The present study was carried out in 7 villages, namely - Mustara, Pichhore, Kochhabhanwar, Digara, Bachwali, Baraon and Baratha, located within the area of Primary Health Centre, Kochhabhanwar, one of the rural Health Training Centres of the Department of Social and Preventive Medicine, M.L.S. Medical College, Jhansi, Uttar Pradesh. In this area, no study had been so far undertaken on the problem of anaemia. It is hoped that the present study would, inter alia, provide some important data that may help in the planning of control measures against anaemia in the area.

ENVIRONMENT AND CLIMATE

District Jhansi of Bundelkhand region is situated in the south-west of the state, surrounded by districts - Gwalior, Datia, Shivpuri and Tikamgarh of Madhya Pradesh and Lalitpur, Hamirpur and Jalaun of Uttar Pradesh. In 1971, district Jhansi had a population of 870,139 (Census of India, 1971). Primary Health Centre, Kochhabhanwar covers a population of 92,033. The total population of the 7 villages considered for the study, as per Primary Health Centre records, is shown in Table 1.
### TABLE 1.

**Village-wise distribution of population in the study area.**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the village</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Mustara</td>
<td>440</td>
</tr>
<tr>
<td>2.</td>
<td>Richhore</td>
<td>648</td>
</tr>
<tr>
<td>3.</td>
<td>Kochhabhanwar</td>
<td>4,660</td>
</tr>
<tr>
<td>4.</td>
<td>Digara</td>
<td>1,243</td>
</tr>
<tr>
<td>5.</td>
<td>Bachawali</td>
<td>320</td>
</tr>
<tr>
<td>6.</td>
<td>Baragaon</td>
<td>5,132</td>
</tr>
<tr>
<td>7.</td>
<td>Baratha</td>
<td>1,500</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>13,959</strong></td>
</tr>
</tbody>
</table>

All the villages, except Richhore and Mustara, are situated on Bombay-Kangur national highway No. 25 and fall within a range of 15 km. from Medical College Campus. Village Richhore is situated just behind the Medical College, while Mustara is situated in the interior (Fig. 1).

Climate of the area is hot and dry. Mean monthly temperature, during the year 1978-79 (Govt. of Uttar Pradesh, 1979) ranged from a minimum of 2.3°C to a maximum of 46.1°C. Total rainfall during the year 1978 was 1,227 mm.
SELECTION OF STUDY AND CONTROL SAMPLES.

All the pregnant women of the study area were included in the study group except those who were having a history of:

(i) gross menorrhagia or epimenorrhoea during the period immediately before conception.

(ii) diseases like tuberculosis, chronic malaria, urinary tract infection of long duration, myxoedema and malignancy.

(iii) taking treatment in the form of iron, folic acid and/or vitamins (as far as could be ascertained).

The concerned A.M.M./F.N.M. of the area was instructed beforehand to issue iron and folic acid tablets to the pregnant women only after the completion of a visit in the third trimester.

An equal number of non-pregnant women belonging to same socio-economic status, parity and age from the same or neighbouring families, were selected to serve as controls. Precautions taken for the selection of controls were same as that for study group.

A total of 246 pregnant women belonging to different trimesters of pregnancy were included in the study group. An exactly equal number served as control. Table 2 shows the village-wise distribution of study and control cases.
**TABLE 2.**

**Village-wise distribution of women in study and control groups.**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the village</th>
<th>STUDY WOMEN</th>
<th>CONTROL WOMEN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>1.</td>
<td>Kochhabhanwar</td>
<td>67</td>
<td>27.24</td>
</tr>
<tr>
<td>2.</td>
<td>Digara</td>
<td>23</td>
<td>9.36</td>
</tr>
<tr>
<td>3.</td>
<td>Baragaon</td>
<td>82</td>
<td>33.33</td>
</tr>
<tr>
<td>4.</td>
<td>Bachawali</td>
<td>13</td>
<td>5.28</td>
</tr>
<tr>
<td>5.</td>
<td>Baratha</td>
<td>39</td>
<td>15.85</td>
</tr>
<tr>
<td>6.</td>
<td>Bhatta</td>
<td>13</td>
<td>5.28</td>
</tr>
<tr>
<td>7.</td>
<td>Richhore</td>
<td>9</td>
<td>3.66</td>
</tr>
</tbody>
</table>

Total | 246      | 100.00 | 246      | 100.00 |

Majority of women in both the groups were in the age-group of 20-35 years and belonging to poor socio-economic status. Almost all of them were Hindu and Muslims were very few (3 percent in study group and 2 percent in control group). No woman belonging to other religion would be encountered. A great majority of women in both the groups were either illiterate or just literate. Family occupation in most of the cases was agriculture or labour. Almost half of the total
pregnant women were found to have a pregnancy of 6 month or above at the time of initial registration. Vegetarians outnumbered non-vegetarians in both the groups.

METHODS OF SURVEY

An extensive search was made, with the help of the A.M.M./F.W.M./H.A. of the concerned villages to detect the pregnant women in the area. Each woman, considered for the study, was subjected to a detailed examination under the following heads:

(i) General interrogation
(ii) History taking
(iii) General and systemic examination
(iv) Investigations
(v) Diet survey
(vi) Follow-up of pregnant women.

Various relevant informations were recorded on a pre-tested schedule specially designed for the purpose (appendix I).

(i) General interrogation

General informations such as - name, age, religion, caste, name of the husband and of the head of the family, occupation and socio-economic status etc. were recorded for the respondents of study as well as control groups. The information on age was verified by obtaining data of
past vital events like age at marriage and first child
birth etc. The actual family occupation and the occupation
of women was also recorded. Social classification of
families was done as recommended by Prasad (1970).

(ii) **History Taking**

Detailed histories on menstrual pattern, previous
as well as present pregnancy and lactation etc. were
obtained as under:

(a) **Menstrual History** :- This included age at menarche,
cycle of menstruation, rhythm, flow, presence or absence
of clots in menstrual blood and date of last menstrual
period. In illiterate women, date of last menstrual
period was calculated by relating the first day of last
menses with the date of Indian Calendar (tithi) or with
fairs and festivals of that particular month. In cases
with advanced pregnancy where the woman did not give any
idea about the date, the month of last menses was taken
into account.

(b) **Obstetrical History** :- Enquiries on number of gravida,
parity, abortions and medical termination of pregnancies
were also made. The date of last child birth was recorded.
Few details on the previous births, if any, like antenatal
care, place and mode of delivery, sex of the child in cases
of live births and age of the child were also obtained.
The duration of breast feeding for their last child and the
time of discontinuation was recorded.
(c) **History of Present Pregnancy**: Duration of pregnancy was calculated from the date of last menstrual period and was recorded in months. It was confirmed by the findings of examination of fundal height. Associated complaints, such as - loss of appetite, nausea, vomiting, weakness, giddiness, fever etc, were also recorded.

(iii) **Examination**

General and systemic examinations were conducted to detect the signs of anaemia like pallor of skin, mucous membranes, conjunctiva and nails, koilonychia etc. Their heights and weights were also recorded following standard methods (Weiner and Lourie, 1969). Blood pressure was recorded by a mercury sphygmomanometer in sitting posture, applying auscultatory method (American Heart Association, 1951). The systolic blood pressure was recorded at the first appearance, while diastolic blood pressure was recorded at the muffling of the Korotkoff sounds. Two readings were made at an interval of 3-5 minutes (Srivastava et al 1979) and the lower value out of the two was recorded (Rose and Blackburn, 1968).

(iv) **Investigations**

Haemoglobin estimation & examination of general blood picture were carried out in the manner given below.
(c) **History of Present Pregnancy** — Duration of pregnancy was calculated from the date of last menstrual period and was recorded in months. It was confirmed by the findings of examination of fundal height. Associated complaints, such as — loss of appetite, nausea, vomiting, weakness, giddiness, fever etc. were also recorded.

(iii) **Examination**

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(iv) **Investigations**

Haemoglobin estimation & examination of general blood picture were carried out in the manner given below.
(a) Haemoglobin Estimation: Haemoglobin estimation was carried out at the spot by standard Sahli's method (Hunter and Sumford, 1968). The graduated haemoglobinometer tube was filled, roughly up to the mark of 10 percent, with N/10 HCl. The pipette was filled up to the mark of 20 c.m.m. with blood, obtained from finger prick using aseptic technique, and blown gently into the tube. The pipette was rinsed several times with the acid solution in the tube. The latter was allowed to stand for five minutes. Distilled water was then added drop by drop with the help of a dropper. After addition of each drop, the fluid in the tube was stirred with a small glass rod. It was continued until the tint in the tube matched with the standard. Comparisons were made in day light. Reading was taken one minute after the last drop of water had been added. It was repeated after the addition of another drop of water and if necessary more drops, until the point is reached when the tints are again just unequal and average of the two readings was accepted as the final result. Results were expressed in gm. per 100 ml.

(b) Examination of General Blood Picture: For examining general blood picture, thin blood films were prepared at the spot and were stained with Leishman's stain in the laboratory of the Department of Social and Preventive Medicine. The preparation and staining of blood films was done by the following methods:
Preparation of blood film: One end of a clean grease-free glass slide was applied to the drop of blood and the slide was placed on a level surface, holding it with the thumb and index finger of the left hand. The narrow edge of a second slide was placed in the drop and held there till the blood had spread across it; it was then drawn slowly over the whole length of the first slide. The blood film was dried by being waved rapidly in the air.

Staining of the slide: The slide was covered with the Leishman's stain, evenly distributed over the entire surface. At the end of one minute double the quantity of distilled water was added and mixed with the stain. After 7 minutes, the mixture was poured off and the film was covered with distilled water for two minutes. The water was then washed off with fresh distilled water and the film was dried (Hunter and Bomford, 1969).

The dry blood film was examined under the oil emersion to see for the size, shape and haemoglobinization of the red blood cells.

(v) Diet Survey

Diet survey was conducted in both study as well as in control groups by interview method, using recall period of 24 hours as recommended by Indian Council of Medical Research (1951). Proforms on diet survey was designed following the points indicated by National
Institute of Nutrition, Hyderabad for such surveys (appendix II).

Informations on the family composition, their dietary habits and intake of food articles, in last 24 hours, by the family as well as by the respondent were recorded. Nutrient intakes were worked-out in terms of energy, protein, calcium, iron, vitamins and folic acid with the help of the tables, designed by Indian Council of Medical Research (Gopalan et al., 1971) for the purpose.

(vi) **Follow-up of Pregnant women**

Follow-up examination, of the study women who had been registered in first and second trimesters of their pregnancy, was carried-out during second and third trimesters respectively at an average interval of about 2 months. Hematocrit, prenatal and systemic examinations.
Haemoglobin level below 12.0 gm. percent were taken as anaemic (C.I.O., 1968). The type of anaemia was decided on the basis of red cell morphology in general blood picture as recommended by Wintrobe (1954).