<table>
<thead>
<tr>
<th>Source of Population:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ill subjects</td>
</tr>
<tr>
<td>2. Non-ill subjects</td>
</tr>
<tr>
<td>3. Minors or persons under guardianship</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physical risks to the subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Social risks</td>
</tr>
<tr>
<td>2. Psychological risks to subjects</td>
</tr>
<tr>
<td>3. Discomfort to subjects</td>
</tr>
<tr>
<td>4. Invasion of privacy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disclosure of information damaging to subjects or others</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Use of records, (hospital, medical, death, birth or other)</td>
</tr>
<tr>
<td>2. Use of fetal tissue or abortus</td>
</tr>
<tr>
<td>3. Use of organs or body fluids</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subjects clearly informed about:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Nature and purposes of study</td>
</tr>
<tr>
<td>2. Procedures to be followed, including alternatives used</td>
</tr>
<tr>
<td>3. Physical risks</td>
</tr>
<tr>
<td>4. Sensitive questions</td>
</tr>
<tr>
<td>5. Benefits to be derived</td>
</tr>
<tr>
<td>6. Right to refuse to participate or to withdraw from study</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Confidential handling of data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Compensation &amp;/or treatment where there are risks or privacy is involved in any particular procedure</td>
</tr>
</tbody>
</table>

If signed consent form is required:
(a) From subjects | Yes |  No |
(b) From parent or guardian | Yes |  No |

If subjects are minors:
- Yes |  No |

Confidentiality:
- Umbrella proposal - Initially submit an overview (all other requirements will be submitted with individual studies).
- Protocol (Required)
- Abstract Summary (Required)
- Statement given or read to subjects on nature of study, risks, types of questions to be asked, and right to refuse to participate or withdraw (Required)
- Informed consent form for subjects
- Informed consent form for parent or guardian
- Procedure for maintaining confidentiality
- Questionnaire or interview schedule

If the final instrument is not completed prior to review, the following information should be included in the abstract summary:
1. A description of the areas to be covered in the questionnaire or interview which could be considered either sensitive or which would constitute an invasion of privacy.
2. Examples of the type of specific questions to be asked in the sensitive areas.
3. An indication as to when the questionnaire will be presented to the Ctiee for review.

Date: 01/06/93

Entered 21 Jun 1999

2. CONSULTANT: Prof. Dr. Buekens,
   Université libre de Bruxelles, Belgium.

3. TITLE OF PROJECT:
   Anemia during Pregnancy in an Urban Community of Bangladesh:
   a study of Prevalence, Validation of Simple Screening Methods and
   Impact of Iron folic acid Supplementation.


7. FUNDING SOURCE: BADC.

8. HEAD OF DIVISION: Dr. R.B. Sack
   Associate Director
   Community Health Division.
EMIA DURING PREGNANCY IN AN URBAN COMMUNITY OF BANGLADESH: 
STUDY OF PREVALENCE, VALIDATION OF SIMPLE SCREENING METHODS AND IMPACT 
IRON FOLIC ACID SUPPLEMENTATION.

JUNCKER and A. VANNESTE.

1 OBJECTIVES.

2.a General objectives.

The aim of the study is to contribute to a more appropriate health 
policy formulation and implementation in anemia control.

To investigate the prevalence and the severity of pregnancy related 
anemia in an urban slum area.
To study the impact of iron-folic acid supplementation during the 
last part of pregnancy.
To test the diagnostic validity of clinical estimation of anemia and 
the Reichert-Jung test in a preliminary study.

2.b Specific objectives.

To study the differences in Hb concentration between iron folic acid 
upplemented women and placebo supplemented women during the last 4 
months of pregnancy, in a double blind randomized controlled trial.

To compare the incidence of pre-eclampsia, infections and low birth 
weight between the iron and placebo group.

To define significant risk factors for anemia in pregnancy such as age, 
gravidity, socio-economic status and education of the woman.

To compare the validity of 2 field tests, in the assessment of anemia: 
Clinical estimation and the Reichert-Jung test with the spectrophotometric 
cyanmethemoglobin test as the reference test.

2 BACKGROUND AND JUSTIFICATION OF THE STUDY.

Anemia is the most important nutritional insufficiency in pregnant women 
in Bangladesh. The Government of Bangladesh intends to start a routine 
iron supplementation program for all pregnant women. Routine iron 
supplementation has been practiced in most developed countries for 
several decades. Arguments used in support of this practice have 
included decreasing hemoglobin values ameliorated by Fe, calculations of 
the extra iron needed for growth of the foetus and placenta and surveys 
in the 1950s and 1960s that indicated correlations between a mother's 
emia and small size and mortality of the infant (Hemminki, 1991)(19).

Rakik and De Mayer (1979)(3) in an overview of nutritional anemia state 
that: "In pregnancy, severe anemia is associated with increased risk of 
preterm delivery and increased maternal and fetal morbidity and 
orbidity. A correlation has been demonstrated between maternal 
emoglobin and the fetal birth weight. It is generally considered that 
emic individuals are more likely to develop infections than nonemic 
s, but epidemiological studies relating the incidence of infections 
the prevalence of anemia are difficult to control and interpret. In 
summary, it appears that there is suggestive, though perhaps not

Vanneste A.M., draft, (May 27, 1993)
inclusive evidence that anemia may make infants more prone to respiratory infections. In adults there has been very little investigation of the relationship between anemia and infection and no good community based studies. Various investigators have been unable to demonstrate a higher prevalence of anemia during the 1st and 2nd year of life in infants born of iron-deficient mothers.

Recent studies either a U-shaped or negative correlation between Hb level and infant problems have been observed (Hemmingi, 1991)(19). WHO sponsored collaborative study on nutritional anemia in India showed that supplementation had no detectable effect on the birth weight of the children (Sood and al., 1975)(46).

Homed and Hytten (1989)(31) argue that there is little doubt that iron, and for some cases folate, "normalize" the Hb status of pregnant women. But the authors question whether achieving a "normal Hb state" benefits or harms the woman and her baby. Concluding from a review of the literature, they state that failure of hemodilution and high Hb during pregnancy is associated with poor fetal outcome, probably because it reflects a lack of physiological adaptation to pregnancy. Oral iron supplements do prevent or reduce this fall in Hb concentration and increase the proportion of women whose Hb is below 10g/dl in late pregnancy. However, routine supplementation has not been shown to confer benefit to mothers or infants in developed countries, on the contrary increased blood viscosity may impair utero-placental blood ow. But they admit that in developing countries, where pregnant women are more likely to be nutrient deficient, supplementation may be appropriate.

Murray and al., (1978)(34) found significantly more infections in anemic Somali nomads treated with iron than in the placebo group, suggesting an immunological compromise, permitting optimum co-survival of host and infecting agents.

Koller (1982)(27) pointed out the association between high Hb and pre-eclampsia and Koller & al. (1980)(28) showed that women whose infants were below the tenth percentile of weight for gestation had relatively low 2 SD) high Hb levels; those whose infants died in utero had particularly high levels. Similar observations were made by Dunlop & al. (1978)(3).

Reddy (1977)(35) found in a large, prospective study that variables significantly influencing the incidence of fatal placental infarcts, without significantly interacting with other variables, were the mother's blood pressure (augmented with the presence of albuminuria), the Hb level and the hematocrit. There was a gradual increase in the rate of fatal placental infarcts with rising Hb levels.

Murphy & al. (1986)(33) concluded from a retrospective study on 54,382 singleton pregnancies, that high (>13.2g%) and intermediate (>=10.2g%) Hb levels are significantly associated with adverse outcome. The frequencies of perinatal death, low birthweight, and preterm delivery were greater with high than with intermediate Hb. There was a striking relation between Hb values and subsequent frequency of hypertension (p<0.001). In primiparas, the frequency of hypertension ranged from 7% at Hb values under 10.5g/dl to 42% at Hb levels over 14.5g/dl.
minki (1991) in a non blinded case control study (routine versus selective iron supplementation during pregnancy) concludes that: there are no significant differences in health outcomes in the 2 groups. Were routine Fe supplementation a new practice, rather than customary, it could be easy to advise against it, because of the lack of firm evidence of its usefulness and because women in the selective group have less subjective adverse effects and fewer births after the 40th gestation week.

Karn & al. (1981) in a study of nearly 60,000 pregnancies in the USA, found the following:

<table>
<thead>
<tr>
<th>Unfavorable outcome</th>
<th>Hgb midpoint(g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Blacks</td>
<td></td>
</tr>
<tr>
<td>563  Fetal death(%)</td>
<td>2.6</td>
</tr>
<tr>
<td>3134 Low Birth Weight(%)</td>
<td>15.9</td>
</tr>
<tr>
<td>5611 Prematurity(%)</td>
<td>30.2</td>
</tr>
</tbody>
</table>

It is clear from this table that the fetal outcome is optimal with a maternal Hb level between 9-11 g%.

Another possible drawback of Fe supplementation is a negative influence on the absorption of other minerals (Hambidge and al., 1987).

But as Rooney (1992) states: "It is estimated that over half of women of child bearing age in Africa have Hb levels below 11g/dl (WHO, 1992a). Anemia may in such circumstances contribute indirectly to mortality associated with hemorrhage and directly to heart failure. Routine iron administration to all pregnant women prophylactically may prevent development of anemia in large numbers of women with frank borderline iron deficiency, or correct mild anemia in many. There is, however, a paucity of well conducted studies demonstrating an improvement in the outcome for mother or infant.

In Bangladesh we estimate that the situation is not much better than in Africa. Increased needs during pregnancy and lactation are hard to meet. Poor economic conditions account for inadequate food intake and consequently inadequate iron intake. Poor hygienic conditions, helminthic infestation and gastro-intestinal disturbances, whereby digestion and absorption of food are hampered, are common. Food taboos during but even more so after pregnancy, interact with a lack of calories and iron containing foods. There is a cultural resistance to eat nutritious dible greens, both wild and cultivated, unless it is grown in one's own garden. Many leaves of tubers are wasted because it is not customary to eat them. A family in rural Bangladesh is a highly hierarchical structure in which individuals are differentiated according to kinship roles which are gender specific and result in unequal rights over resources, including food (8). Men eat first followed by the children, that is left is given to the women. This can induce a degree of anemia that is threatening for mother and child.
The use of contraceptives and their impact on anemia is under investigation by BIPERTH (6): it is assumed that oral contraceptives reduce menstrual blood loss by about 50%, whereas intra-uterine devices increases loss by as much as 100%.

Only a few studies have investigated anemia in Bangladesh. Most of these are hospital based.

A large survey on 8000 women and 7000 men in the Sylhet tea gardens in 1986 showed that 74.4% of the population had Hb between 60-80% and 20% or 3000 people had Hb of less than 60%, 2400 of them were women of childbearing age (2).

A study by S.M. Haq & K.A. Khaleque (18) on 200 pregnant women anno 1969 at the out and inpatient clinic of Dhaka Medical College showed that of the 84 anemic women (<10 g%) 54 had microcytic hypochromic anemia, 26 normocytic and 4 macrocytic anemia. There was a correlation between anemia and poor economic conditions, multigravida and duration of pregnancy.

In 1973 Dr. Hussain & al. (20) conducted a study among 157 low and middle class pregnant women in the Azimpur Maternity in Dhaka. The mean Hb level measured with cyanmethemoglobin method was 10.53 g%, the mean level for the first pregnancy was 10.53 g%, for the second pregnancy 9.84 g% and between 9.95 and 10.9 g% for subsequent pregnancies (16).

The Nutrition Survey of Rural Bangladesh (1981-1982), in a sample of 279 pregnant and lactating women, found 47% with hemoglobin levels below 11 g% (52).

A workshop on Safe Motherhood in Colombo Sri Lanka in Aug.1991 reports that the most important nutritional disorder among young and pregnant others was nutritional anemia: 62.4% of 983 pregnant women had a Hb <11 g%; of these 4.6% had a Hb <7g%. The Hb levels showed a significant correlation with the educational level of the husband (51).

In Matlab where anemia is clinically estimated, and 92% of pregnant women receive iron tablets during pregnancy and lactation, mild anemia in 3017 pregnant women (1987-1990) was found in 90% of the women, moderate and severe anemia in 2.8%. We believe this to be an important overestimation of mild cases and a serious underestimation of moderate and severe anemia.

A study conducted in Matlab by C. Jagdeo in 1990 assessed anemia in 129 pregnant, non pregnant and lactating women. Hb was measured by the Eichert-Jung hemoglobinometer. 49% had a Hb level of less than 11 g% and 21% a Hb level of less than 10 g% (23).

In Bangladesh, the prevalence and the severity of anemia in the community has never been studied in the last decade. The government of Bangladesh intends to provide nutritional advice and iron-folic acid tablets to all pregnant women during pregnancy and lactation.

To outline a policy to deal with the problem, information on prevalence, the predictive power and cost effectiveness of anemia testing and the impact of routine iron supplementation should be available. This study was conceived to answer some of these questions.
Field test study will be set up to estimate the validity of clinical estimation of anemia and the Reichert-Jung test, which is an easy field test, comparison with the cyanmethemoglobin test (reference test).

Predictive power of clinical estimation and the Reichert-Jung test for assessment of anemia compared with the reference test could contribute the establishment of a policy for anemia screening in the community.

A study in India (15) and another study in Matlab (23) showed a low (67%) very low (26%) sensitivity in the clinical assessment of moderate and severe anemia (cut off is 10g % Hb) based on the pallor of the conjunctiva, the WHO declared the Sahli and Tallquist methods inadequate.

A cut-off at 9g% Hb, the sensitivity for clinical estimation of anemia may reach 80%, this would have important implications for the policy in Bangladesh.

Bangladesh there are about 4 million births per year. If the health system can reach about 75% or 3 million pregnant women during the antenatal period, with an estimated prevalence of severe anemia of 15%, 450,000 pregnant women per year are severely anemic. We assume that 80% of these women under iron supplementation will recover or reach a Hb level of 11 g/dl or more. The cost of 4 months iron-folic acid supplementation is 44 Tk/pregnant women, when 2 tablets per day are given and each tablet contains 60 mg elemental iron.

Different policies can be adopted for iron supplementation during pregnancy and cost per year and cost effectiveness of the different policies should be calculated. We assume that the distribution cost is similar for all policies and that for any of the following strategies no supplementary cost per woman will be needed, since testing and supplementation can be handled by health workers in charge of antenatal care, though we are aware that if testing is to be done, supplementary training will be needed.

**CY 1:**

Pregnant women will be supplemented with iron-folic acid tablets daily for 4 months from the 6th month of pregnancy on. No screening for anemia is done. There are about 4 million pregnancies per year in Bangladesh, the ICDS system reaches 75% of all pregnant women or 3 million. Out of these 3 million women, 15% or 450,000 will be severely anemic and we estimate that of these severely anemic women will recover due to iron supplementation. Cases recovered: 450,000 severely anemic women * 0.8 = 360,000

Recovery rate: 360,000/450,000 = 80%

Cost per case recovered: 360,000/360,000 = 367 Tk.

**CY 2:**

Pregnant women are clinically screened for anemia and only severely anemic receive iron tablets.

We assume:

- Prevalence of severe anemia = 15%
- Sensitivity of clinical screening for severe anemia = 80%
- Positive rate of clinical screening for severe anemia = 20%
- Number of women with severe anemia supplemented: 3 million * 15% * 80% = 360,000
- Number of women not severely anemic but supplemented: 3 million * 85% * 20% = 510,000
Total supplemented = 360,000 + 510,000 = 870,000
Cases recovered: 360,000 * 0.8 = 288,000
Recovery rate: 288,000/450,000 = 64%
Total cost per year: 870,000 * 44Tk = 38,280,000 Tk.
Cost per case recovered: 38,280,000/288,000 = 133 Tk.

Reichert-Jung test is an easy and accurate field test with.

Positive rate = 80%,
Test positive rate = 10%

We supplement only the women with severe anemia.

Reichert-Jung hemoglobinometer cost (10,000 Tk/piece),

We estimate that in Bangladesh we would need 10,000 meters to screen yearly million women or 300 screenings per year per meter, and the life time of hemoglobinometer is about 5 years.

90% of women with severe anemia supplemented:

million*15%*80% = 360,000

60% of women not severely anemic but supplemented:

million*85%*10% = 255,000

Total supplemented = 360,000 + 255,000 = 615,000

Cases recovered 360,000 * 0.8 = 288,000
Recovery rate: 288,000/450,000 = 64%
Total cost for iron tablets: 615,000 * 44Tk = 27,060,000 Tk
Cost for saponin sticks 2Tk * 3 million = 6 million Tk
Cost for prickling needle 1 Tk * 3 million = 3 million Tk
Cost for Hb meter 10,000 Tk * 10,000/5 years = 20 million Tk
Total cost per year:

= 56,060,000 Tk
Cost per case recovered: 56,060,000/288,000 = 195 Tk

<table>
<thead>
<tr>
<th>Policy</th>
<th>Total cost per year in million Taka</th>
<th>Recovery rate</th>
<th>Cost per recovered case in Taka</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>132</td>
<td>80%</td>
<td>367</td>
</tr>
<tr>
<td>2</td>
<td>38</td>
<td>64%</td>
<td>133</td>
</tr>
<tr>
<td>3</td>
<td>56</td>
<td>64%</td>
<td>195</td>
</tr>
</tbody>
</table>

It is clear from the above table that, if iron supplementation has only more for women with a Hb less than 9g%, and if we anemia has a sensitivity of 80% and false positive rate of 20%, then clinical screening is the most cost effective test in comparison with a field test (e.g. the Reichert-Jung test) which we estimate the sensitivity at 80% and the false positive rate at 5%. But the table shows also clearly that routine or universal supplementation is much more expensive than clinical screening and selective supplementation of anemic women. The total cost per year would be 3.5 times less and cost per recovered case 2.75 times less for selective supplementation aed to indiscriminate iron supplementation, with the clinical screening anemia 36% of all anemic women will not recover while with indiscriminate distribution only 20% of all anemic women will not recover.

Vanneste A.M., draft, (May 24, 1993)
INTERNATIONAL JOURNAL OF GYNECOLOGY AND OBSTETRICIANS

STUDY ON PREVALENCE OF ANEMIA AND IMPACT OF IRON SUPPLEMENTATION.

STUDY POPULATION.

The study population includes pregnant women up to 2 weeks after delivery, chosen from an urban slum area in Dhaka, Ward no. 56, including the areas Mothertek, Maradia and Goran. The Ward is near the central railway station and the commercial area of Dhaka Metropolitan.

The area has a population of about 100,000 and 2,600 deliveries per year. A Bangladeshi NGO, Nari Maitree, has been working in the area from September 1, 1991. Its income generating program was funded by South Asia Partnership from 9-1991 and the MCH program is funded by BPHC (Bangladesh Population Health Commission). Nari Maitree receives funds from DANIDA for ten women's group credit and income generating program. Originally the NGO focused only on the poorest people in the Ward, but from 1993 on, all inhabitants of the area were included in the project.

Family welfare assistants visit every 2 months each household and collect information on: households, eligible couples, provided health care, fertility, mortality, migration and sanitation. They offer house to house visits for birth control methods, refer to their clinic for IUD insertion and to a hospital outside the area for sterilization. Extended services for mothers and children, antenatal and postnatal care are provided from satellite clinics.

List of all pregnant women and their LMP/PTD (last menstrual period date) is available before the 20th week of pregnancy.

METHOD OF THE STUDY.

This is a randomized controlled trial in an urban community. All women at 20 weeks of pregnancy will be visited and they will be asked to sign a consent form before enrollment in the study. Capillary blood will be drawn for the hemoglobin test. The test will be read in a central laboratory. Women with a Hb concentration less than 9g% will be provided iron tablets and excluded from the case control study, though another Hb test will be performed after delivery to compare the anemia prevalence before and after supplementation. Women with a Hb of 9g% or more will be randomized into two groups. One group will receive iron folic acid supplemented (120 elemental iron and 0.5 mg folic acid), the other group will receive a placebo. Supplementation will be given regularly from the 24th week of pregnancy up to the second week after delivery.

Random sampling will be done as follows: the supervisor receives the list of pregnant women from the lab, women with a Hb <9g% will receive iron supplementation and they will be excluded from the list. The supervisor will draw a list with women at 24 weeks of pregnancy. Each woman on the list will be attributed a serial number and a number from 1 to 6. The supervisor will have a list with random sampling for every 6 numbers eg. 1, 4, 5 will be group A and 2, 3 and 6 will be group B. Women from group A will...
ive an envelop A with the supplementation tablets, women assigned to envelop B will receive the B envelop with the supplementation tablets. The content of envelops A and B will only be known to the key holder in Dhaka, who will be a person alien to the study. Whenever a woman, during the study, is suspected by the field worker to suffer from serious anemia, a Hb assessment with the cyanmethemoglobin meter will be performed, if the woman has a Hb less than 9g % she will be referred to an independent physician. When physician confirms the diagnosis, she can call the key holder. The key holder may then eventually break the seal to procure information on previous supplementation. The supervisor will be informed on this event.

Intermediate analysis will be done during the course of the field study.

During the first visit at 20 weeks of pregnancy the research field worker:

* conduct an interview through a questionnaire (see annex 1) concerning risk factors for anemia such as age, obstetric history, past health status, iron intake, family size, use of contraceptives, economic status, education of the woman. Hookworm infestation is excluded for budgetary reasons.
* draw a micropipette of capillary blood for Hb assessment with the cyanmethemoglobin test.
* check blood pressure.
* measure upper arm circumference.

During the second visit at 24 weeks of pregnancy, the research field officer:

* supplement the women for 3 weeks.
* perform a clinical examination for severe anemia and check the blood pressure.
* record data on hemorrhage, therapy, and eventual foetal or maternal death.

Follow-up visits will be at respectively 27, 30, 34, 36 and 38 weeks of pregnancy. The research officer will:

* check and record the intake of the supplemented tablets and provide a new supply until the next visit.
* examine women for severe anemia and check the blood pressure and proteinuria.
* record data on hemorrhage, infections and therapy, eclamptic fits and eventual perinatal or maternal mortality.

During the visit after delivery, the field research worker will, apart from usual performances, take a capillary blood sample.

The replacement field officer is informed about the birth within the first 3 days after delivery, she will visit and weigh the newborn.

Sample size will be 1769, we estimate that 15% or 265 women will have a Hb < 9g%, 752 women will be assigned to each group at the start of the study. Estimate a fall out of 20% (N=150) due to non-compliance, migration and mobility. Each group will have 602 women at the end of the study.
Estimation of the different risk factors of anemia is as follows:

<table>
<thead>
<tr>
<th>Age group</th>
<th>Risk Factor</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=20 years</td>
<td>gravidity: 1</td>
<td>estimated at 23%</td>
</tr>
<tr>
<td>21-25 years</td>
<td>2-4</td>
<td>estimated at 51%</td>
</tr>
<tr>
<td>26-30 years</td>
<td>&gt;4</td>
<td>estimated at 26%</td>
</tr>
<tr>
<td>&gt;30 years</td>
<td>estimated at 20%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maternal Size</th>
<th>Risk Factor</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>education of the mother:</td>
<td></td>
</tr>
<tr>
<td>3-5</td>
<td>no education</td>
<td>estimated at 70%</td>
</tr>
<tr>
<td>&gt;5</td>
<td>at least 1 year</td>
<td>estimated at 30%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Household Income</th>
<th>Risk Factor</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tk</td>
<td>estimated at 27%</td>
<td></td>
</tr>
<tr>
<td>&lt;2500 Tk</td>
<td>estimated at 43%</td>
<td></td>
</tr>
<tr>
<td>Tk</td>
<td>estimated at 30%</td>
<td></td>
</tr>
</tbody>
</table>

**Exclusion Criteria.**

Following subjects will be refused admission to the study:

- Females with thalassemia. Thalassemia, which is estimated at less than 1%, will be determined through anamnesis.
- Females with a transfusion in the last six months or more than 3 times a transfusion during her lifetime.
- Females with iron supplementation for more than 20 days since the start of pregnancy.
- Females with a chronic diarrhoea (malabsorption). Chronic diarrhoea is at least 3 loose motions per day, since 2 weeks or more.

**Study.**

A month pilot study will be done to assess the cultural resistance for collection and the accuracy of the questionnaire.

**Supervisors will be trained in composing lists of pregnant women according to MPDT. They will be instructed in methods for supervision and follow-up.**

**Health workers will be trained to draw capillary blood in a micropipette, to blood pressure and proteinuria.**

Systolic blood pressure will be determined at phase 1 of the Korotkoff is, the diastolic blood pressure at phase 4, the muffling of the sounds.

The size and speed of descent of the mercury column will be standardized. Cuff must be at the level of the left atrium. The mercury manometer will be used and the instruments will be standardized.

Sticks will be used to detect proteinuria on a clean catch midstream specimen.
II:

TEST STUDY.

This study, set up to estimate the sensitivity, specificity, positive and negative predictive values of clinical estimation of anemia and the Reichert-Jung test, will take place in the Azimpur Maternity Center in Dhaka, where there is an average of 3000 deliveries per year. The pregnant women delivering in the Center are drawn from all socio-economic levels of the society. A field worker will be stationed in the antenatal care out-patient clinic where she will perform clinical estimation of anemia at the time of antenatal clinic. The result will be written down by the normally in charge of anemia screening. The field worker will execute Reichert-Jung test and an additional capillary sample will be sent to the laboratory for the cyanmethemoglobin test. The Maternity Center will be informed on the results of the reference test. Azimpur Maternity Center draws reticulocyte capillary blood from all pregnant mothers for Hb screening.

DESCRIPTION OF THE STUDY.

Part I of the study will have a duration of 54 weeks after the 1 month pilot. Part II, in Azimpur Maternity, will take about 2 months.

ETHICAL CONSIDERATIONS.

The purpose and the interventions needed for this study will be explained to women and their informed consent must be obtained before enrollment. Women with a Hb < 9 g% will be supplemented and excluded from the study, since it is assumed, supported by the literature, that they do not seem to have adverse outcomes due to iron supplementation, on the contrary, they are women who will most benefit from the iron supplementation. All women tested but where severe anemia becomes apparent during the study will be tested by an independent doctor.

Women with a diastolic blood pressure of 110 mm Hg or more or women with 2 consecutive diastolic blood pressures of 90 mm Hg or more and/or women with proteinuria of 300 mg or more on 2 consecutive clean catch stream samples will be sent to the antenatal clinic for treatment.

Women with an infection, a hemorrhage and fits will be referred for treatment.
**SAMPLE SIZE CALCULATION.**

---

**The required sample size to estimate the prevalence of anemia:**

Info Version 5: Population survey, population size: N=3000

<table>
<thead>
<tr>
<th>POPULATION</th>
<th>EXPECTED PREVALENCE</th>
<th>PRECISION</th>
<th>REQUIRED SIZE</th>
<th>STUDY SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>at 20wk</td>
<td>15%</td>
<td>3%</td>
<td>N=461</td>
<td>N=885</td>
</tr>
<tr>
<td>Placebo group at PP</td>
<td>20%</td>
<td>3%</td>
<td>N=556</td>
<td>N=602</td>
</tr>
<tr>
<td>Iron supplemented group at PP</td>
<td>10%</td>
<td>3%</td>
<td>N=341</td>
<td>N=602</td>
</tr>
</tbody>
</table>

**The required sample size per group for the comparison of anemia prevalence**

1. \( \alpha = 0.05, \beta = 0.20 \)
2. Unmatched Cohort Studies (Exposed and Nonexposed)

- \( \text{Exposed} = \text{women with Hb } \geq 9g/\text{l} \) and receiving placebo
- \( \text{Exposed} = \text{women with Hb } \geq 9g/\text{l} \) and receiving iron
- \( \text{Exposed/Exposed} = 1/1 \)
- \( \text{Expected anemia prevalence of unexposed after delivery} = 20\% \)
- \( \text{Expected anemia prevalence of exposed after delivery} = 10\% \)
- \( \beta = 2.00 \)

- \( \text{Exposed} = \text{women with Hb } < 9g/\text{l} \) at 20 weeks of pregnancy
- \( \text{Exposed} = \text{women with Hb } < 9g/\text{l} \) receiving iron, after delivery
- \( \text{Exposed/Exposed} = 1/0.8 \)
- \( \text{Expected anemia prevalence of unexposed after delivery} = 99.99\% \)
- \( \text{Expected anemia prevalence of exposed after delivery} = 50\% \)
- \( \beta = 2.00 \)

**Population**

<table>
<thead>
<tr>
<th>POPULATION</th>
<th>TIME</th>
<th>ESTIMATION</th>
<th>REQUIRED SIZE IN EACH GROUP</th>
<th>STUDY SIZE IN EACH GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>On &amp; placebo group</td>
<td>PP</td>
<td>20%-10%-10%</td>
<td>N=219/219</td>
<td>N=602/602</td>
</tr>
<tr>
<td>Iron supplemented</td>
<td>20wk-PP</td>
<td>100%-50%-50%</td>
<td>N=16/13.</td>
<td>N=203/163</td>
</tr>
</tbody>
</table>

*Vanneste A.M., draft, (May 24, 1993)*
PLE SIZE REQUIRED TO ESTIMATE SIGNIFICANT DIFFERENCES FOR PRE-ECLAMPSIA
WEEN IRON & PLACEBO SUPPLEMENTED GROUP.
(.05, β= .20)

Info Version 5: Unmatched Cohort Studies (Exposed and Nonexposed)

posed = women with Hb >= 9g% and receiving placebo
sed = women with Hb >= 9g% and receiving iron
posed/exposed = 1/1
cited preeclampsia prevalence of unexposed after delivery = 4%
cited preeclampsia prevalence of exposed after delivery = 8%

Sample size required
posed = 601 unexposed = 602
sed = 601 exposed = 602
l = 1202 total = 1204.

PLE SIZE REQUIRED TO ESTIMATE SIGNIFICANT DIFFERENCES FOR RISK FACTORS
WEEN SEVERELY AND NOT SEVERELY ANEMIC WOMEN AT 20 WEEKS OF PREGNANCY.
(.05, β= .20)


posed = women without risk factor at 20 weeks of pregnancy
sed = women with risk factor at 20 weeks of pregnancy
posed/exposed = 4/1
cited anemia prevalence of unexposed at 20 weeks of pregnancy = 12%
cited anemia prevalence of exposed at 20 weeks of pregnancy = 18%

Sample size required
exposed= 1408 unexposed = 1415
osed = 352 exposed = 354
al = 1760 total = 1769

PLE SIZE REQUIRED FOR COMPARING THE SENSITIVITY OF THE FIELD TESTS
H THE REFERENCE TEST.

\[
\frac{1.96^2 \times S \times (1-S)}{E^2}
\]

Estimated sensitivity, for Reichert-Jung test and for clinical stimulation=.80, conservative estimate=.50

Error = .05 & S=.80 N = 246
Error = .05 & S=.50 N = 384

Vanneste A.M., draft, (May 24, 1993)
From our experience in Matlab we are field workers visit each household fortnightly, we assume that the recall error of the last menstrual period will be the most important error in the study. The field worker visits the study site visits each household once in 2 months and asks for the last menstrual period. The great majority of the errors will not exceed one year in both directions. Women's knowledge of their age is also not always accurate, but the error will be bi-directional.

SECTION BIAS: all selection biases apply equally to the non supplemented and the supplemented group.

USAL: Women who refuse to participate in the study will probably be the younger elements in the population, presumably the older women, who refuse could also be poor women ashamed of their poverty and bad health, though poor women could be more inclined to collaborate if they believe collaboration could improve their health. Richer women could feel ended if someone wants to evaluate their health status. The consent form be divided in 2 parts: a consent for interview and a consent for blood tests. This will enable us to assess the characteristics of the women who use collaboration for the blood tests but not for an interview. Most DRB research studies have not encountered important resistance to collaboration.

LUSION: exclusion of women who took already iron tablets will probably ban the educated and the richest women or women in bad health for whom iron was prescribed. However, most prescriptions in Bangladesh are very short term. Transfusions not related to acute blood loss are rare.

active loss due to:

RATION: in the slums, those without a steady job go back to the village harvest time. The poorest families send off their daughters-in-law, particularly primipara, for delivery to their own families to avoid expenses to delivery. We assume that the migration loss will be similar in both groups.

TALITY: the fall out due to mortality will be small and probably similar the iron and placebo supplemented group.

COMPLIANCE: Non compliant women will presumably be the least educated or women with side-effects. We assume that the side effects of iron tablets will be more important than those for the placebo tablets. Field workers are very well aware of the side-effects of iron supplementation and will impede the blindness of the study.

ensure a better compliance all women will be visited with a maximum interval of 6 weeks.
QUESTIONNAIRE.

Questions are closed questions which require a "yes" or "no" answer, or numbers. Questions on risk factors such as age, gravidity, family income will be verified through previous records, available in the study site. Income will be confirmed through other observations such as rent paid, number of beds related to family size and the presence of other household products such as a watch, a bicycle, a radio or TV in the house. Date of medication previous to the study will be verified through left overs or empty blisters and previous health records.

Same research officers will visit the placebo and iron supplemented women all will be exposed to the same questionnaire and the same tests. Reviewers and clients will not be explained the hypothesis that anemia be associated with the different risk factors and outcomes, though they will be informed about the different benefits and disadvantages of the iron vitamin supplementation.

Data will be done by an independent code officer and the analysis of the data by an independent data manager.

METHODS AND DEFINITIONS.

The Field test study, a field worker will perform clinical estimation of haemoglobin and the Reichert-Jung test in Azimpur Maternity Center. The results of the tests must be independent. The midwife in the Azimpur Maternity Center will first notify the result of the clinical estimation of anemia and only then can the Reichert-Jung test be performed. A nurse could perform the Reichert-Jung test but we assume that the results could be different from those of a field worker and it is the field workers who will eventually perform the test, if estimated to be successful. Reference test which is the decisive test for the anemic status of women will be performed in a central laboratory, independent from observations in Azimpur outpatient clinic.

Errors of blood pressure measurement, attributable to the instrument and observer are many. Intra-arterial readings are the gold standard but usually all studies reported and all clinical correlations between hypertensive disorders and the outcome of pregnancy refer to readings made by indirect blood pressure measurement. A simple mercury manometer be used as it is less subject to errors than the aneroid gauge. Speed of the mercury column and the location of the cuff at the level of left atrium will be standardized. In addition to technical and observer errors associated with indirect blood pressure measurement, many factors are marked variability in blood pressure between individuals (e.g. age, sex, race) and within the same pregnant woman, such as time of the day, level of activity, sleep, emotions and posture. Wallenberg (1989) concludes his review on detection of hypertensive disorders in pregnancy, that there are good reasons to base clinical definitions and diagnosis of hypertension on diastolic blood pressure values alone, taken at phase 4 of Korotkoff sounds (50). MacGillivray (1961)(32) and Page and Christianson (6a)(37)suggest that the absolute level of blood pressure is far more important than the rise, both in relation to the occurrence of proteinuria in terms of prognosis. However, a recent detailed study (Redman and Sires (1988)(38) indicates that a combination of a first diastolic reading less than 90 mm Hg, a subsequent increase of at least 25 mm Hg, and a mum reading of at least 90 mm Hg may be better for identifying pre-eclamptic women than either measurement alone. Definitions in the study be as follows:

Vanneste A.M., draft, (May 24, 1993)
**HYPERTENSION:**
1. One indirect measurement of diastolic blood pressure of 110 mm Hg or more,
2. Two consecutive indirect measurements of DBP of 90 mm Hg or more.

**PROTEINURIA:**
On 2 random clean catch samples, a protein excretion of 300 mg or more.

**FEVER:**
Jaundice
OR fever for more than 3 days,
OR bloody cough for more than 3 days,
OR cough and fever for more than 3 days,
OR diarrhoea for more than 3 days,
OR bloody diarrhoea.

**EPIDEMIOLOGY:**
Any fits in the last part of pregnancy or the first days after delivery in women with no previous history of epilepsy and in the absence of high fever.

**PARTUM HEMORRHAGE:**
Any per vagina blood loss during pregnancy.

**ANEMIA:**

The descriptive part will determine the prevalence of anemia, the proportion of mild, moderate and severe anemia at 20 weeks of pregnancy in non-iron supplemented women.

The analytical part will look for significant differences between the non-iron supplemented and the iron supplemented groups for:

* The prevalence of anemia within the first 2 weeks after delivery.
* The incidence of pre-eclampsia (which means high blood pressure and proteinuria).
* The incidence of infections.
* The incidence of low birth weight.

Through multivariate analysis, significant associations will be computed between anemia at 20 weeks of pregnancy and risk factors (such as age, parity, family size, socio-economic status, education of the mother and nutritional status of the mother).

The significant risk factors relative and attributable risks will be calculated.

Sensitivity, specificity, positive and negative predictive value of the clinical estimation of anemia and the Reichert-Jung test in comparison with the reference test, will be evaluated.
Importance of the Study.

It is clear that in the industrialized countries there is growing evidence suggesting that routine iron supplementation of pregnant women is not beneficial and can be harmful to mother and child. Rodney (1992) (40) concludes that there is a need for well-conducted studies demonstrating an improvement in the health of the mother or infant. However, the potential for benefit depends on the specific prevalence of iron deficiency in the population and the levels of iron, or mean Hb concentration of the population, at which universal supplementation would be beneficial are not clear, in part because the level at which detriment to mother and/or fetus occurs is also uncertain.

The Bangladesh government wants to establish a program of routine iron supplementation for pregnant and lactating women, but no community-based study has been done in the last decade to evaluate the extent and severity of anemia in the country. This study aims to assess the prevalence and the severity of anemia in mid-pregnancy and early lactation in an urban slum area of Dhaka. In Bangladesh, around 80% of the people live in rural areas, 50-60% of the rural population is landless. Important migrations from rural to the urban areas are expected in the next decades. It is estimated that 50% of the urban population lives in the slums.

The study will allow us to assess in not severely anemic women the impact of iron supplementation on the Hb status of women, the incidence of pre-eclampsia, infection and birth weight.

Though establishing significant correlations between risk factors for anemia and through estimation of the weight of the risk factors (such as young or older age, primiparity or grand multiparity, low socio-economic status, large family size and lack of education of the mother, low nutritional status), new policies can be developed to target the most affected groups in society, for which, we assume, the benefits of iron supplementation will overshadow the eventual deleterious impact of iron supplementation. Iron tablets could then be provided for these groups at a lower cost.

The predictive power of clinical estimation and the Reichert-Jung test for assessment of anemia compared with the reference test could contribute to the establishment of a policy for anemia screening in the community.
The reference test is the cyanmethemoglobin test, measured photometrically. A solution with a single reagent should be freshly prepared every week and may not be exposed to the light. Capillary blood (0.02ml) is drawn into a micropipette and added to the reagent. Once the blood specimen is added to the reagent the solution can be examined when convenient. However sample storage for more than 6 hours should be done at 4-10°C in the dark, provided the sample does not become infected, and care is taken to prevent evaporation. Diluted samples can be stored 2-3 weeks. Precision can be enhanced by using samples from fasting subjects. Determination of the hemoglobin should be performed in duplicate and the test should be repeated where differences are greater than 5%. The most reliable instrument to be used is the dual beam spectrophotometer (21).

The field test for hemoglobin will be done by the Reichert-Jung method. The Reichert-Jung hemoglobinometer is a specialized type of colorimeter for the evaluation of the Hb content of the blood. Because of the simplified technique and pocket size it can be used as a field test. One drop of capillary blood is deposited in a transparent glass chamber, hemolyzed with a coated stick for 30-45 seconds and covered with a glass plate. This is introduced in the instrument. While looking through the eyepiece one moves the slide button until the two halves of the field are equally light and appear as a single field. The position of the index mark on the slider knob indicates the Hb concentration. This method has already been used in Matlab by C. Jagdeo on a small sample (N=130) of women. No dilution of the blood is required. This test needs to be done by the field worker.

The clinical estimation of anemia is widely used in Bangladesh. In our study, it will be done by a field worker in the antenatal clinic. The color of the conjunctivae and mucosae will be examined and degrees of tiredness and dizziness of the women will be recorded. The clinical estimation will be performed before the Reichert-Jung test under the supervision of the nurse usually in charge of the Hb measurement in the antenatal clinic.
1 is the first week of the study, week 2 the second week etc.

This group, group 1 means women at 20 weeks of pregnancy during week 1.

Average group will be 2600/52=50, one field officer (nurse) can make some visits per week or 2 groups.

<table>
<thead>
<tr>
<th>Week</th>
<th>Need for</th>
<th>Field Officer(s)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10</td>
<td>1</td>
<td>10 weeks*1</td>
<td>10</td>
</tr>
<tr>
<td>50-54</td>
<td>1</td>
<td>5 weeks*1</td>
<td>5</td>
</tr>
<tr>
<td>11-16</td>
<td>2</td>
<td>6 weeks*2</td>
<td>12</td>
</tr>
<tr>
<td>44-49</td>
<td>2</td>
<td>6 weeks*2</td>
<td>12</td>
</tr>
<tr>
<td>17-21</td>
<td>3</td>
<td>5 weeks*3</td>
<td>15</td>
</tr>
<tr>
<td>34-43</td>
<td>3</td>
<td>10 weeks*3</td>
<td>30</td>
</tr>
<tr>
<td>22-33</td>
<td>4</td>
<td>12 weeks*4</td>
<td>48</td>
</tr>
<tr>
<td>Placement</td>
<td>1</td>
<td>58 weeks*1</td>
<td>54</td>
</tr>
<tr>
<td>Test study</td>
<td>1</td>
<td>4 weeks*1</td>
<td>4</td>
</tr>
</tbody>
</table>

Total = 194
BIBLIOGRAPHY


Vanneste A.M., draft, (May 24, 1993)


Vanneste A.M., draft, (May 24, 1993)


WORKSHOP ON SAFE MOTHERHOOD 19-23 AUG. 1991, COLOMBO SRI LANKA.

WORKSHOP ON THE SELECTION OF THE MAIN RISK FACTORS FOR MATERNAL DEATH IN BANGLADESH. 17 Feb 1991, Background Paper prepared by Prof. Sadiqa Tahera Mianam.
PERSONNEL.

Computed as follows: day pay * days/wk * wk * no of staff

<table>
<thead>
<tr>
<th>JOB</th>
<th>Rate (Ksh)</th>
<th>Days/wk</th>
<th>Weeks</th>
<th>No of Staff</th>
<th>Total (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Test Worker</td>
<td>200</td>
<td>1</td>
<td>9</td>
<td>1</td>
<td>1,800</td>
</tr>
<tr>
<td>Field Officer</td>
<td>364</td>
<td>6</td>
<td>194</td>
<td>1</td>
<td>423,696</td>
</tr>
<tr>
<td>Field Supervisor</td>
<td>590</td>
<td>6</td>
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<td>1</td>
<td>205,320</td>
</tr>
<tr>
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<td>6</td>
<td>36</td>
<td>1</td>
<td>43,200</td>
</tr>
<tr>
<td>Manager</td>
<td>1136</td>
<td>6</td>
<td>7</td>
<td>1</td>
<td>47,712</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>721,728</strong></td>
</tr>
</tbody>
</table>

LABORATORY.

Computed as follows: no of units * price/unit

<table>
<thead>
<tr>
<th>Item</th>
<th>Units</th>
<th>Price (Ksh)</th>
<th>Total (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Test</td>
<td>1750</td>
<td>1450</td>
<td>90,000</td>
</tr>
<tr>
<td>Tistix</td>
<td>7.500</td>
<td>3</td>
<td>22,500</td>
</tr>
<tr>
<td>FNE Collectors</td>
<td>7.500</td>
<td>1</td>
<td>7,500</td>
</tr>
<tr>
<td>PP Meters</td>
<td>1.000</td>
<td>4</td>
<td>4,000</td>
</tr>
<tr>
<td>Pipettes</td>
<td>4.000</td>
<td>3</td>
<td>12,000</td>
</tr>
<tr>
<td>Pipets</td>
<td>4.000</td>
<td>1</td>
<td>4,000</td>
</tr>
<tr>
<td>CH. HB Meter</td>
<td>10.000</td>
<td>1</td>
<td>10,000</td>
</tr>
<tr>
<td>Stick, Desinf</td>
<td>400</td>
<td>2</td>
<td>800</td>
</tr>
<tr>
<td>Sy Scale</td>
<td>8.000</td>
<td>1</td>
<td>8,000</td>
</tr>
<tr>
<td>Emergency Med Mat</td>
<td></td>
<td></td>
<td>5,000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td><strong>163,800</strong></td>
</tr>
</tbody>
</table>

LEVEL EXPENSES.

Computed as follows: no of woman to visit * no of visits * transport cost

<table>
<thead>
<tr>
<th>Category</th>
<th>No of Visits</th>
<th>Transport Cost (Ksh)</th>
<th>Total (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Workers</td>
<td>1650</td>
<td>7 * 5</td>
<td>57,750</td>
</tr>
<tr>
<td>Investigators &amp; Supervisors</td>
<td></td>
<td></td>
<td>12,500</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td><strong>70,250</strong></td>
</tr>
</tbody>
</table>

SUPPLEMENTARY AND PHOTOCOPIES.

AL:

- Miscellaneous and unforeseen 20%
- TOTAL

997.778
199.556
1,197.334 or 29.933 US$

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Vanneste A.M., draft, (May 30, 1993)
ABSTRACT

ANEMIA DURING PREGNANCY IN AN URBAN COMMUNITY OF BANGLADESH: A STUDY OF PREVALENCE, VALIDATION OF SIMPLE SCREENING METHODS AND IMPACT OF IRON FOLIC ACID SUPPLEMENTATION.

BACKGROUND AND JUSTIFICATION.

In Bangladesh, anemia, and particularly iron deficiency anemia, is considered as the most important indirect contributor to maternal death. Since more than a decade no study has been done in the country on the prevalence of anemia in pregnant women. Recent publications on anemia during pregnancy, however, show that not only low but also high Hb levels can have an adverse effect on mother and child outcome of pregnancy.

Testing for anemia in an area where the prevalence of moderate and severe anemia is around 20% is more cost effective than systematic iron supplementation and despite wide scale iron supplementation programs over the last 30 years did not decrease anemia. The few studies available on screening methods reveal poor characteristics of the tests and prove the need for simple, reliable field tests.

AIM AND OBJECTIVES.

The aim of the study is to contribute to a more appropriate health policy formulation and implementation in anemia control. The specific objectives of the research are: 1) to assess the prevalence and the degree of anemia at 20 weeks of pregnancy. 2) to compare Hb levels of iron supplemented and non iron supplemented women. 3) to compare the incidence of preeclampsia, infections and low birth weight between the supplemented and placebo group. 4) to study the validity of clinical screening and the Reichert-Jung test for diagnosis of anemia.

STUDY DESIGN.

The research is divided in two parts. The first part is a double blind controlled trial in a slum area of Dhaka city. Women will be contacted at 20 weeks of pregnancy. Women who consent to participate will be randomly allocated to one of two groups: iron or vitamin supplemented group. Women with a Hb level under 9g% will be excluded but supplemented with iron folic acid tablets. Women will be visited at 20, 24, 27, 30, 34, 36, 38 weeks of pregnancy and the first week postpartum. The visits include: questionnaire, supplementation, compliance control, clinical screening of anemia, measurement of BP and proteinuria. A capillary blood sample will be collected at the first and last visit. A total of 1170 pregnant women will be enlisted.

The second part of the study will be done in Azimpur Maternity Center, Dhaka, where 384 pregnant women will be screened for anemia by the following methods: clinical screening, Reichert-Jung hemoglobinometer and Cyanmethemoglobinometer.

ANALYSIS.

The analysis will provide information on the prevalence and degree of anemia at 20 weeks of pregnancy, the evolution of Hb in iron supplemented and placebo group, the differences of the incidence of preeclampsia, infection and low birth weight in the 2 groups. Sensitivity, specificity and predictive values of the screening tests will be computed. Significant correlations between anemia and socio-economic factors will be explored.
CONSENT FORM
ANEMIA STUDY

Anemia is an important problem in Bangladesh especially among pregnant women.

We are interested to measure the importance of this problem and to investigate if iron supplementation affects the woman's or the foetus' health. All the fieldworkers and researchers involved in the study are female.

If you accept to contribute to this study, few drops of blood will be taken by finger prick at the beginning of the study and after your delivery.

If the first examination of your blood shows that you are moderately or severely anemic, you will be automatically supplemented with iron.

If the first examination of your blood shows that you are mildly or non-anemic, you will receive either iron or vitamins tablets, that you are requested to take regularly. You will be visited by a fieldworker during the 20th, 24th, 27th, 30th, 34th, 36th, 38th week of pregnancy and after delivery.

During each visit, the field worker will provide you the tablets, ask you some questions regarding your health and fill out a questionnaire. Your blood pressure will be measured, presence of oedema and anemia will be checked and you will be requested to produce a urine sample for protein check. During the last visit, your newborn baby will be weighed.

If you are found very anemic, if you suffer from high blood pressure or other disorder during the course of your pregnancy, the fieldworker will refer you to a medical facility where you will receive medical assistance.

All the materials used for blood collection are sterile.

All information obtained from the history, physical examination and laboratory investigations will be kept confidential.

At any time during the study you may withdraw your consent. By doing that, you will not miss the opportunity to get usual attendance provided by the project.
Are you willing to participate in this study during your pregnancy?  
YES( ) NO( )

If yes, please put your signature or your left thumb impression in the specified area of the form no 1.

Thank you for your collaboration.

CONSENT FORM No 1: Participation in the whole study.

<table>
<thead>
<tr>
<th>name of the investigator</th>
<th>Signature of the Investigator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of the woman</td>
<td>Age</td>
</tr>
<tr>
<td>Address</td>
<td></td>
</tr>
<tr>
<td>Household number</td>
<td></td>
</tr>
<tr>
<td>Name of the guardian (for minor women only)</td>
<td></td>
</tr>
<tr>
<td>Signature of the Woman / Guardian (for minor woman only)</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Signature of witness</td>
</tr>
</tbody>
</table>
If you are not willing to participate in the whole study, do you accept:

to give one blood sample, now?    Yes ( )    No ( )
to be questioned only once, now?    Yes ( )    No ( )

If yes, please put your signature or your left thumb impression in the specified area of the form no 2.
Thank you for your collaboration.

<table>
<thead>
<tr>
<th>CONSENT FORM No 2: for one questionnaire ( )  for one blood sample ( )</th>
</tr>
</thead>
<tbody>
<tr>
<td>name of the investigator                             Signature of the Investigator</td>
</tr>
<tr>
<td>Name of the woman                                      Age</td>
</tr>
<tr>
<td>Address</td>
</tr>
<tr>
<td>Household number</td>
</tr>
<tr>
<td>Name of the guardian (for minor women only)</td>
</tr>
<tr>
<td>Signature of the Woman / Guardian (for minor woman only)</td>
</tr>
<tr>
<td>Date</td>
</tr>
<tr>
<td>Signature of witness</td>
</tr>
</tbody>
</table>
PROCEDURE FOR MAINTAINING CONFIDENTIALITY

Questionnaires will be provided with a code which matches a master sheet where the name of the interviewee and location of the house are noted. Only the principal investigators and the field supervisor will have access to this sheet. After each interview, the name and code number of the interviewee will be checked by the field supervisor, then the name of the interviewee will be crossed out of the questionnaire and all data entry will use the code for identification.

All the interviewers will be female; they will be counselled on the sensitive nature of some of the information to be collected and on the need for confidentiality.
STUDY DESIGN

DOUBLE BLIND RANDOMIZED CONTROLLED TRIAL

STAGE OF PREGNANCY

20 weeks
FIRST VISIT TO PREGNANT WOMEN (n = 1770)
CONSENT FORM QUESTIONNAIRE BLOOD SAMPLE BP

> exclusion Hb < 9gr % → iron suppl

RANDOM ALLOCATION IN 2 GROUPS (n = 1505)

24 weeks
IRON SUPPLEM → QUESTIONNAIRE BP, ANAEMIA
VIT SUPPLEM

27 weeks
SUPPLEMENT COMPLIANCE

30 weeks
QUESTIONNAIRE SUPPLEMENT COMPLIANCE BP PROTEINURIA ANEMIA

34 weeks

36 weeks

38 weeks

PP (n = 602 per group)

IDEM BLOOD SAMPLE INFANTS' WEIGHT
PART I: IDENTIFICATION

1.1 NAME

1.2 ADDRESS

1.3 HOUSEHOLD NO.

1.4 DATE OF BIRTH: (DAY) ____ (MONTH) ____ (YEAR) ____

1.5 AGE

1.6 LMPDT (DAY) ____ (MONTH) ____ (YEAR) ____

1.7 EDD (DAY) ____ (MONTH) ____ (YEAR) ____

1.8 DATE OF INTERVIEW (DAY) ____ (MONTH) ____ (YEAR) ____

1.9 NAME OF INTERVIEWER

BLOOD SAMPLE TAKEN: DATE ______

RESULTS: ______________________

UPPER ARM CIRCUMFERENCE: ______ cm
2.1 Did you ever receive blood transfusion?  
Yes(1)  No(2)

2.2 If yes,
when did you receive your last blood transfusion?

2.3 Was this transfusion during the last 6 months?  Yes(1)  No(2)
IF YES UNDERLINE EXCLUSION

2.4 Did you receive a blood transfusion more than 3 times in your life?  Yes(1)  No(2)
IF YES UNDERLINE EXCLUSION

2.5 Do you suffer from thalassemia?  Yes(1)  No(2)  Unknown(9)
IF YES UNDERLINE EXCLUSION

2.6 Did you take iron pills for more than 20 days during this pregnancy?  Yes(1)  No(2)  Unknown(9)
IF YES UNDERLINE EXCLUSION

2.7 Do you have loose motions at least 3 times a day, for more than 2 weeks?  Yes(1)  No(2)  Unknown(9)
IF YES UNDERLINE EXCLUSION
### Part III: Socioeconomic Status

#### Occupancy

<table>
<thead>
<tr>
<th>House Type</th>
<th>Owned</th>
<th>Self</th>
<th>Rent</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>City</td>
<td>no</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Vill</td>
<td>yes</td>
<td>1</td>
<td>1</td>
<td>1</td>
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</table>

#### 2. Other Land Owner

<table>
<thead>
<tr>
<th>Ship Type</th>
<th>City</th>
<th>Vill</th>
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</thead>
<tbody>
<tr>
<td>No</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Yes</td>
<td>1</td>
<td>1</td>
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</table>

#### 4. Construction

<table>
<thead>
<tr>
<th>Type</th>
<th>Roof</th>
<th>Wall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jhupri</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Bamboo</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Wood</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Tin</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Pucca</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
<td>7</td>
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</table>

#### 5. # Room

<table>
<thead>
<tr>
<th>Room Type</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
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</tbody>
</table>

#### Assets

<table>
<thead>
<tr>
<th>Item</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Radio</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Watch</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Cycle</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Almirah</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Table</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Khat</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

#### 8. # Sarees

<table>
<thead>
<tr>
<th>Sarees</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
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</tbody>
</table>

#### Status

<table>
<thead>
<tr>
<th>Religion</th>
<th>Married</th>
<th>Widowed</th>
<th>Divorced</th>
<th>Single</th>
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<tr>
<td>Muslim</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>Hindu</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>Christian</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
</tbody>
</table>

#### 10. Religion

<table>
<thead>
<tr>
<th>In-laws</th>
<th>Parents</th>
<th>Alone</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
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</table>

#### 11. Resides With

<table>
<thead>
<tr>
<th>Husband only</th>
<th>10 Yrs</th>
<th>&lt;=10 Yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td></td>
<td></td>
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</tbody>
</table>

#### 12. Who Pays Your Food

<table>
<thead>
<tr>
<th>Husband only</th>
<th>10 Yrs</th>
<th>&lt;=10 Yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 13. Beds

<table>
<thead>
<tr>
<th>No. of People Sleeping</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;10 Yrs</td>
</tr>
<tr>
<td>&lt;=10 Yrs</td>
</tr>
</tbody>
</table>

#### 18. Yourself

<table>
<thead>
<tr>
<th>No. of Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Years</td>
</tr>
</tbody>
</table>

#### 21. Other Income

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
</tr>
</tbody>
</table>

#### 22. Source

<table>
<thead>
<tr>
<th>Source</th>
<th></th>
</tr>
</thead>
</table>

#### 23. Average Income

<table>
<thead>
<tr>
<th>Income Type</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1000 Tk</td>
<td>(1)</td>
<td>(1)</td>
</tr>
<tr>
<td>&gt;1000-2000 Tk</td>
<td>(2)</td>
<td>(2)</td>
</tr>
<tr>
<td>&gt;2000 Tk</td>
<td>(3)</td>
<td>(3)</td>
</tr>
</tbody>
</table>

#### 24. Total Income

<table>
<thead>
<tr>
<th>Income Type</th>
<th>No. of People Living on That Income</th>
</tr>
</thead>
</table>

---

*Note: The table includes all the information from the given page.*
### PART IV  MEDICAL AND OBSTETRIC HISTORY

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many pregnancies did you have?</td>
<td></td>
</tr>
<tr>
<td>How many miscarriages or abortions?</td>
<td></td>
</tr>
<tr>
<td>How many stillbirths did you have?</td>
<td></td>
</tr>
<tr>
<td>How many live births did you have?</td>
<td></td>
</tr>
<tr>
<td>In which year started your first pregnancy?</td>
<td></td>
</tr>
<tr>
<td>Did you ever use any contraceptive method?</td>
<td>Yes(1) No(2)</td>
</tr>
<tr>
<td>Method of contraceptive used</td>
<td></td>
</tr>
<tr>
<td>for how long?</td>
<td></td>
</tr>
<tr>
<td>Previous ones</td>
<td></td>
</tr>
<tr>
<td>for how long?</td>
<td></td>
</tr>
<tr>
<td>Have you ever been admitted in a hospital?</td>
<td>Yes(1) No(2)</td>
</tr>
<tr>
<td>If yes, when and why were you admitted in the hospital?</td>
<td>Reason</td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Have you ever had jaundice?</td>
<td>Yes(1) No(2)</td>
</tr>
<tr>
<td>If yes, when did you have jaundice?</td>
<td></td>
</tr>
<tr>
<td>1 Did you suffer from High BP during previous pregnancies?</td>
<td>Yes(1) No(2) Unknown(9)</td>
</tr>
<tr>
<td>2 Did you suffer from High Blood Pressure while not pregnant?</td>
<td>Yes(1) No(2) Unknown(9)</td>
</tr>
</tbody>
</table>
3. Did you suffer in the last five years from epilepsy?
   Yes(1)  No(2)  Unknown(9)

4. Do you suffer from a disease for which you need regular medical attention?
   Yes(1)  No(2)  Unknown(9)

5. If so what kind of disease?

   When?  How long did you suffer?

6. Do you suffer from a disease for which you need regular medical attention?
   Yes(1)  No(2)  Unknown(9)

7. If so what kind of disease?

   When?  How long did you suffer?

   Yes(1)  No(2)  Unknown(9)

---

**PART V  ACTUAL PREGNANCY**

Did you have vaginal blood loss since the beginning of this pregnancy?
   Yes(1)  No(2)

Do you suffer from High Blood Pressure during this pregnancy?
   Yes(1)  No(2)  Unknown(9)

**PHYSICAL EXAMINATION:**

**BLOOD PRESSURE:**

**CAPILLARY BLOOD:** Yes(1)  DATE:  No (2)

**OEDEMA:** Yes(1)  Light, Moderate, Severe  No (2)
PART I: IDENTIFICATION

1.1 NAME

1.2 ADDRESS

1.3 HOUSEHOLD NUMBER

1.4 DATE OF INTERVIEW (DAY) (MONTH) (YEAR)

1.5 NAME OF INTERVIEWER

1.6 STILLBIRTH YES (1) NO (2) UNKNOWN (9)

1.7 SUPPLEMENTATION NUMBER: ____________________________

1.8 SUPPLY ENVELOP A ( ) ENVELOP B ( ) DATE ______

1.8 Did you have vaginal blood loss since our last visit?

Yes (1) No (2)

1.9 Did you receive a blood transfusion since our last visit?

Yes (1) No (2)
1.10 Did you have a serious injury with severe blood loss since our last visit? Yes (1)  No (2)

1.11 Were you in hospital since our last visit? Yes (1)  No (2)

1.12 If yes, for what reason? ____________________________

1.13 Have you been to a doctor, health worker or pharmacist since our last visit? Yes (1)  No (2)

1.14 For what kind of disease? ____________________________

1.15 Did you take iron pills for more than 20 days since our last visit? Yes (1)  No (2)  Unknown (9)

PHYSICAL EXAMINATION:

1.16 CONJUNCTIVAE: VERY PALE Yes (1)  No (2)

Referred to the supervisor Yes (1)  No (2)

Referred to other place? Yes (1)  No (2)

Where? ____________________________

1.17 BLOOD PRESSURE: ____________________________

1.18 OEDEMA YES (1)  LIGHT  MODERATE  SEVERE

NO (2)
PART I: IDENTIFICATION

1.1 NAME ________________________________

1.2 ADDRESS ________________________________

1.3 HOUSEHOLD NUMBER ________________________________

1.4 DATE OF INTERVIEW (DAY) ______ (MONTH) ______ (YEAR) ______

1.5 NAME OF INTERVIEWER ________________________________

1.6 STILLBIRTH YES (1) NO (2) UNKNOWN (9)

LIVE BIRTH YES (1) NO (2) UNKNOWN (9)

MATERNAL DEATH YES (1) NO (2) UNKNOWN (9)

1.7 LEFT OVER TABLETS ______ TABLETS TAKEN ______

1.8 SUPPLEMENTATION NUMBER: ________________________________

SUPPLY ENVELOP A( ) ENVELOP B( ) DATE ______

IF THE MOTHER DELIVERED, GO TO POST PARTUM QUESTION I

IF THE MOTHER MOVED AWAY, TRY TO FIND HER NEW ADDRESS:
PART I: IDENTIFICATION

1.1 NAME

1.2 ADDRESS

1.3 HOUSEHOLD NUMBER

1.4 DATE OF INTERVIEW (DAY) (MONTH) (YEAR)

1.5 NAME OF INTERVIEWER

1.6 STILLBIRTH
   YES (1) NO (2) UNKNOWN (9)
   LIVE BIRTH
   YES (1) NO (2) UNKNOWN (9)
   MATERNAL DEATH
   YES (1) NO (2) UNKNOWN (9)

1.7 LEFT OVER TABLETS TABLETS TAKEN

1.8 SUPPLEMENTATION NUMBER:
   SUPPLY ENVELOP A( ) ENVELOP B( ) DATE

IF THE MOTHER DELIVERED, GO TO POST PARTUM QUESTION I

IF THE MOTHER MOVED AWAY, TRY TO FIND HER NEW ADDRESS:

PART II: MEDICAL HISTORY

2.1 Did you have a vaginal blood loss since our last visit?
   Yes(1) No(2)

2.2 Did you have a serious injury with severe blood loss since our last visit?
   Yes(1) No(2)

2.3 Were you in hospital since our last visit?
   Yes(1) No(2)

2.4 If yes, for what reason?
2.5 Have you been to a doctor, health worker or pharmacist since our last visit? Yes(1) No(2)

2.6 For what kind of disease?

2.7 Did you take iron tablets for more than 20 days since our last visit? Yes(1) No(2)

2.8 Did you receive a blood transfusion since our last visit? Yes(1) No(2)

2.9 Did you had jaundice since our last visit? Yes(1) No(2)

2.10 Did you had fever for more than 3 days since our last visit? Yes(1) No(2) Unknown(9)

2.11 Since our last visit, did you have for more than 3 days:
  - cough + blood Yes(1) No(2)
  - cough + fever Yes(1) No(2)
  - diarrhoea Yes(1) No(2)

2.12 Did you have fits since our last visit? Yes(1) No(2)

**PHYSICAL EXAMINATION:**

2.13 CONJUNCTIVAE: VERY PALE Yes (1) No (2)
Referred to the supervisor Yes (1) No (2)
Referred to other place? Yes (1) No (2)
Where? ________________________

2.14 OEDEMA YES(1) LIGHT MODERATE SEVERE NO (2)

2.15 BLOOD PRESSURE: ______________ DATE ________________________

2.16 PROTEINURIA: ______________ DATE ________________________
QUESTIONNAIRE AFTER DELIVERY

PART I: IDENTIFICATION

1.1 NAME

1.2 ADDRESS

1.3 HOUSEHOLD NUMBER

1.4 DATE OF INTERVIEW (DAY) ___________ (MONTH) ___________ (YEAR) ___________

1.5 NAME OF INTERVIEWER

1.6 DATE OF DELIVERY: (DAY) ___________ (MONTH) ___________ (YEAR) ___________

1.7 STILLBIRTH
   YES (1) NO (2) UNKNOWN (9)

   LIVE BIRTH
   YES (1) NO (2) UNKNOWN (9)

   MATERNAL DEATH
   YES (1) NO (2) UNKNOWN (9)

1.8 LEFT OVER TABLETS _____ TABLETS TAKEN _____

1.9 SUPPLEMENTATION NUMBER:

   SUPPLY ENVELOP A( ) ENVELOP B( ) DATE ________

IF THE MOTHER MOVED AWAY, TRY TO FIND HER NEW ADDRESS:

PART II: MEDICAL HISTORY

2.1 Did you have a SEVERE vaginal blood loss since our last visit?  
   Yes(1) No(2)

2.2 Did you have a serious injury with severe blood loss since our last visit?  
   Yes(1) No(2)

2.3 Were you in hospital since our last visit?  Yes(1) No(2)

2.4 If yes, for what reason?  

2.5 Have you been to a doctor, health worker or pharmacist since our last visit?  
   Yes(1) No(2)
2.6 For what kind of disease? 

2.7 Did you take iron tablets for more than 20 days since our last visit?  
Yes(1)  No(2)

2.8 Did you receive a blood transfusion since our last visit?  
Yes(1)  No(2)

2.9 Did you had jaundice since our last visit?  
Yes(1)  No(2)  Unknown(9)

2.10 Did you had fever for more than 3 days since our last visit?  
Yes(1)  No(2)  Unknown(9)

2.11 Since our last visit, did you have for more than 3 days: 
- cough + blood  
- cough + fever  
- diarrhoea  
Yes(1)  No(2)

2.12 Did you have fits since our last visit?  
Yes(1)  No(2)

PHYSICAL EXAMINATION:

2.13 CONJUNCTIVAE: VERY PALE  
Yes (1)  No (2)  

Referred to the supervisor  
Yes (1)  No (2)

Referred to other place?  
Yes (1)  No (2)

Where?

2.14 OEDEMA  
YES(1)  LIGHT MODERATE SEVERE

NO (2)

2.15 BLOOD PRESSURE:  
DATE

2.16 PROTEINURIA:  
DATE

2.16 WEIGHT OF NEWBORN:  
GRAM  DATE

2.17 BLOOD SAMPLE TAKEN:  
DATE  2.18 Hb results:
Title: Anemia during pregnancy in an urban community of Bangladesh: a study of prevalence, validation of simple screening methods and impact of iron folic acid supplementation.

Summary of Referee's Opinions: Please see the following table to evaluate the various aspects of the proposal by checking the appropriate boxes. Your detailed comments are sought on a separate, attached page.

<table>
<thead>
<tr>
<th>Rank Score</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
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</thead>
<tbody>
<tr>
<td>Quality of Project</td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequacy of Project Design</td>
<td>✔</td>
<td></td>
<td></td>
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<tr>
<td>Suitability of Methodology</td>
<td>✔</td>
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<td></td>
</tr>
<tr>
<td>Feasibility within time period</td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appropriateness of budget</td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potential value of field of knowledge</td>
<td>✔</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CONCLUSIONS

I support the application:

a) without qualification

b) with qualification
   - on technical grounds
   - on level of financial support

I do not support the application

Name of R

Signature

Position:

Institute:

Detailed 
Please briefly provide your opinions of this proposal, giving special attention to the originality and feasibility of the project, its potential for providing new knowledge and the justification of financial support sought; include suggestions for modifications (scientific or financial) where you feel they are justified.

(Use additional pages if necessary)

Title: Anemia during pregnancy in an urban community of Bangladesh: a study of prevalence, validation of simple screening methods and impact of iron folic acid supplementation.

PI:

Reviewer:

Great project. The results will have a strong impact in the developing world. I would suggest to exclude women with Hb ≤ 7.0 instead of 7.9 g. I am not aware of studies giving strong arguments in favor of supplementation between 7 g and 9 g (although it is commonly accepted as an indication). Excluding women between 7 g and 9 g could reduce the generalizability of the study.
TITLE: Anaemia during pregnancy in an urban community of Bangladesh: a study of prevalence, validation of simple screening methods, and impact of iron folic supplementation.

PI: T. Juncker and A. Vanneste

REVIEWER:

DETAILED COMMENTS:

1. Originality and feasibility.

This is a well-prepared proposal focusing on a subject of considerable public health importance. However, the recent literature on anaemia is increasingly challenging the focus on pregnant women, and calls for greater attention to women of reproductive age as regards the scope for long-term reduction in the prevalence of anaemia. There is considerable evidence to show that despite widescale iron supplementation programmes, the prevalence of anaemia in women over the last 30 years has not decreased and in some areas has worsened. The investigators of the submitted proposal should be requested to justify their continued focus on pregnant women.

2. Potential for providing new knowledge.

This could be enhanced if the following points were addressed:

a. the investigators assume that iron and folate deficiencies are the primary causes of anaemia in this population. It would be preferable if they attempted to establish the aetiologic fraction due to all the possible contributory factors and their combinations. Is not malaria an issue here? Also some form of dietary information is essential, not only as regards identifying nutrient deficiencies contributing to anaemia, but also to establish possible inhibitors of the absorption of oral iron supplements and dietary iron.

b. non-compliance represents a potential major problem in this study, as elsewhere. The investigators should consider a variety of approaches to minimizing this bias (such as health education messages delivered at individual and group levels, spot-checks on compliance, and repeat motivation at each point of contact with the study women).

c. the effectiveness of supplementation will be assessed at several points during pregnancy but only one point post-delivery. An important question is the extent to which supplementation during pregnancy affects Hb status in the puerperium, especially in lactating women. A single observation in this latter period is inadequate. The investigators should be encouraged to
extend the follow-up to 6 weeks postpartum, possibly with three contacts during this interval. The post-delivery questionnaire presented with the proposal needs to gather some information on breastfeeding, dietary and working (manual) practices of the women, as well as details on complications at the time of delivery and, in particular, haemorrhage. It would be important to gather at least some indicator of overall nutritional status of the study women, such as body mass index or mid-upper arm circumference.

d. a detailed time-line for the project is needed.

3. Justification of financial support sought.

a. the investigators should consider the possible need for a second Reich. Hb meter in the event of breakdown as well as for calibration purposes.

b. no budgetary allowance, or indeed reference, is made to the dissemination of findings.

*****
Title: Anemia during pregnancy in an urban community of Bangladesh: a study of prevalence, validation of simple screening methods and impact of iron folic acid supplementation.

Summary of Referee’s Opinions: Please see the following table to evaluate the various aspects of the proposal by checking the appropriate boxes. Your detailed comments are sought on a separate, attached page.

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<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appropriateness of budget</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potential value of field of knowledge</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

CONCLUSIONS

I support the application:

a) without qualification

b) with qualification
   - on technical grounds
   - on level of financial support

I do not support the application

Name of Ref:

Signature:

Position:

Institution:

Detailed Comments (Attached)