoglobin level were 10 gm % and above all the time during the pregnancy
3. Parity - refers to pregnancy that have continued to viability (at least 28 completed weeks of gestation)
4. Interval from the last delivery - refers to the number of months between the date of the last child birth and the date of the present delivery
5. First trimester - refers to the gestational stage below 16 completed weeks

6. Second trimester - refers to the gestational stage of 16 completed weeks and above, but below 28 completed weeks

7. Third trimester - refers to the gestational stage of 28 completed weeks and above

8. Stillbirth - birth of a foetus weighing more than 500 gm when there is no sign of life after birth

9. Perinatal death - defined as the number of stillbirth and the number of death within the first seven days of life

10. Stillbirth rate - this the stillbirth per 1000 total births

11. Perinatal mortality rate - it is the stillbirth plus the death in the first seven days of life per 1000 total births.

12. Primigravida - refers to mother who is pregnant for the first time

13. Multipara - refers to mother who had two or more viable pregnancies

14. Grandmultipara - refers to mother who had six or more viable pregnancies

15. Level of education - refers to the mother's highest completed education level, categorized as follows:

    i) no formal education - never attended school

    ii) primary education - standard 1 to 6

    iii) secondary education - form 1 to 6

    iv) tertiary education - diploma and degree holder