ment 1.   Date 01/06/93
SHEET)

ETHICAL REVIEW COMMITTEE, ICDDR,B.

pal Investigator JUNCKER & VANNESTE   Trainee Investigator (if any) ______

ation No. 93-021   Supporting Agency (if Non-ICDDR,B) BADC

of Study ANEMIA DURING PREGNANCY IN AN COMMUNITY: A STUDY OF PREVALENCE, ~~TION OF SIMPLE SCREENING METHODS AND~~ OF IRON FOLIC ACID SUPPLEMENTATION,

Project status:
( ) New Study
( ) Continuation with change
( ) No change (do not fill out rest of form)

the appropriate answer to each of the following (If Not Applicable write NA).

urce of Population:
) Ill subjects — Yes (No)
) Non-ill subjects — (Yes) No
) Minors or persons under guardianship — (Yes) No

es the study involve:
) Physical risks to the subjects — (Yes) No
) Social Risks — Yes (No)
) Psychological risks to subjects — Yes (No)
) Discomfort to subjects — (Yes) No
) Invasion of privacy — Yes (No)
) Disclosure of information damaging to subject or others — Yes (No)

es the study involve:
) Use of records, (hospital, medical, death, birth or other). — (Yes) No
) Use of fetal tissue or abortus — Yes (No)
) Use of organs or body fluids. — (Yes) No

e subjects clearly informed about:
) Nature and purposes of study — (Yes) No
) Procedures to be followed including alternatives used — (Yes) No
) Physical risks — (Yes) No
) Sensitive questions — Yes (No)
) Benefits to be derived — (Yes) No
) Right to refuse to participate or to withdraw from study — (Yes) No
) Confidential handling of data — (Yes) No
) Compensation &/or treatment where there are risks or privacy is involved in any particular procedure — (Yes) No

5. Will signed consent form be required:
(a) From subjects — (Yes) No
(b) From parent or guardian (if subjects are minors) — (Yes) No

6. Will precautions be taken to protect anonymity of subjects — (Yes) No

7. Check documents being submitted herewith to Committee:
___ 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 Cttee. for review.

ee to obtain approval of the Ethical Review Committee for any changes ing the rights and welfare of subjects before making such change.

ncipal Investigator   Trainee

ENTERED 2 1 JUN 1998

585/ Screening = 21 — 5%

1.PRINCIPAL INVESTIGATORS: T. Juncker & A.Vanneste.

2.CONSULTANT: Prof. Dr. Buekens,
Universite 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.

4.STARTING DATE: August 15, 1993.

5.DATE OF COMPLETION: November 15, 1994.

6.TOTAL BUDGET: 29,933 US$.

7.FUNDING SOURCE: BADC.

8.HEAD OF DIVISION: R. Bradley Sack

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.

e aim of the study is to contribute to a more appropriate health
licy 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.

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

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

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

o compare the validity of 2 field tests, in the assessment of anemia: linical estimation and the Reichert-Jung test with the spectrophoto- etric cyanmethemoglobin test as the reference test.

2 BACKGROUND AND JUSTIFICATION OF THE STUDY.

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

aker and De Mayer (1979)(3) in an overview of nutritional anemia state hat:"In pregnancy, severe anemia is associated with increased risk of emature delivery and increased maternal and fetal morbidity and ortality. 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 non anemic es, but epidemiological studies relating the incidence of infections the prevalence of anemia are difficult to control and interpret. In ummary, it appears that there is suggestive, though perhaps not

nclusive evidence that anemia may make infants more prone to respira-
ry infections. In adults there has been very little investigation of
e relationship between anemia and infection and no good community
sed studies. Various investigators have been unable to demonstrate a
gher prevalence of anemia during the 1st and 2nd year of life in
fants born of iron-deficient mothers."

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

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

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

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

eye (1977)(35) found in a large prospective study that variables
gnificantly influencing the incidence of fatal placental infarcts,
thout significantly interacting with other variables, were the
ther's blood pressure (augmented with the presence of albuminuria),
e Hb level and the hematocrit. There was a gradual increase in the
te of fatal placental infarcts with rising Hb levels.

rphy & al. (1986)(33) concluded from a retrospective study on 54,382
ingleton pregnancies, that high (>13.2g%) and intermediate (>=10.2g%
) levels are significantly associated with adverse outcome. The
equencies of perinatal death, low birthweight, and preterm delivery
ere greater with high than with intermediate Hb. There was a striking
elation between Hb values and subsequent frequency of hypertension
p<0.001). In primiparas, the frequency of hypertension ranged from 7%
t Hb values under 10.5g/dl to 42% at Hb levels over 14.5g/dl.

mminki (1991)(19) in a non blinded case control study (routine versus lective iron supplementation during pregnancy) concludes that: there re no significant differences in health outcomes in the 2 groups. Were utine Fe supplementation a new practice, rather than customary, it uld be easy to advise against it, because of the lack of firm evidence its usefulness and because women in the selective group have less bjective adverse effects and fewer births after the 40th gestation ek.

rn & al.(1981)(14)in a study of nearly 60,000 pregnancies in the USA, und the following:
rcentage unfavorable outcome by maternal pregnancy Hgb.

	Unfavorable outcome	Hgb midpoint(g)						
		8	9	10	11	12	13	14
Blacks								
563	Fetal death(%)	2.6	1.6	2.0	2.7	5.4	9.7	14.5
3134	Low Birth Weight(%)	15.9	14.9	15.5	15.9	17.9	22.4	30.4
5611	Prematurity(%)	30.2	28.1	28.4	27.5	28.9	32.5	40.8

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

nother possible drawback of Fe supplementation is a negative influence the absorption of other minerals (Hambidge and al., 1987)(17).

t as Rooney (1992)(40)states: " It is estimated that over half of men of child bearing age in Africa have Hb levels below 11g/dl (WHO, 92a). Anemia may in such circumstances contribute indirectly to rtality associated with hemorrhage and directly to heart failure. utine iron administration to all pregnant women prophylactically may an prevent development of anemia in large numbers of women with frank borderline iron deficiency, or correct mild anemia in many. There s,however, a paucity of well conducted studies demonstrating an mprovement in the outcome for mother or infant.

Bangladesh we estimate that the situation is not much better than in frica. Increased needs during pregnancy and lactation are hard to meet. oor economic conditions account for inadequate food intake and nsequently inadequate iron intake. Poor hygienic conditions, helmin-ic infestation and gastro-intestinal disturbances, whereby digestion nd absorption of food are hampered, are common. Food taboos during but ven more so after pregnancy, interact with a lack of calories and iron ntaining foods. There is a cultural resistance to eat nutritious dible greens, both wild and cultivated, unless it is grown in one's own arden. Many leaves of tubers are wasted because it is not customary to at them. A family in rural Bangladesh is a highly hierarchical tructure in which individuals are differentiated according to kinship oles which are gender specific and result in unequal rights over esources, including food (8). Men eat first followed by the children, hat is left is given to the women. This can induce a degree of anemia hat is threatening for mother and child.

he use of contraceptives and their impact on anemia is under investiga-
ion by BIPERTH (6): it is assumed that oral contraceptives reduce
enstrual blood loss by about 50%, whereas intra-uterine devices
ncreases loss by as much as 100%.

nly a few studies have investigated anemia in Bangladesh. Most of these
re hospital based.

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

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

n 1973 Dr. Hussain & al. (20) conducted a study among 157 low and
iddle class pregnant women in the Azimpur Maternity in Dhaka. The mean
b level measured with cyanmethemoglobin method was 10.53g%, the mean
evel for the first pregnancy was 10.53 g%, for the second pregnancy
.84 g% and between 9.95 and 10. g% for subsequent pregnancies (16).

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

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

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

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

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

o outline a policy to deal with the problem, information on prevalence,
he predictive power and cost effectiveness of anemia testing and the
mpact of routine iron supplementation should be available. This study
as conceived to answer some of these questions.

eld test study will be set up to estimate the validity of clinical
iation of anemia and the Reichert-Jung test, which is an easy field test,
mparison with the cyanmethemoglobin test (reference test).
predictive power of clinical estimation and the Reichert-Jung test for
ssessment of anemia compared with the reference test could contribute
ie establishment of a policy for anemia screening in the community.

study in India (15) and another study in Matlab (23) showed a low (67%)
ry low (26%) sensitivity in the clinical assessment of moderate and
e anemia (cut off is 10g % Hb) based on the pallor of the conjunctiva,
WHO declared the Sahli and Tallquist methods inadequate.
a cut-off at 9g% Hb, the sensitivity for clinical estimation of anemia
l maybe reach 80%, this would have important implications for the policy
ngladesh.

Bangladesh there are about 4 million births per year. If the health
em can reach about 75% or 3 million pregnant women during the antenatal
iod, with an estimated prevalence of severe anemia of 15%, 450.000
gnant women per year are severely anemic. We assume that 80% of these
ic women under iron supplementation will recover or reach a Hb level of
or more. The cost of 4 months iron-folic acid supplementation is 44
/pregnant women, when 2 tablets per day are given and each tablet
ains 60 mg elemental iron.

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

CY 1:

pregnant women will be supplemented with iron-folic acid tablets daily
g 4 months from the 6th month of pregnancy on. No screening for anemia
one. There are about 4 million pregnancies per year in Bangladesh, the
h system reaches 75% of all pregnant women or 3 million. Out of these 3
ion women, 15% or 450.000 will be severely anemic and we estimate that
f these severely anemic women will recover due to iron supplementation.
ases recovered: 450.000 severely anemic women * 0.8 = 360.000
ecovery rate: 360.000/450.000 = 80%
otal cost per year: 3 million * 44Tk = 132 million Tk
ost per case recovered: 132 million/360.000 = 367 Tk.

CY 2:

nant women are clinically screened for anemia and only severely anemic
n receive iron tablets.
e assume:
alence of severe anemia = 15%
itivity of clinical screening for severe anemia = 80%
e positive rate of clin. screening for sev anemia = 20%
o of women with severe anemia supplemented:
million*15%*80% = 360.000
o of women not severely anemic but supplemented:
million*85%*20% = 510.000

)tal supplemented = 360.000 + 510.000 = 870.000
ases recovered: 360.000 * 0.8 = 288.000
ecovery rate: 288.000/450.000= 64%
)tal cost per year: 870.000 * 44Tk = 38.280.000 Tk.
)st per case recovered: 38.280.000/288.000 = 133 Tk.

:Y 3:

e Reichert-Jung test is an easy and accurate field test with
sitivity = 80%,
e positive rate = 10%
ie supplement only the women with severe anemia
Reichert-Jung hemoglobinometer cost 10.000 Tk/piece,
stimate that in Bangladesh we would need 10.000 meters to screen yearly
llion women or 300 screenings per year per meter, and the life time of
iemoglobinometer is about 5 years.
) of women with severe anemia supplemented:
million*15%*80% = 360.000
) of women not severely anemic but supplemented:
million*85%*10% = 255.000
)tal supplemented = 360.000 + 255.000 = 615.000
ases recovered 360.000 * 0.8 = 288.000
ecovery rate: 288.000/450.000= 64%
)tal cost for iron tablets: 615.000 * 44Tk = 27.060.000 Tk
)st for saponin sticks 2Tk * 3 million = 6 million Tk
)st for pricking needle 1 Tk * 3 million = 3 million Tk
)st for Hb meter 10.000Tk * 10.000/5 years = 20 million Tk
)tal cost per year: = 56.060.000 Tk
)st per case recovered: 56.060.000/288.000 = 195 Tk

	Total cost per year in million Taka	recovery rate	cost per recovered case in Taka
)licy 1) screening	132	80%	367
)licy 2 lin. screening	38	64%	133
)licy 3)od field test	56	64%	195

; clear from the above table that, if iron supplementation has only more fits than disadvantages for women with a Hb less than 9g%, and if we ne that clinical screening for severe anemia has a sensitivity of 80% and lse positive rate of 20%, then clinical screening is the most cost ctive test in comparison with a field test (e.g. the Reichert-Jung test) vhich we estimate the sensitivity at 80 % and the false positive rate at But the table shows also clearly that routine or universal supplementa- is much more expensive than clinical screening and selective supplemen-)n 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 ared to indiscriminate iron supplementation, with the clinical screening iemia 36% of all anemic women will not recover while with indiscriminate distribution only 20% of all anemic women will not recover.

IGN OF THE STUDY.
==========

T I:

DY ON PREVALENCE OF ANEMIA AND IMPACT OF IRON SUPPLEMENTATION.

Y POPULATION.

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

area has a population of about 100,000 and 2600 deliveries per year. A gladeshi NGO, Nari Maitree, has been working in the area from September 9. Its income generating program was funded by South Asia Partnership from 9-1991 and the MCH program is funded by BPHC (Bangladesh Population Health sortium). Nari Maitree receives funds from DANIDA for ten women's group credit and income generating program. Originally the NGO focused only on poorest people in the Ward, but from 1993 on, all inhabitants of the area included in the project.

s or family welfare assistants visit every 2 months each household and lect information on: households, eligible couples, provided health care, ality, mortality, migration and sanitation. They offer house to house vice for temporary birth control methods, refer to their clinic for IUD ertion and to a hospital outside the area for sterilization. Extended EPI vices for mothers and children, antenatal and postnatal care are provided satellite clinics.

ist of all pregnant women and their LMPDT(last menstrual period date) is ilable before the 20th week of pregnancy.

HODOLOGY OF THE STUDY.

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

random sampling will be done as follows: the supervisor receives the list pregnant women from the lab, women with a Hb <9g% will receive iron plementation and they will be excluded from the list. The supervisor will ry week draw a list with women at 24 weeks of pregnancy. Each woman on the t will be attributed a serial number and a number from 1 to 6. The ervisor 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
p B will receive the B envelop with the supplementation tablets. The
ent of envelops A and B will only be known to the key holder in Dhaka,
h will be a person alien to the study. Whenever a woman, during the
y, is suspected by the field worker to suffer from serious anemia, a Hb
with the cyanmethemoglobin meter will be performed, if the woman has a
f less than 9g % she will be referred to an independent physician. When
physician confirms the diagnosis, she can call the key holder. The key
er may than eventually break the seal to procure information on previous
ived supplementation. The supervisor will be informed on this event.
ntermediate analysis will be done during the course of the field study.

ng 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 a Hb assessment with the cyanmethemoglobin test.
* check blood pressure.
* measure upper arm circumference.

ng 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.

ow-up visits will be at respectively 27, 30, 34, 36 and 38 weeks of
nancy. 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.

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

he replacement field officer is informed about the birth within the
t 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
9g%, 752 women will be assigned to each group at the start of the study.
stimate a fall out of 20% (N=150) due to non-compliance, migration and
ality. Each group will have 602 women at the end of the study.

on other outcome measures

stimation of the different risk factors of anemia is as follows:

<=20 years	estimated at 20%	gravidity: 1	estimated at 23%
21-25 years	estimated at 32%	2-4	estimated at 51%
26-30 years	estimated at 28%	>4	estimated at 26%
>30 years	estimated at 20%		

y size:	1-3 estimated at 28%	education of the mother:	
	3-5 estimated at %	no education	estimated at 70%
	>5 estimated at 28%	at least 1 year	estimated at 30%

ehold income:

) Tk	estimated at 27%
-<2500Tk	estimated at 43%
) Tk	estimated at 30%

JSION CRITERIA.

following subjects will be refused admission to the study:

en with thalassemia. Thalassemia, which is estimated at less than 1%, l be determined through anamnesis.
en with a transfusion in the last six months or more than 3 times a nsfusion during her life time.
en with iron supplementation for more than 20 days since the start of gnancy.
en with a chronic diarrhoea (malabsorption). Chronic diarrhoea is at st 3 loose motions per day, since 2 weeks or more.

T STUDY.

month pilot study will be done to assess the cultural resistance for l collection and the accuracy of the questionnaire.
rvisors will be trained in composing lists of pregnant women according to MPDT. They will be instructed in methods for supervision and follow-up.

l 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 ls, the diastolic blood pressure at phase 4, the muffling of the sounds. size and speed of descent of the mercury column will be standardized. uff must be at the level of the left atrium. The mercury manometer will sed and the instruments will be standardized.
icks will be used to detect proteinuria on a clean catch midstream imen:

II:

) TEST STUDY.

---

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

TION OF THE STUDY.

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.

CAL CONSIDERATIONS.

ourpose and the interventions needed for this study will be explained to
vomen and their informed consent must be obtained before enrollment.
n with a Hb <9 g% will be supplemented and excluded from the study, since
s assumed, supported by the literature, that they do not seem to have
adverse outcomes due to iron supplementation, on the contrary, they are
vomen who will most benefit from the iron supplementation. All women
sted but where severe anemia becomes apparent during the study will be
ed by an independent doctor.
n with a diastolic blood pressure of 110 mm Hg or more or women with 2
ecutive diastolic blood pressures of 90 mm Hg or more and/or women with
oteinuria of 300 mg or more on 2 consecutive clean catch stream samples
be sent to the antenatal clinic for treatment.
n with an infection, a hemorrhage and fits will be referred for treatment
sual.

LE SIZE CALCULATION.
==========

E REQUIRED SAMPLE SIZE TO ESTIMATE THE PREVALENCE OF ANEMIA:

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

OPULATION	EXPECTED PREVALENCE	PRECISION	REQUIRED SIZE	STUDY SIZE
at 20wk	15%	3%	N=461	N=885
acebo group at PP	20%	3%	N=556	N=602
on supplemented oup at PP	10%	3%	N=341	N=602

E REQUIRED SAMPLE SIZE PER GROUP FOR THE COMPARISON OF ANEMIA PREVALENCE
=.05, ß=.20)

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

nexposed= women with Hb >=9g% and receiving placebo
xposed = women with Hb >=9g% and receiving iron
nexposed/exposed= 1/1
xpected anemia prevalence of unexposed after delivery= 20%
xpected anemia prevalence of exposed after delivery = 10%
R=2.00

nexposed= women with Hb <9g% at 20 weeks of pregnancy
xposed = women with Hb <9g% receiving iron, after delivery.
nexposed/exposed= 1/0.8
xpected anemia prevalence of unexposed after delivery= 99.99%
xpected anemia prevalence of exposed after delivery = 50%
R=2.00

OPULATION	TIME	ESTIMATION	REQUIRED SIZE IN EACH GROUP	STUDY SIZE IN EACH GROUP
on & placebo group	PP	20%-10%=10%	N=219/219	N=602/602
n.anemic at 20wk supplemented	20wk-PP	100%-50%=50%	N=16/13.	N=203/163

PLE SIZE REQUIRED TO ESTIMATE SIGNIFICANT DIFFERENCES FOR PRE-ECLAMPSIA
WEEN IRON & PLACEBO SUPPLEMENTED GROUP.
.05, β=.20)

nfo 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
cted preeclampsia prevalence of unexposed after delivery= 4%
cted preeclampsia prevalence of exposed after delivery = 8%
.00

e size required	Sample size of the study
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)

nfo Version 5: Unmatched Cross-Sectional Studies.

posed= women without risk factor at 20 weeks of pregnancy
sed = women with risk factor at 20 weeks of pregnancy
posed/exposed= 4/1
cted anemia prevalence of unexposed at 20 weeks of pregnancy = 12%
cted anemia prevalence of exposed at 20 weeks of pregnancy = 18%
.5

e size required	Sample size of the study
xposed=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.

$$\frac{1.96^2 * S * (1-S)}{E^2}$$

stimated sensitivity, for Reichert-Jung test and for clinical
stimation=.80, conservative estimate=.50
rror

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

SES.
====

DOM ERROR: From our experience in Matlab were field workers visit each sehold fortnightly, we assume that the recall error of the last menstrual iod date will be the most important error in the study. The field worker the study site visits each household once in 2 months and asks for the t menstrual period. The great majority of the errors will not exceed one th in both directions. Women's knowledge of their age is also not always y accurate, but the error will be bi-directional.

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

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

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

ective loss due to:

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

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 en or women with side-effects. We assume that the side effects of iron lets will be more important than those for the placebo tablets. Field kers are very well aware of the side-effects of iron supplementation and s will impede the blindness of the study.
ensure a better compliance all women will be visited with a maximum erval of 6 weeks.

RVATION BIAS

ESTIONNAIRE.
questions are closed questions which require a "yes" or "no" answer,
s or numbers. Questions on risk factors such as age, gravidity, family
, income will be verified through previous records, available in the
y site. Income will be confirmed through other observations such as rent
e paid, number of beds related to family size and the presence of other
ry products such as a watch, a bicycle, a radio or TV in the house.
ke of medication previous to the study will be verified through left-
s 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.
rviewers and clients will not be explained the hypothesis that anemia
d be associated with the different risk factors and outcomes, though they
be informed about the different benefits and disadvantages of the iron
vitamin supplementation.
ng will be done by an independent code officer and the analysis of the
y by an independent data manager.

STS AND DEFINITIONS.
the Field test study, a field worker will perform clinical estimation of
ia and the Reichert-Jung test in Azimpur Maternity Center. The results of
e tests must be independent. The midwife in the Azimpur Maternity Center
harge for anemia testing will first notify the result of the clinical
mation of anemia and only than can the Reichert-Jung test be performed.
ramedic could perform the Reichert-Jung test but we assume that the
lts could be different from those of a field worker and it is the field
ers who will eventually perform the test, if estimated to be successful.
reference test which is the decisive test for the anemic status of women
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
ually all studies reported and all clinical correlations between
rtensive disorders and the outcome of pregnancy refer to readings
ined by indirect blood pressure measurement. A simple mercury manometer
be used as it is less subject to errors than the aneroid gauge. Speed of
ent 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
rs associated with indirect blood pressure measurement, many factors
e marked variability in blood pressure between individuals (e.g. age,
ty,race) and within the same pregnant woman, such as time of the day,
l of activity, sleep, emotions and posture. Wallenberg (1989) concludes
is review on detection of hypertensive disorders in pregnancy, that there
good reasons to base clinical definitions and diagnosis of hypertension
regnancy 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
rtant than the rise, both in relation to the occurrence of proteinuria
in terms of prognosis. However, a recent detailed study (Redman and
eries (1988)(38)indicates that a combination of a first diastolic reading
ess 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-
mptic women than either measurement alone. Definitions in the study
be as follows:

RTENSION: 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.

EINURIA: on 2 random clean catch samples, a protein excretion of 300 mg or more.

CTION: 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.

MPSIA: 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.

YSIS.
====

descriptive part will determine the prevalence of anemia, the proportion nild, moderate and severe anemia at 20 weeks of pregnancy in non iron plemented women.

analytical part will look for significant differences between the ebo supplemented and the iron supplemented group 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.

ugh multivariate analysis significant associations will be computed veen anemia at 20 weeks of pregnancy and risk factors (such as age, ty, family size, socio-economic status, education of the mother and itional status of the mother).
the significant risk factors relative and attributable risks will be ulated.

itivity, specificity, positive and negative predictive value of the nical estimation of anemia and the Reichert-Jung test in comparison with reference test, will be evaluated.

FICANCE OF THE STUDY.

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

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

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

ugh establishing significant correlations between risk factors for re anemia and through estimation of the weight of the risk factors (such oung or older age, primiparity or grand multiparity, low socio-economic us, large family size and lack of education of the mother, low itional status), new policies can be developed to target the most cted groups in the society, for which, we assume, the benefits of iron lementation will overshadow the eventual deleterious impact of iron lementation. Iron tablets could than be provided for these groups at .

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

OGLOBIN TESTS.
==========

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.

SCHEME

	GR	GR	GR	GR	GR	GR	GR	GR
1 :	1							
2 :	2							
3 :	3							
4 :	4							
5 :	1	5						
6 :	2	6						
7 :	3	7						
8 :	4	8						
9 :	5	9						
10:	6	10						
11:	1	7	11					
12:	2	8	12					
13:	3	9	13					
14:	4	10	14					
15:	1	5	11	15				
16:	2	6	12	16				
17:	1	3	7	13	17			
18:	2	4	8	14	18			
19:	1	3	5	9	15	19		
20:	2	4	6	10	16	20		
21:	3	5	7	11	17	21		
22:	1	3	4	6	8	12	18	22
23:	2	5	7	9	13	19	23	
24:	3	6	8	10	14	20	24	
25:	4	7	9	11	15	21	25	
26:	5	8	10	12	16	22	26	
27:	6	9	11	13	17	23	27	

	GR	GR	GR	GR	GR	GR	GR
WEEK 28:	7	10	12	14	18	24	28
WEEK 29:	8	11	13	15	19	25	29
WEEK 30:	9	12	14	16	20	26	30
WEEK 31:	10	13	15	17	21	27	31
WEEK 32:	11	14	16	18	22	28	32
WEEK 33:	12	15	17	19	23	29	33
WEEK 34:	13	16	18	20	24	30	
WEEK 35:	14	17	19	21	25	31	
WEEK 36:	15	18	20	22	26	32	
WEEK 37:	16	19	21	23	27	33	
WEEK 38:	17	20	22	24	28		
WEEK 39:	18	21	23	25	29		
WEEK 40:	19	22	24	26	30		
WEEK 41:	20	23	25	27	31		
WEEK 42:	21	24	26	28	32		
WEEK 43:	22	25	27	29	33		
WEEK 44:	23	26	28	30			
WEEK 45:	24	27	29	31			
WEEK 46:	25	28	30	32			
WEEK 47:	26	29	31	33			
WEEK 48:	27	30	32				
WEEK 49:	28	31	33				
WEEK 50:	29	32					
WEEK 51:	30	33					
WEEK 52:	31						
WEEK 53:	32						
WEEK 54:	33						

1 is the first week of the study, week 2 the second week etc..
s group, group 1 means women at 20 weeks of pregnancy during week 1.
verage group will be 2600/52=50, one field officer (nurse) can make some
visits per week or 2 groups.

week 1-10:	need for 1 field officer	10 weeks*1	= 10
50-54:	need for 1 field officer	5 weeks*1	= 5
week 11-16:	need for 2 field officer	6 weeks*2	= 12
44-49:	need for 2 field officer	6 weeks*2	= 12
week 17-21:	need for 3 field officer	5 weeks*3	= 15
34-43:	need for 3 field officer	10 weeks*3	= 30
week 22-33:	need for 4 field officer	12 weeks*4	= 48
acement :	need for 1 field officer	58 weeks*1	= 54
t study :	need for 1 field officer	4 weeks*1	= 4
		total	=194

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anam.

ET.
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SONNEL.
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uted as follows:day pay * days/wk * wk * no of staff

D WORKER FIELD TEST	200*1*9	=	1.800	
D OFFICER	364*6*194*1	=	423.696	
D SUPERVISOR	590*6*58 *1	=	205.320	
A ENTRY ASS	200*6*36 *1	=	43.200	
A MANAGER	1136*6*7 *1	=	47.712	
TOTAL:				721.728

ORATORY.
---
uted as follows:no of units * price/unit

ERENCE TEST:	1750+1450+400(PILOT)*	25	=	90.000	
TISTIX :	7.500 *	3	=	22.500	
NE COLLECTORS	7.500 *	1	=	7.500	
OD PRESSURE METERS	1.000 *	4	=	4.000	
ROPIPETTES	4.000 *	3	=	12.000	
CETS	4.000 *	1	=	4.000	
CH. HB METER	10.000 *	1	=	10.000	
.STICK,DESINF	400 *	2	=	800	
Y SCALE	8.000 *	1	=	8.000	
ER MED MAT				5.000	
TOTAL:					163.800

VEL EXPENSES.
---
puted as follows: NO OF WOMAN TO VISIT * NO OF VISITS * TRANSPORT COST

FIELD WORKERS	1650*7*5	=	57.750	
INVESTIGATORS & SUPERVISORS			12.500	
TOTAL:				70.250
TIONARY AND PHOTOCOPIES.				50.000
				997.778
AL:				199.556
cellaneous and unforeseen 20%				
AL			1.197.334	or 29.933 US$

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 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 20st, 24th, 27th, 30st, 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.

name of the investigator Signature of the Investigator

Name of the woman Age

Address

Household number

Name of the guardian (for minor women only)

Signature of the Woman / Guardian (for minor woman only)

Date Signature of witness

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.

CONSENT FORM No 2: for one questionnaire ( )
for one blood sample ( )

name of the investigator _____ Signature of the Investigator _____

Name of the woman _____ Age _____

Address _____

Household number _____

Name of the guardian (for minor women only) _____

Signature of the Woman / Guardian (for minor woman only) _____

Date _____ Signature of witness _____

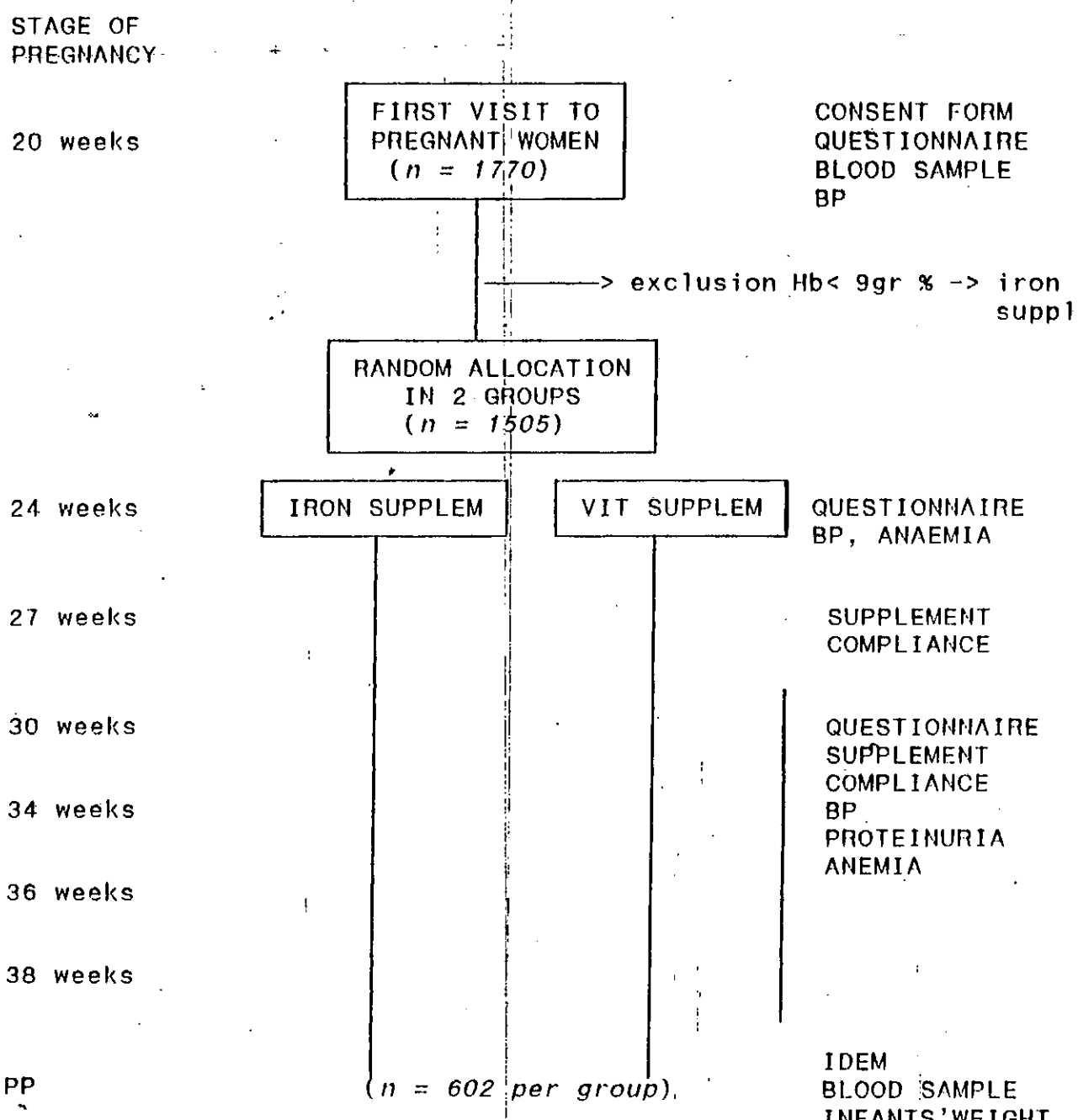
PROCEDURE FOR MAINTAINING CONFIDENTIALITY

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 fieldsupervisor 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



SERIAL NUMBER.....

QUESTIONNAIRE AT 20 WEEKS

PART I : IDENTIFICATION

1.1 NAME _____

1.2 ADDRESS _____

1.3 HOUSE HOLD 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

PART II : EXCLUSION.

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.

1. OCCUPANCY

house	land
owned 1	self 1
rented 2	railway 2
other 7	govt. 3
	private 4
	other 7

2. OTHER LAND OWNER SHIP

	City	Vill
no	0	0
yes	1	1

3. OTHER HOUSE OWNER SHIP

	City	Vill
no	0	0
yes	1	1

4. CONSTRUCTION

Type	roof	wall
jhupri	1	1
bamboo	2	2
wood	3	3
tin	4	4
pucca	5	5
other	7	7

5. # ROOM [ ]

6. ELECTRICITY

no 0
yes 1

7. ASSETS

	TV	Radio	Watch	Cycle	Almirah	Table	Khat
No	0	0	0	0	0	0	0
Yes	1	1	1	1	1	1	1

8. # Sarees [ ]

9. STATUS:

Married (1)
Widowed (2)
Divorced (3)
Single (4)

10. RELIGION

Muslim (1)
Hindu (2)
Christian (3)
Other (4)

11. RESIDES WITH

Husband only (1)
In-laws (2)
Parents (3)
Alone (4)
Others_____(5)

12. WHO PAYS YOUR FOOD

Husband only (1)
In-laws (2)
Parents (3)
Yourself (4)
Others_____(5)

13. # beds: [ ]

14. # of people sleeping in the basha for minimum 2 wks/mnth >10 YRS [ ] <=10YRS [ ]

15. HUSBAND years of education [ ]

16. OCCUPATION

rickshaw puller (1)
petty business (2)
day laborer (3)
servant (4)
other:.....(5)

17. AVERAGE INCOME/MONTH

.....
<1000Tk (1)
>1000-2000Tk< (2)
>2000Tk (3)

18. YOURSELF years of education [ ]

19. OCCUPATION

Garments (1)
Servant (2)
Day laborer (3)
Beggar (4)
Other:.....(5)

20. AVERAGE INCOME/MONTH

.....
<1000Tk (1)
>1000-2000Tk< (2)
>2000Tk (3)

21. OTHER INCOME

yes (1) no (2)

22. SOURCE

.....
.....
.....

23. AVERAGE INCOME/MNTH

.....
<1000Tk (1)
>1000-2000Tk< (2)
>2000Tk (3)

24. TOTAL INCOME/MONTH.....# OF PEOPLE LIVING ON THAT INCOME.....

RT IV MEDICAL AND OBSTETRIC HISTORY

How many pregnancies did you have? _____

How many miscarriages or abortions? _____

How many stillbirths did you have? _____

How many live births did you have? _____

In which year started your first pregnancy? _____

Did you ever use any contraceptive method? Yes(1) No(2)

e of contraceptive used	how long?
t _____	from:_____to:_____
vious ones_____	from:_____to:_____
_____	from:_____to:_____

Have you ever been admitted in a hospital? Yes(1) No(2)

If yes, when and why were you admitted in the hospital?

Reason	Date
1_____	_____
2_____	_____
3_____	_____

Have you ever had jaundice? Yes(1) No(2)

0 If yes, when did you have jaundice?_____

1 Did you suffer from High BP during previous pregnancies?

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

2 Did you suffer from High Blood Pressure while not pregnant?

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

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)

RT 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)

SERIAL NUMBER.....

QUESTIONNAIRE AT 24 WEEKS OF PREGNANCY.

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 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

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)

QUESTIONNAIRE AT 27 WEEKS SERIAL NUMBER .....

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:

_____

QUESTIONNAIRE AT 30, 34, 36, 38 WEEKS SERIAL NUMBER .....

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. SERIAL NUMBER .....

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)

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_____

2.16 WEIGHT OF NEWBORN:_____GRAM DATE_____

2.17 BLOOD SAMPLE TAKEN: DATE_____ 2.18 Hb results:_____

FIRST REVIEWER

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.

	Rank Score		
	High	Medium	Low
Quality of Project	✓		
Adequacy of Project Design	✓		
Suitability of Methodology	✓		
Feasibility within time period	✓		
Appropriateness of budget	✓		
Potential value of field of knowledge	✓		

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

cc = Dr. A-M Vannestle

Signature

Position:

Institutic

Detailed c

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:

Good project. The results will have a strong impact in the developing world.
I would suggest to exclude women with Hb $< 7g$ instead of $9g$.
I am not aware of studies giving strong arguments in favor of supplementation between $7g$ and $9g$ (although it is commonly accepted as an indication). Excluding women between $7g$ and $9g$ could reduce the generalizability of the study.

SECOND REVIEWER

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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	High	Medium	Low
Quality of Project		✓	
Adequacy of Project Design		✓	
Suitability of Methodology		✓	
Feasibility within time period	✓		
Appropriateness of budget	✓		
Potential value of field of knowledge		✓	

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: 5/93.....

Position: S

Institution:

Detailed Comm... (Attached)