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# From the Editor



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This issue of the journal is rich with a number of papers on maternal health from Bangladesh, Iran and Iraq.

A study from Iraq looked at Malaria that has stalked human history for the past 50,000 years. It is clear that the clinical consequences to mother and child, of malaria in pregnancy, and the magnitude of the problem, are enormous. A study from Bangladesh investigated the utilization of maternal and child health care, using data from the 2004 Bangladesh Demographic and Health survey (BDHS, 2004) over two time spans 1990-1999 and 2000-2004. The analysis revealed that the vast majority of women do not have any care (i.e., antenatal, natal and postnatal care services) and those women who did have antenatal care received that care from doctors.

Akter S, Rahman MM, Khan AR, and Rahman J.A.M.S looked at

Reproductive knowledge as a vital factor in knowing the consciousness of bearing a child. Knowledge of

healthy reproductive behavior as well as lower acceptance of family planning procedures by contraception substantially reduces the risk of pregnancy wastage; however giving more births increases this risk. A study from Bangladesh looked at the basic characteristics and their impacts on desired family size using data from a survey of 4500 ever-married women of which 2250 women were in urban areas and 2250 women in rural areas of Rajshahi district. The study shows that the rural respondents are less educated than the urban counterparts. Husbands seem to be better educated than the wives in all areas. This study also reveals that women desire higher family size with increasing number of living sons in rural Rajshahi.

Nourmohammadi,\* A. Akbaryan, Sh.Fatemi,\*\* A.R. Meamarzadeh+ and E. Noormohammadi commented on a case-control study, in which serum zinc concentration was measured in a study group consisting of 40 pre-eclamptic Iranian women. Several investigators in recent years have reported that reduced levels of Zn may have a positive association to pre-eclampsia. Similarly, this data provided evidence of a decrease in serum zinc concentrations in pre-eclamptic pregnant mothers. Progressive depletion of zinc during the course of healthy pregnancy due to physiological changes is a normal process. While the findings can be considered consistent with others who have looked into the relation between Zn and pre-eclampsia, the existence of contrary evidence only highlights the obvious need for more prospective documented studies to find the exact cause-effect relationship of Zn imbalance in women at risk for development of pregnancy induced pre-eclampsia.

A study from Iran looked at the abnormal behavior among the youth living in the suburbs. The authors used a 'survey' for measuring the abnormality and used self-reported accounts for data collection. Based on the results obtained from Multiple

Regression, association with others, family problems, control failure, labels, alienation, religious beliefs, and socioeconomic status are the significant variables to abnormalities.

A study from Bangladesh looked at health facilities in the World. USA was at the top ranking position in 1990 but in 2000 it came down to 2nd position. The study reveals that Bangladesh was at 36th position in 1990 and increased their facilities for health during 1990 to 2000 but it did not come out from the low ranking group.

A paper from Iraq looked at improving Opportunities for Learning in Postgraduate Physician Training Program. Active participation of learners in any Postgraduate training programs needs to be critically monitored by an internal review process. The author suggests that residents should spend more time in outpatient clinics. Journal clubs are an essential strategy.

# Effect of Reproductive Knowledge of Mothers on Pregnancy Wastage in Rural Rajshahi, Bangladesh

**Key words:** Reproductive Health, Pregnancy Wastage, Reproductive Knowledge Rating, Linear Probability Model.

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## ABSTRACT

Reproductive knowledge is a vital factor in bearing a child. To have reproductive knowledge and the adverse effect of it over several birth related factors we have collected data from some selected rural areas of Rajshahi District. Some influential factors those influence the reproductive knowledge and their adverse effect on child bearing and pregnancy wastage have been identified. Analyzing our data by some statistical tools like linear probability models we have found that the reproductive knowledge influences pregnancy wastage of mother. The pregnancy wastage of women in two extreme age groups (below 20 and above 35) is tremendously dodgy where as in other age groups this is relatively benign. Knowledge on healthy reproductive behavior as well as lower acceptance of family planning procedure by contraception substantially reduces the risk of pregnancy wastage; however giving more birth increases this risk.

## Introduction

Reproductive health is a crucial part of general health and a central feature of human development. This is a universal concern but is of special importance for women, particularly during the reproductive years. Reproductive health is becoming an emerging issue by United Nations. During the past few decades, there has been a growing recognition of the reproductive health issue for people, particularly women, in the third world countries. Every year at the global level about eight million women suffer from pregnancy related complications and over half a million die. About 99% of them are in developing countries (WHO, 2004). Most of these deaths can be averted even where resources are limited. The poor reproductive health of women in third world countries is an outcome of the general neglect

of health and nutrition in childhood and adolescence, which affects their future wellbeing (De Silva 1998).

Improvement of the reproductive health status of women in the third world is being considered as one of the most important goals of human and social development. Reproductive knowledge of mother is highly related to the education level. As about 50% of the total population is woman in Bangladesh, the maternal education is a key factor that can role over a family, even over the country. Specifically, mother's education can change a society which lift-up a country from lower level to upper level because the practices of educated mothers with regard to pregnancy, child birth, immunization, management of childhood diseases etc. are quite different from those of their uneducated counterpart (Govindasamy and Ramesh, 1997).

Now to undergo in-depth of our study we would like to discuss some conceptual terms in brief like new concept of reproductive health, knowledge on reproductive health, reproductive age, pregnancy and pregnancy wastage.

### **New concept of reproductive health**

Reproductive health does not start out from a list of diseases or problems—sexually transmitted diseases (STDs), maternal mortality or from a list of programs like maternal and child health, safe motherhood, and family planning. Reproductive health instead must be understood in the context of relationships like fulfillment and risk, the opportunity to have a desired child or alternatively to avoid unwanted or unsafe pregnancy. This contributes enormously to physical and psychological comfort and closeness and to personal and social maturation or poor reproductive health is frequently associated with disease, abuse, exploitation, unwanted pregnancy and death.

Problems that are specific to women's reproductive process can be divided into two ways. Firstly, problems occurring during pregnancy, delivery, and puerperium are referred to in the medical literature as obstetric (maternal) morbidity. Secondly, problems that occur to non-pregnant women and outside the puerperal period of six weeks are known as gynecological morbidity.

### **Knowledge on reproductive health**

Reproductive health is an important component of general health and it is a pre-requisite for social, economic, and human development. Knowledge on reproductive health such as early and unwanted pregnancy, HIV, and other sexually transmitted infections and pregnancy related illness and death account for a significant part of the burden of diseases among adolescent and adults. To improve knowledge on reproductive health, efforts have so far focused on the approaches such as antenatal care, tetanus toxic immunization, iron supplementation, training of traditional birth attendants for clean and safe delivery practices and family planning.

### **Women in reproductive age**

Women can conceive and produce child safely within certain age limits. Usually, it indicates childbearing period or reproductive span of women. Generally, the age from 15 to 49 years is considered as reproductive span for women.

### **Pregnancy and pregnancy wastage**

Pregnancy is the state of female which is produced due to the implantation of the fertilized ovum in the uterine endometrium and ultimately giving rise to a foetus (Jeffcoate, 1975). In an average, duration of pregnancy accepted 280 days from the first day of last menstruation. Pregnancy wastage may be defined as the loss of product of conception normally or therapeutically and can be classified as intra-uterine foetal death, abortion, and menstrual regulation (Jeffcoate, 1975; and Shaw, Soutter and Stanton, 2003). In our study, we have dealt with the normal pregnancy wastages only that are not therapeutically wasted.

### **Review of Literature**

Many researchers have evaluated factors affecting maternal education and reproductive health of women that vary from one geographical area to another. Ardebili, Kamali, Pouranssari, and Komarizadeh (1987) studied the reproductive behavior of 1525 pregnant women at the time of pregnancy termination in relation to maternal age, education, prenatal care, and number of previous pregnancies. The results showed that the frequency of maternal attendance at prenatal care centers was significantly related to maternal education and that total pregnancies or woman is inversely correlated with maternal education. The type of pregnancy termination which resulted in live birth or abortion has significant relation to the age of mother. Again, the highest percentage of abortion was observed in (15-19) age group and the highest number of natural deliveries was observed in the age group (20-29).

Govindasamy and Ramesh (1997) used Indian's National Family Health Survey (1992-93) data and showed that there is a consistently strong association between maternal health care utilization and mother's education.

In the country as a whole, only half of births to illiterate women received antenatal care compared to 79% of births to literate women with less than middle school education and more than 90% of births to women with at least middle school education. Only 12% of births to illiterate women are delivered in institutions compared with 67% of births to women with at least a middle school education. Similarly, only one-fifth of births to illiterate women are attended by a health professional where as three-fourth of births to women with at least a middle school education.

Mothers in third world countries with their limited resources and cultural background, rarely give priority to their health problems except where there is a life threatening danger (Bhatia and Cleland, 1995). Hence it is not surprising that such women are also reluctant to admit having health problems or hesitate to seek medical help, especially if ailment is related to reproductive health (Bang et al, 1989). Shidhu and Shidhu (1988) studied the case of pregnancy wastage in scheduled caste women of Punjab and identified some causes of more pregnancy wastage. Besides these, Banerjee and Hazra (2004) investigated some socio-economic determinants of pregnancy wastage. But no such elaborate works have been conducted in Bangladesh.

Although reproductive health and knowledge on it is a vital issue by United Nations and in every country world wide, there have been some efforts to do the same in Bangladesh. Ashraf et al (2001) showed that 90% of the rural and urban women had the knowledge about menstrual hygiene, need of antenatal care visits, and immunization during pregnancy. But 55% of women were not aware of complications associated with pregnancy and post-delivery with a notable difference between rural and urban areas. Surprisingly, 68% of the women in both rural and urban areas had knowledge about delivery related complications.

Khanum et al. (2000) explained the complications of pregnancy and childbirth regarding the knowledge and practices of women in Rural Bangladesh. Women's knowledge on symptoms of complications relating to pregnancy, delivery, and after-delivery was found to be high in Abhoyagar

Thana in Mirsarai. More than 60% of them had knowledge of severe vomiting as a complication during pregnancy in both the areas. Nearly half of the Abhoynagar women and one-third in Mirsarai were aware of severe bleeding as a post-delivery complication. More than two-fifth (42.5%) of the women of Abhoynagar and 30.7% women of Mirsarai mentioned oedema as a danger sign of pregnancy.

Bangladesh has among the lowest indicators of use of maternal health care services in the world. Recently around 67% of all pregnant women had no antenatal check-up throughout their whole pregnancy, around 92% of deliveries occur at home and approximately 87% of deliveries occur without the presence of a skilled attendant (ICDDR, B, 2003). Less than one-half of pregnant women obtain antenatal care and almost all births (91%) occur at home, generally with an unskilled attendant (BMSS, 2002 and BDHS, 2000). Limited access to essential obstetric contributes to high maternal mortality and has been estimated to be 320 to 400 per 100,000 live births (BMMS, 2002). Thus no clear policies have been formulated towards ensuring basic obstetric care at the community level. But the regional study of these factors is really shaky. A study on Tangail and Noakhali district confirmed only on some indicators like total population, crude birth rate, expected number of deliveries, life saving obstetric surgery and unmet need only. But no such study has been conducted in the district of Rajshahi in Bangladesh. From the above review, it is obvious that there are many scopes of conducting research. To our knowledge, no work has been done yet in Rajshahi district regarding different factors like reproductive knowledge, pregnancy wastage, delivery status, acceptance of family planning and their impacts on each other.

In this paper an attempt has been made to investigate the impact of reproductive knowledge, acceptance of family planning, birth spacing, number of live birth, age, education, and occupation of mother on pregnancy wastage.

## Data and Analytical Methods

### Data

The data were collected from a field survey conducted in the rural area of the district of Rajshahi in Bangladesh. We selected Baksimoil Union of Mohanpur Thana as a representative part of Rural Rajshahi. We have collected information from 1500 mothers by preparing a questionnaire.

### Analytical Methods

In our study we have used mainly the tabular system of data, and rating the knowledge on reproductive behavior. We have also used the linear probability models to predict the pregnancy wastage and to identify the impact of some most influential variables.

### Linear probability model

Let us consider a simple model

$$Y_i = \beta_1 + \beta_2 X_i + u_i$$

where  $X$  is the reproductive knowledge rate,  $Y = 1$  when pregnancy wastage occurs, and  $Y = 0$  when there depicts no pregnancy wastage.

This model expresses the dichotomous  $Y_i$  as a linear function of the explanatory variables  $X_i$  and is called linear probability model. Now the conditional expectation of  $Y_i$  given  $X_i$  can be interpreted as the conditional probability that the event will occur given  $X_i$ , that is,  $\Pr(Y_i = 1 | X_i)$ .

Thus  $E(Y_i | X_i)$  gives the probability of pregnancy wastage whose reproductive knowledge is rated as  $X_i$  (Gujarati, 1995).

Assuming to find an unbiased estimator we obtain

$$E(Y_i | X_i) = \beta_1 + \beta_2 X_i$$

Now letting  $P_i$  probability that  $Y_i = 1$  (the event occurs) and  $1 - P_i$  probability that  $Y_i = 0$  (the event does not occur), the variable has the following distribution:

$Y_i$	Probability
0	$1 - P_i$
1	$P_i$
Total	1

Now by the definition of mathematical expectation we obtain

$$E(Y_i | X_i) = \beta_1 + \beta_2 X_i = P_i$$

. Thus we can write the conditional expectation as probability, that is,

$$E(Y_i | X_i) = \beta_1 + \beta_2 X_i$$

Since the probability  $P_i$  must lie between 0 and 1, we have the restriction

$0 \leq E(Y_i | X_i) \leq 1$ , that is, the conditional expectation or conditional probability must lie between 0 and 1.

The general expression of the linear probability model (LPM) is

$$Y = \beta_1 + \beta_2 X_1 + \beta_3 X_2 + \dots + \beta_{k+1} X_k + u$$

where,  $Y$  equal to 1 or 0 according as pregnancy wastage occurs or not,  $X_i$  and 's are explanatory variables like reproductive knowledge rating, acceptance of family planning, birth spacing, total number of live birth, age of respondent, and other relevant factors.

### Reproductive knowledge rating

We have collected some reproductive knowledge (opinion) related information like risk of pregnancy before 18 years, taking iron tablets during pregnancy, vitamins before and after birth, T.T. injection during pregnancy, medical check-up, understand pregnancy complications, need of safe birth attendant, and birth spacing. Assuming these eight factors have uniform weight we have scored on knowledge for every factor. We rated for each factor such that if one had knowledge about a factor and she did according her knowledge then we had rated her knowledge as  $1/8 = 0.15$  for that factor and 0 otherwise. For example, if a respondent replies that she has taken T.T. injection during pregnancy (obviously she knows it) then we have rated her knowledge 0.15 for this factor. Finally we have summed the scores of all eight factors to obtain the rate of knowledge that is then termed as reproductive knowledge rate. If a respondent bears knowledge on each of these eight factors in mind then she is termed to have perfect knowledge of reproductive behavior. Thus this knowledge rating ranges between 0

and 1.

## Results and Discussions

Some basic characteristics of the study population have been incorporated in Table 1. We observe that the highest number of respondents is aged between 25-29 years and the lowest number of respondents is aged between 45 to 49 years. By the constitutional law of Bangladesh the minimum age at first marriage for women is 18 years and in an average first age at marriage is found 20.44 years and 21.4 years in urban and rural areas, respectively (SVRS, 2002). But in our study area early marriage is most frequent and more than 90% respondents get married before their early eighteens. This clearly depicts that the female populations in that study area and their guardians are not aware of the extent of various physical and mental complications for early marriage. The most vulnerable sight of this early marriage is that the mean age at marriage of the study population is only 16.8 years.

Age at first birth is also a measure of proper reproductive behavior. In Bangladesh average age at first birth is 19 (BDHS, 2001). But, early pregnancy and early motherhood is commonly

observed in our study area. More than 70% of married women gave their first birth before reaching 20 years of age. The tendency of early motherhood is so high that the mean age at first birth is only 18.7 years, that is, most of the mothers are in high risk with respect to their proper physical growth of being pregnant.

Gender equity is acceptable worldwide. Many government and non-government organizations are working for establishing gender equality over the country and are encouraging women to work with their male counterpart. However, around 98% of married women in this area are house keeper. Although the Government of Bangladesh launched two-child program several years (nearly 25 years) ago in 1980, around one-fourth respondents have more than two children, that is, the effect of family planning services is very slow here.

Two consecutive births within 24 months (2 years) are very risky for mother's health. However, 15% mothers gave their last birth before two years from their previous birth. Only 44% of mothers in this area maintained proper child spacing. Surprisingly enough that very limited number of respondent bear knowledge

on healthy reproductive behavior. Most of the females in this study area are not aware of their reproductive health. The most perilous deed is that mean reproductive knowledge rating is only 0.45 that covers the 45% of most influential knowledge of reproductive behavior.

Education is the single most factors that accumulate knowledge on social as well as reproductive behavior. Illiteracy is common here and around one-third respondent and their husbands are illiterate. Only one-third of our study population with their husband studied at primary level only. Lack of much formal education may cause such fall in reproductive knowledge rating.

Further, the proportions of pregnancy wastage to mother have been computed just dividing the number of pregnancy wastage in a certain age group by the number of women in that age group. The proportion of pregnancy wastage to mother depicts that pregnancy wastage is higher for below 20 age groups and above 35 age groups (Fig.1). Pregnancy wastage may be a result of many causes. But we have counted only unintentional pregnancy wastages.

Now we fit linear probability model

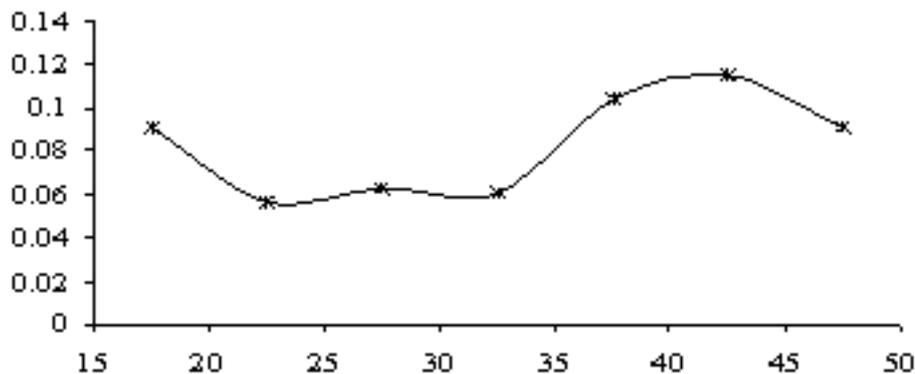


Table 1: Characteristics of study population

Respondents by age group	Age	15-19	20-24	25-29	30-35	35-39	40-44	45-49	Total
	No. of Women	186	334	350	294	192	122	22	1500
		12.4%	22.3%	23.6%	19.6%	12.8%	8.1%	1.5%	100%

Age at first marriage	Age	<18 years	>18 years	Total	Mean
	No. of Women	1360	140	1500	16.8
		90.7%	9.3%	100.0%	

Age at first birth	Age	<20 years	>20 years	Total	Mean
	No. of Women	966	378	1344	18.7
		72%	28%	100%	

Occupation of respondent	Work type	House keeping	Other	Total
	No. of Women	1468	32	1500
		97.9%	2.0%	100%

Number of children at present	Children	<2	2	>2	No child	Total
	No. of Women	430	546	368	156	1500
		28.7%	36.4%	24.5%	10.4%	100%

Spacing of last two births	Duration	1	2	3	4	5	6	Total
	Females	139	376	221	138	34	2	914
		15.2%	41.1%	24.2%	15.1%	37.2%	0.2%	100%

Reproductive knowledge ratings	Rates	<0.2	0.2-0.4	0.4-0.6	0.6-0.8	0.8-1.0	Total	Mean
	Respondents	166	328	756	140	110	1500	0.45
		11.1%	20.9%	50.4%	9.3%	7.3%	100%	

Education level of respondent	Level	Illiterate	Primary	Secondary	H Secondary	Higher	Total
	Respondent's education	480	516	426	36	42	1500
		32.0%	34.4%	28.4%	2.4%	2.8%	100%
	Husband's education	500	454	372	82	92	1500
33.3%		30.3%	24.8%	5.5%	6.1%	100%	

Pregnancy wastage	Age	15-20	20-25	25-30	30-35	35-40	40-45	45-49	Total
	Respondents	186	334	350	294	192	122	22	1500
	Mother with pregnancy wastage	17	19	22	18	20	14	2	109
	Proporstion	0.0914	0.0569	0.0628	0.0612	0.1042	0.1147	0.0909	

using occurrence and non-occurrence of pregnancy wastage as the dependant variable. We have dealt with several explanatory variables like reproductive knowledge rating, acceptance of family planning, total number of live birth, age, working status and education level of respondent. We found that only reproductive knowledge rating, acceptance of family planning, and numbers of live children were significantly affecting the pregnancy wastage. However age, working status and education level showed no significant effect on pregnancy wastage. Thus our fitted linear probability model includes only those significant factors and can be expressed as

$$\hat{Y}_i = 0.0032 - 0.4572X_1 + 0.1403X_2 - 0.2316X_3$$

$$t = (2.673) \quad (-5.244) \quad (2.742) \quad (-3.468)$$

where  $X_1$  represents reproductive knowledge rating (continuous variable),  $X_2 = 0$  when number of children is less than or equal to two and  $X_2 = 1$  when the number of children is more than two, and  $X_3 = 0$  when the respondent accepts family planning and  $X_3 = 1$  when she does not accept it. The dichotomous dependent variable  $Y_i$  is such that when there depicts no pregnancy wastage then  $Y_i = 0$  and when there occurs any pregnancy wastage then  $Y_i = 1$ .

We observe that increase in reproductive knowledge and acceptance of family planning (contraception) substantially decreases the risk of pregnancy wastage. But the increased number of living child as well as increased number of birth increases the risk of pregnancy wastage. We can also explain these feature that with the 10%, 20%, and 30% increase in reproductive knowledge rates the risk of pregnancy wastage

is decreased by 4.57%, 9.14%, and 13.71%, respectively subject to the condition that all other factors in the model are fixed at certain level.

## Concluding Remarks

Now we fit linear probability model using occurrence and non-occurrence of pregnancy wastage as the dependant variable. We have dealt with several explanatory variables like reproductive knowledge rating, acceptance of family planning, total number of live birth, age, working status and education level of respondent. We found that only reproductive knowledge rating, acceptance of family planning, and numbers of live children were significantly affecting the pregnancy wastage. However age, working status and education level showed no significant effect on pregnancy wastage. Thus our fitted linear probability model includes only those significant factors and can be expressed as where represents reproductive knowledge rating (continuous variable), when number of children is less than or equal to two and when the number of children is more than two, and when the respondent accepts family planning and when she does not accept it. The dichotomous dependent variable is such that when there depicts no pregnancy wastage then and when there occurs any pregnancy wastage then.

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# Utilization of Maternal Health Care Services in Bangladesh: Evidence from Bangladesh Demographic and Health Survey 2000-2004

**Key words:** Ante natal care, Natal care, Post natal care, Pregnancy complications, Delivery assistance.

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## ABSTRACT

Maternal health, especially in the pregnancy period, is a worthy research topic. Less developed countries like Bangladesh give little attention to the utilization of mother's health care services. This study investigates the utilization of maternal and child health care in Bangladesh, using data from the 2004 Bangladesh Demographic and Health survey (BDHS, 2004) over 2 eperiod spanning 1990-1999 and 2000-2004. The analysis reveals that a vast majority of women do not take any care (i.e., antenatal, natal and postnatal care services) and of those women who take antenatal care most of them received care from doctors and the same result is obtained for the time span 1990-1999 and 2000-2004. Well-trained personnel can reduce mother and child mortality at the time of the delivery. This study also found that very few women in Bangladesh are found to receive delivery assistance from medically trained personnel and most of them took assistance from untrained persons. It is also observed from the study that around nineteen percent of mother's place of delivery is their own homes or other homes and only a few of them were found to go to the government or private hospital for delivery cases. This study also elucidates that only 12 percent of babies receive a postnatal checkup by trained health providers within the first two days of delivery. Although it is found that in the time span 1990-1999 and 2000-2004 a vast portion of the children aged 12-23 months receive all the recommended vaccination before their first birthday but still many of them did not receive the recommended vaccination.

## Introduction

Maternal health services have been given highest priority in the health system and it deserves high priority and special importance in a nation's development. In any community, mothers constitute not only a relatively large and primary group, but also a vulnerable or special risk group. The risk is connected especially with child bearing and delivery. Globally, over half a million women die of pregnancy related complications each year and 99 percent of these deaths occur in developing countries (ICPD, 1994; UNICEF, 1996). UNFPA has estimated lifetime risk of dying from pregnancy and child birth related causes in Bangladesh as 1 woman in 21, which compares to 1 woman in over 4,000 in industrialized countries (UNFPA, 2002). The situation in South Asia is more precarious and accounts for about half of maternal deaths, globally (WHO, 1991). In Bangladesh, the current level of maternal mortality is very high, even by the standard of other developing countries (Mtra al., 1994). Much of the maternal mortality and morbidity is largely preventable and improvement of maternal health considerably contributes to the health of general population. These considerations have led to the formulation of special health care services for mothers all over the world. The term 'Maternal Health Care' encompasses the promotive, preventive, curative and rehabilitative health care for mothers especially during and after the pregnancy and delivery. The provision of maternal health care services is of utmost importance for the survival as well as

for a better health and better quality of life of both mother and child.

The state of maternal health in a nation can be characterized by numerous factors, such as outcome measures like maternal mortality and morbidity rates, or maternal nutrition status, as well as process indicators of service availability and use. These indicators include: the levels of antenatal and postnatal care, contraceptive prevalence rate (CPR), coverage of tetanus toxoid (TT) vaccination, proportion of deliveries conducted in health facilities by trained birth attendants, or proportion of unwanted pregnancies. Unfortunately, according to many of these measures, the maternal health situation in Bangladesh appears to be poor. Antenatal care is essential to promote, protect and maintain the health of both mother and child. The risk of maternal mortality and morbidity as well as neonatal deaths and infant mortality and morbidity can be reduced substantially through proper antenatal care, such as timely regular antenatal check-ups to trained health personal during pregnancy and delivery under safe and hygienic condition (Moller et al., 1989; Joseph, 1989). Three visits should be covered during the entire pregnancy a) 1<sup>st</sup> visit at 20 weeks or as soon as the pregnancy is known, b) 2<sup>nd</sup> visit at 32 weeks and c) 3<sup>rd</sup> visits at 36 weeks. (Park, 1997).

In Bangladesh, lack of proper medical attention and hygienic conditions during delivery leads to the risk of complications and infections that cause death or serious illness for the mother or the newborn

or both. Although Government health facilities are available down to union level, more than 90% of deliveries are conducted at home (BDHS, 1999-2000).

Despite the presence of a well-established service delivery infrastructure in Bangladesh and various measures taken so far, the utilization of essential obstetric care (EmOC) services is still poor. Women in rural Bangladesh are not fully aware of the complications that they may encounter during pregnancy and childbirth, and even those who are aware do not know where to go for help. They also face certain barriers (cultural, geographic and economic) in accessing obstetric care. Although the problem is not exclusively medical, the role of the health system is most crucial to the saving of lives. A large percentage of women with obstetric complications fail to get the care they need in time and die at home or on the way to the hospital. This is because referral linkage in the country is weak and there is a need to strengthen it from the grassroots level to the upper tiers of service delivery (Ahmed S et al., 1998).

Although Bangladesh has made significant progress in child survival initiatives and has cut the infant mortality rate by half, every year 150,000 babies are lost within the first 28 days of their lives. Added to this loss, another 100,000 babies are stillborn in late pregnancy bringing the total perinatal (still births and early neonatal) and neonatal deaths to 250,000 annually.

Hence from the forgoing analysis it appears that although Maternal and Child Health (MCH) services have been given highest priority in the health sector the maternal health situation in Bangladesh appears to be poor and the facilities available for these services is not sufficient enough to fulfill these needs adequately.

#### Maternal Health Care Delivery System in Bangladesh

Maternal and child health (MCH) services have been given highest priority in the health system. At the community level the services are provided by the Family Welfare Assistants and Health Assistants

from the Community Clinics (CC). At the union level a Family Welfare Visitor (FWV) and a Sub-Assistant Community Medical Officer or Medical Assistants are mainly responsible for providing the services. There are also 250 Graduate Medical Officers posted in 3,275 UHFWCs for providing MCH services. At the Upazila level, the MCH unit of the Upazila Health Complex (UHC) headed by a Graduate Medical Officer is responsible for providing MCH services. Trained support personnel such as FWV and Ayas (female ward assistants) assist as well. There is also a position of junior Consultant (Gynecological) who provides services in case of emergencies, attending all deliveries at the UHC and all referred maternal patients. The activities of the MCH unit and other maternal health care services are supervised by the Upazila Health and Family Planning Officer in the UHC.

The MCWCs established mainly at the district level (with some also at the Upazila level) provide only the maternal and child health services under the direct control of the Directorate of Family Planning. These facilities are expected to be equipped to provide basic EOC and obstetric first aid (Ahmed et al., 1995). The District Hospitals (DHs) in the district headquarters provide maternal services through an outpatient consultation centre and a labour ward. Between 25-40% hospital beds are reserved for maternal patients in every hospital.

The immunization and other related programmes such as health laboratory; epidemiological surveillance/health information system will be further expanded and strengthened to assist in controlling communicable and non-communicable diseases effectively. A typical THC is a two-story building and is headed by a Thana Health and Family Planning Officer (TH&FPO). Under TH&FPO there are 8 doctors (the medical officers) working in each THC. The THC covers on average a population of around 200,000 people. The lowest level of static health facilities is located at Union level.

## Data Collections and Methodology

In Bangladesh, for women in reproductive age, getting proper maternal health care services was found to be beyond their reach, which is mainly due to their poverty, illiteracy, general backwardness and adherence to superstitious beliefs, and inadequate facilities. With a view to understanding the utilization of Maternal and Child Health care Services (MCH) and its determinants, this study has been carried out. This study utilizes the data extracted from 2004 Bangladesh Demographic and Health Survey (BDHS), which were conducted under the authority of the National Institute of Population Research and Training (NIPORT) of the Ministry of Health and Family Welfare.

The BDHS survey was implemented by Mitra and Associates, a private research firm located in Dhaka. Macro International Inc. of Calverton, Maryland provided technical assistance to the project as a part of its international Demographic and Health Survey (DHS) program, while financial assistance was provided by United States Agency for International Development (USAID) Bangladesh.

Previously, BDHS surveys were carried out in 1993-1994, 1996-1997 and 1999-2000. The objectives of the BDHS was to provide up to date information on fertility, childhood mortality, fertility preference, awareness, approval and use of family planning method, breastfeeding practices, nutrition levels, maternal and child health and so forth. This information is intended to assist in evaluating and designing programmers' strategies for improving health and family planning services in Bangladesh.

The BDHS 2004 is a nationally representative survey from 11,440 ever married women of age 10-49 and 4297 men age 15-54 from 10,500 households covering 361 sample points (clusters) throughout Bangladesh, 122 urban areas and 239 in the rural areas. The data was collected from six administrative divisions of the country - Barisal, Chittagong, Dhaka, Khulna, Rajshahi and Sylhet. Data collection took place over a five-month period from 1 January to 25

May 2004. Out of 11,440 ever-married sample, data was taken from 8860 women who have at least one child (live or dead) under consideration the time interval 1990-2004 and divided the sample according to the two time spans 1990-1999 and 2000-2004 in order to achieve our objectives. In the time span 1990-1999, 3987 samples were identified and in 2000-2004, 4873 were identified. The data were analyzed using SPSS (Version 11.5). Percentage distribution and the average

value are used to investigate the overall situation of maternal and child health care utilization in Bangladesh.

## Findings

### Background of the Respondents

The socio-economic and demographic background of the women is presented in terms of their educational status, occupational status, place of residence, region of residence; mother's earning status and number of

children surviving.

We have utilized respondents' place of residence as a proxy to control for the differing levels of service access seen between urban and rural areas. It is found that 26.5 percent are in urban area and 73.5 percent live in rural areas. The biggest percent of mothers live in rural areas. The results in Table 2 provides that Dhaka division contains the highest proportion of mothers (31.9 percent), and more than one-quarter

**Table-1:** Socio-economic and Demographic Background of Respondents

Variable	Percentage	
	1990-1999	2000-2004
<b>Place of residence</b>		
Urban	23.6	26.5
Rural	76.4	73.5
<b>Region of residence</b>		
Barisal	6.6	6.0
Chittagong	16.1	17.9
Dhaka	31.1	31.9
Khulna	12.1	11.2
Rajshahi	28.6	29.5
Sylhet	5.5	7.5
<b>Religion</b>		
Muslim	88.6	91.9
Non-Muslim	11.4	8.1
<b>Mother's education</b>		
No-education	49.5	36.5
Primary	30.2	30.3
Secondary	17.0	27.7
Higher	3.3	5.5
<b>Mother's earning status</b>		
Not working	71.6	82.1
Working for cash	23.9	14.8
Others	4.5	3.1
<b>Husband's education</b>		
No-education	41.4	39.2
Primary	25.8	26.8
Secondary	23.4	24.2
Higher	9.4	9.9
<b>Child survival Status</b>		
Alive	94.5	95.4
Death	5.5	4.6

lives in Rajshahi division compared to the other division.

Another structural variable included here is religion. Religion is represented by a dummy variable for Muslims and Non-Muslims. Muslim women are expected to differ in receiving health care services due to their restricted movement and cultural norm than the Non-Muslim. The analysis reveals that of a total group of mothers 91.9 percent are Muslims.

The educational attainment of the women was grouped into three categories (no education, primary, secondary and higher education) so as to capture critical educational transitions, which are directly related to employment prospects, and socioeconomic status. A large proportion of mothers (36.5 percent) of the children are illiterate.

27.6 percent completed secondary education and only a few (5.5 percent) are higher educated. Mothers are further distinguished according to their work status.

A majority of the Bangladeshi women are housewife (82.1 percent) and 14.8 percent are involved in working with cash. Men with higher educational attainment may play a more important role in decisions affecting children than men with less schooling (Caldwell, 1990). Our present study represents that 39.2 percent women's husbands are illiterate and 9.9 percent are higher educated. Regarding child survival status overall 95.4 percent are alive.

### Ante Natal Care

Ante natal aspects such as, Antenatal care (ANC) received Sources of Antenatal care Number of months

pregnant at time of first visits, Number of antenatal visits, Tetanus toxoid injection received; Delivery assistance; are covered in the study.

Antenatal care is the most important care for a pregnant mother and her child in maternal health services. Here in our maternal health care services, we have categorized antenatal care into three groups (groups are: Sufficient, Insufficient & No care) depending on the extent of care received by mothers. The mothers who received the antenatal care visits from medically trained personal (i.e. doctor, nurse & family welfare visitor) are treated as sufficient antenatal care. The mothers who didn't receive antenatal care from medically trained personal are treated as insufficient antenatal care and the mothers who didn't receive any type of antenatal care are considering in the

**Table-2:** Utilization of Ante Natal Care Services according two-time span 1990-1999 & 2000-2004

Characteristics	Percentage 1990-1999	2000-2004
<b>Antenatal care (ANC) received</b>		
Sufficient <sup>a</sup>	45.3	49.1
Insufficient <sup>b</sup>	7.4	7.2
No care <sup>c</sup>	47.3	43.8
<b>Sources of Antenatal care</b>		
<b>Government Health professional</b>		
Doctor	27.2	31.6
Nurse/Trained midwife & Family welfare visitor	18.1	19.5
<b>TBA</b>		
Birth attendant (trained & untrained)	0.2	0.3
Others	7.2	4.8
No one	47.3	43.8
<b>Number of months pregnant at time of first visits</b>		
< 6 months	81.4	78.5
6-7 months	12.6	11.7
8+ months	6.0	9.8
<b>Number of antenatal visits</b>		
None	47.3	43.7
For one time	14.7	16.2
2-3 times	24.3	23.8
4 times or more	13.7	16.2
<b>Tetanus toxoid injection received</b>		
None	17.3	18.4
One dose	22.6	26.0
Two/more doses	60.1	55.6
<b>Delivery assistance</b>		
Medically trained personnel <sup>d</sup>	15.4	25.1
TBA <sup>e</sup>	44.4	40.9
Others <sup>f</sup>	40.2	34.0
<b>Vitamin-A Received by Mothers</b>		
Yes	85.6	67.1
No	13.6	32.0
Don't know	0.8	1.0

a Received at least three antenatal care visits with first visit during the first three months of pregnancy from medically trained personnel (i.e. doctor, nurse & family welfare visitors).

b Received antenatal care from other persons (i.e. trained & untrained TBA, other).

c Not receiving antenatal care.

d Assistance from doctor, nurse & family welfare visitor

e Assistance from trained & untrained traditional birth attendant

f Assistance from relative/other persons or no one.

none category or No care. Representing in this way we see from Table 2, that 45.3 percent of mothers take sufficient antenatal care and only 7.4 percent of mothers take insufficient antenatal care and the rest of the 47.3 percent women did not have any care during 1990-1999. On the other side during 2000-2004, sufficient antenatal care was taken by 49.1 percent of mothers and only 7.2 percent of mothers had taken insufficient and the rest of 43.8 percent mother did not have any type of care.

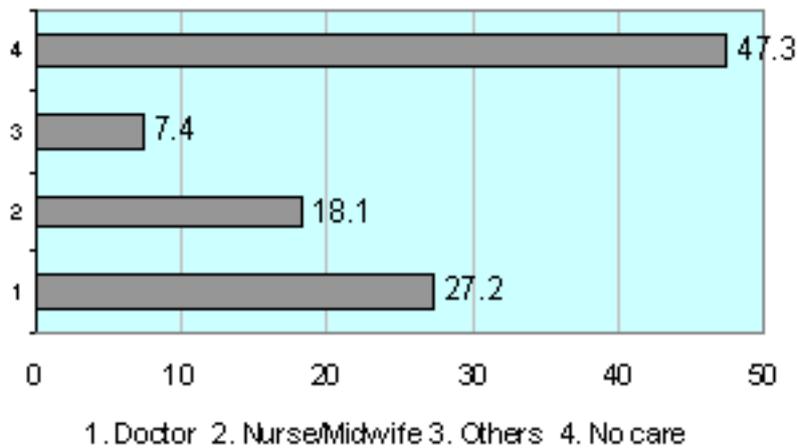
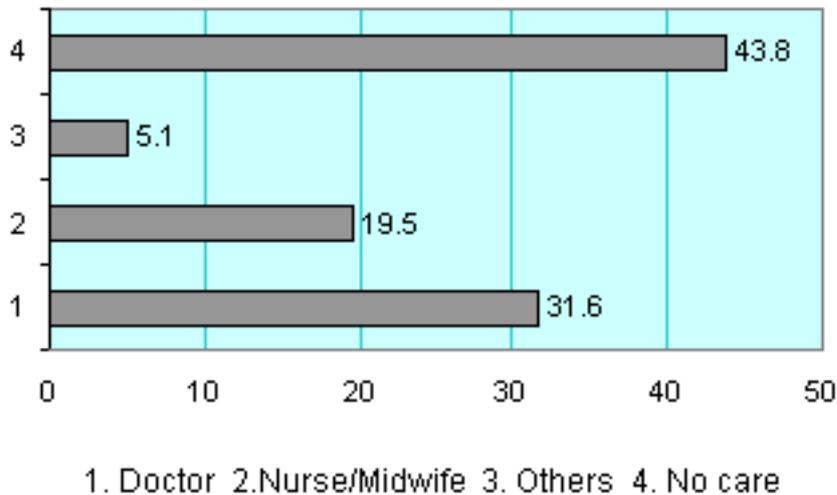
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sufficient antenatal care. The mothers who didn't receive antenatal care from medically trained personal are treated as insufficient antenatal care and the mothers who didn't receive any type of antenatal care are considering in the none category or No care. Representing in this way we see from Table 2, that 45.3 percent of mothers take sufficient antenatal care and only 7.4 percent of mothers take insufficient antenatal care and the rest of the 47.3 percent women did not have any care during 1990-1999. On the other side during 2000-2004, sufficient antenatal care was taken by 49.1 percent of mothers and only 7.2 percent of mothers had taken insufficient and the rest of 43.8 percent mother did not have any type of care.

Table 2 represents mothers who have sufficient antenatal care, 27.2 percent have care from doctor, and 18.1 percent from nurses or trained midwives and family welfare visitors and 47.3 percent did not have any care

from any persons in 1990-1999 (Figure-1). On the other side, from 2000-2004, the rate of antenatal care from doctors has increased than in 1990-1999, where 31.6 percent mothers had gone to the doctor and 19.5 percent to nurse/trained midwife and family welfare visitors and 43.8 percent did not have any care (Figure-2). Antenatal visits should be taken in the specific months during pregnancy. It can also be seen from Table 2 it is clear that most of the mothers (81.4 percent) had the first visit within six months, 12.6 percent of mothers visited within six to seven months and only 6.0 percent mother had care in eight months or after (1990-1999). In 2000-2004, 78.4 percent and 11.7 percent mothers had a visit less than six months, and six to seven months respectively. Only a few, 9.8 percent of mother had it in eight months or after eight months during pregnancy.

We can see that Table 2 represents that 14.7 percent, 24.3 percent and

**Figure-1 Sources of mother's ANC in 1990-1999****Figure-2 Sources of mother's ANC in 2000-2004**

13.7 percent of mothers had taken one, 2-3 or more than 4 antenatal visits and 47.3 percent of mothers did not have any visits, respectively in 1990-1999. On the other hand in 2000-2004 16.2 percent, 23.8 percent and 16.2 percent mothers made visits for one, two or three times and more than four times respectively.

In the case of tetanus toxoid (TT) injection, the mothers' who have received two or more dose of TT injections are considered in one group. The other categories are those who have received just one dose and the rest is those who haven't received any dose of TT injection. On this view 17.3 percent of mothers did not take any dose, 22.6 percent mother had taken only one dose and 60.1 percent mother had taken two or more doses of tetanus

toxoid (TT) injections in 1990-1999. Besides these 26.0 percent of mothers had taken one dose, 55.6 percent had taken two or more doses and 18.4 percent of mother's delivery assistance was a medically trained personal in the year 1990-1999. 44.4 percent of mothers took assistance during delivery form a TBA and 40.2 percent took assistance form other persons. In 2000-2004, 25.1 percent and 40.9 percent of mother's delivery assistance was medically trained personnel and TBA respectively and the rest 34.0 percent took assistance from others. Vitamin A capsules may be regarded as a preventive management. Table 2 shows that 85.6 percent mothers took vitamin A in 1990-1999 where the rate is low in 2000-2004 (67.1 percent).

Well-trained personnel can reduce a Mother's and child's mortality at the time of delivery. For assistance during delivery, the mothers who received assistance from doctor nurse/trained midwife and family welfare visitor are considered as mother having received assistance from a "Health professional". If the mother was assisted by more than one type of provider, only the most qualified person is recorded. The mothers who received assistance from trained and untrained traditional birth attendants (TBA) are considered "TBA" category and in the

It is an important factor that mothers

**Table-3:** Utilization of Natal Care Services according two-time span 1990-1999 & 2000-2004.

Background characteristics	Percentage	
	1990-1999	2000-2004
Place of delivery		
Respondent's / Others home	91.6	85.4
Govt' / Private hospital	8.1	14.0
Public Place / Others	0.3	0.6
<b>Type of assistance</b>		
Medically trained persons (Health professional)		
Doctor	5.6	9.5
Nurse / Midwife & family welfare visitors	9.8	15.6
<b>TBA</b>		
Trained TBA	8.4	10.2
Untrained TBA	36.0	30.7
<b>Other's</b>	40.2	34.0
<b>Told about pregnancy complications</b>		
Yes	24.8	31.0
No	75.2	69.0
<b>Types of complications</b>		
Long labor		
No	85.1	82.7
Yes	14.9	17.3
Excessive bleeding		
No	92.1	88.8
Yes	7.9	11.2
High fever		
No	96.5	95.2
Yes	3.5	4.8
Convulsion		
No	96.7	96.7
Yes	3.3	3.3

**Table 4:** Utilization of Post -Natal Care Services according two-time span 1990-1999 & 2000-2004.

Characteristics	Percentage	
	1990-1999	2000-2004
<b>Received postnatal care from a trained provider (Mother)</b>		
<b>Timing</b>		
Within 2 days of delivery	12.0	14.5
3-6 days after delivery	0.2	0.6
7-41 days after delivery	1.4	2.6
Within 42 days of delivery	14.0	17.8
Did not receive postnatal checkup	78.0	82.2
<b>Received postnatal care from a trained provider (Children)</b>		
<b>Timing</b>		
Within 2 days of delivery	10.0	12.1
3-6 days after delivery	0.8	1.2
7-41 days after delivery	2.1	4.3
Within 42 days of delivery	14.0	17.5
Did not receive postnatal checkup	16.0	82.5
<b>Vitamin-A received by Children</b>		
Yeas	11.8	14.9
No	88.2	85.1
<b>Child Vaccination</b>	60.2	68.4

can inform about their pregnancy complications. But generally this is a rare case. Table 3 shows that about one-quarter mothers can tell their pregnancy complications in 1990-1999 and 31.0 percent in 2000-2004. The rest of the mothers are unable to inform of any complications about their pregnancy. In response to a question whether mothers suffer from any problem, about 21.9 percent of mothers reported that they suffered

from many types of hazards in 1990-1999 and 26.1 percent in 2000-2004 (Table 3). The major delivery hazards as experienced by the women in Bangladesh, include prolonged labor (i.e. duration of true labor or regular, rhythmic uterine contraction lasting for more than 12 hours); excessive bleeding which may be life-threatening; high fever with bad smelling vaginal discharge and convulsions not cause by fever. 14.9 percent mothers

suffered from prolonged labor and 7.9 percent excessive bleeding in 1990-1999 whereas the rate is slightly higher (17.3 percent and 11.2 percent respectively) in 2000-2004. 3.5 percent of mothers suffered from high fever and 3.3 percent from convulsions in 1990-1999 where the rate is 4.8 percent and 3.3 percent in 2000-2004 respectively.

### Post Natal Care

A crucial component of safe motherhood is postnatal care. Postnatal care is important for mothers for treatment of complications arising from delivery, especially for births that occur at home. Postnatal checkups provide an opportunity to assess and treat delivery complications and to counsel mothers on how to care for themselves and their newborns. In order to assess the extent of postnatal care utilization, women whose most recent live birth in the five years preceding the survey was delivered outside a health facility were asked whether they and/or the child received a postnatal checkup from a health provider and within how many days of delivery the checkup was received. It is assumed that deliveries in any health facility will receive a postnatal checkup for the mother and the child within the first two days of delivery, as a part of routine institutional delivery care.

## Conclusions and Recommendations

Table 4 shows that very few mothers in Bangladesh receive postnatal care. Only 14 percent of mothers received a postnatal checkup from a trained health service provider within 42 days of delivery during the year 1990-1999 and the corresponding figure for the year 2000-2004 is 17.8 percent. In Bangladesh, newborns are as likely as their mothers to have received postnatal care from a medically trained provider. During the year 2000-2004 less than one in five newborns is checked by a health professional within six weeks of delivery. The timing of postnatal care for newborns is important since most neonatal deaths occur within two days of delivery. The data indicates that during the year 2000-2004 only 12 percent of babies received a postnatal checkup by a trained health provider within the first two days of delivery.

Vitamin A capsules may be regarded as preventive management. It is also effective in child morbidity especially it is the leading factor to prevent childhood blindness. Table 4 shows that 11.8 percent children took vitamin A in 1990-1999 where the rate is 14.9 percent in 2000-2004

(67.1 percent).

Universal immunization of children under one year of age against the six vaccine-preventable diseases (tuberculosis; diphtheria, pertussis, and tetanus [DPT]; poliomyelitis; and measles) is one of the most cost-effective programs in reducing infant and child morbidity and mortality. The Expanded Program on Immunization (EPI) is a priority program for the government of Bangladesh. It follows the international guidelines recommended by the World Health Organization (WHO). WHO recommends that children receive all of these vaccines before their first birthday. Overall, 68 percent of children age 12-23 months had received all the recommended vaccinations before their first birthday during the time span 2000-2004 and 60.2 percent during 1990-1999.

Bangladesh has achieved important health gains over the last decade. However, equivalent progress has not been realized in the area of maternal health. The main focus of this study is to analyze the patterns and determinants of maternal and child health care services utilization in Bangladesh with particular attention to the utilization of maternal health care facilities for effective antenatal care (ANC), tetanus toxoid injection, delivery care, and delivery related complications. The result shows that 47.3 percent women did not take any ANC during pregnancy in the time span 1990-1999 and 43.8 percent in 2000-2004. It is a positive notation that mothers neglecting ANC has decreased in 2000-2004 than 1990-1999.

Of those who receive some ANC, the majority of them (27.2 percent) receive care from a qualified doctor, 18.1 percent from nurse/trained midwives and family welfare visitors and 7.2 percent are from others, in 1990-1999. But these rates are positively high and low in 2000-2004, whereas 31.6 percent go to a doctor, 19.5 percent go to a nurse/trained midwife and family welfare visitor and 4.8 percent have ANC from others in 2000-2004.

Out of them 45.3 percent of

mothers have sufficient antenatal care and only 7.4 percent of mothers had insufficient antenatal care during 1990-1999. On the other side during 2000-2004, sufficient antenatal care has increased (49.1 percent of mothers) and only 7.2 percent of mothers had insufficient ANC during pregnancy. It is a well-known fact that antenatal visits should be taken in the specific months during pregnancy.

Our study shows that most of the mothers (81.4 percent) had the first visit within six months, 12.6 percent of mothers had one at six to seven months and only 6.0 percent of mother had care at eight months or after in 1990-1999. But in 2000-2004, 78.4 percent and 11.7 percent of mothers had a visit less than six months and six to seven months respectively.

Only a few, 9.8 percent of mothers had it at eight months or after eight months during pregnancy. On the other hand 4.7 percent, 24.3 percent and 13.7 percent of mothers has attended once, 2-3 times and more than 4 antenatal visits, and 47.3 percent mother did not take any visits respectively in 1990-1999. In 2000-2004 16.2 percent, 23.8 percent and 16.2 percent mother made visits for once, two or three times and more than four times respectively.

The proportion receiving tetanus (TT) injections in the time span 2000-2004 has decreased than in the time span 1990-1999. 17.3 percent mothers did not take any dose, 22.6 percent of mother had had only one dose and 60.1 percent of mothers had two or more doses of tetanus toxoid (TT) injections in 1990-1999. Besides these 26.0 percent of mother had one dose, 55.6 percent had two or more doses and 18.4 percent of mother had not had any dose in 2000-2004.

The utilization of health facilities for delivery assistance shows a clear picture; 15.4 percent of mother's delivery assistance was by medically trained personal in the time span 1990-1999. 44.4 percent of mothers had assistance during delivery from TBAs and 40.2 percent had assistance from other persons. In 2000-2004, 25.1 percent and 40.9 percent of mother's delivery assistance was by medically trained personnel and

TBAs respectively and the rest, 34.0 percent from others.

Regarding Natalcareservices,home deliveries are widely reported by women in the study.This study also reveals that about one-quarter of mothers can relatetheir pregnancy complications in 1990-1999 and 31.0 percent in 2000-2004.

The rest of mothers are unable to relate any complications about their pregnancy. In response to a question whether mothers suffer from any problem, about 21.9 percent of mothers reported that they suffered from many types of hazards in 1990-1999 and 26.1 percent in 2000-2004. 14.9 percent mothers suffered from prolonged labor and 7.9 percent from excessive bleeding in 1990-1999 whereas the rate is slightly higher (17.3 percent and 11.2 percent respectively) in 2000-2004. 3.5 percent of mothers suffered from high fever and 3.3 percent from convulsions in 1990-1999 whereas the rate is 4.8 percent and 3.3 percent in 2000-2004 respectively. With respect to postnatal care services it was found that very few mothers in Bangladesh receive postnatal care.

Only 14 percent of mothers received a postnatal checkup from a trained health service provider within 42 days of delivery during the year 1990-1999 and the corresponding figure for the year 2000-2004 is 17.8 percent.

In Bangladesh, newborns are as likely as their mothers to have received postnatal care from a medically trained provider. During the years 2000-2004 less than one in five newborns is checked by a health professional within six weeks of delivery. The timing of postnatal care for newborns is important since most neonatal deaths occur within two days of delivery.

The data indicates that during the year 2000-2004 only 12 percent of babies received a postnatal checkup by a trained health provider within the first two days of delivery. It is also found that 11.8 percent if children took vitamin A in 1990-1999 whereas the rate is 14.9 percent in 2000-2004 (67.1 percent). The study also

identified that during the time span 2000-2004 and 1990-1999 68.4 and 60.2 percent of children age 12-23 months had received all the recommended vaccinations before their first birthday.

Based on the discussion some recommendations have been suggested that would help the government to take initiatives to promote maternal and child health care facilities.

1. The results of this study indicate that there is a strong need to focus strategic measures upon the increase of health facilities, such as the THC, health clinic and FWC. Emphasis should be given to the IEC activities of the national health programme that communities, particularly the poor and uneducated women become aware of the need for regular antenatal care check up and safe deliveries by competent health personnel. Trained TBAs should be linked with the health service facility-delivery system at different levels to ensure their utilization.
2. There is a further need to investigate with regard to the efforts of Programmatic (e.g., accessibility and cost of antenatal services) on the antenatal care seeking behavior of Bangladeshi women.
3. As most people go to TBAs and village doctors they should be given proper training and integrated into the main stream of government health intervention programmes, which should upgrade the poor maternal and child health care status existing in Bangladesh to a greater extent.
4. Policies to expand educational opportunities, particularly for girls, would increase the access to information and health services and improve their ability to make good use of it in order to lead healthier lives.

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# Malaria in Pregnancy

Dr Safaa Bahjat

**Mal aria:** bad air (medieval Italian).

Malaria has stalked human history for the past 50,000 years, with mention of survivors from 27500 BC during the Xia dynasty in ancient China. In 1880, Charles Alfonso Louis Alphonso Lavaren identified the parasite (*Plasmodium* spp) responsible for malaria and at the turn of the century Sir Ronald Ross proved that it was the mosquito that spread the infection. For a while it become common to use malaria in targeting syphilis, at the time of mortal affliction. The patient would be deliberately infected with malaria to induce fever. This would be treated with quinine (isolated from an old Peruvian remedy) in the hope that the one illness be regulated, the other halted.

So long as woman has walked the earth, malaria has stalked her, however the problem of malaria in pregnancy was not described until the early 20th century. Over 50 million women are exposed to the risk of malaria in pregnancy every year. Pregnancy associated malaria results in substantial, and especially fetal and infant, morbidity, causing 7500-200000 infant deaths every year. Both *Plasmodium falciparum* and *Plasmodium vivax* infections can cause adverse pregnancy outcomes including maternal anemia and low body weight due to pre-term delivery and fetal growth restriction, but much could differ. Pregnant women are more susceptible to malaria than non-pregnant women, and this susceptibility is greatest in the first and second pregnancy. Although some other infectious diseases are also worse in pregnancy, malaria seems to be a special case. Susceptibility to pregnancy-associated malaria probably represents a combination of immunological and hormonal changes associated with pregnancy (although the nature of the latter is the subject of debate) combined with the ability of a subset of infected erythrocytes to sequester in the placenta. Extensive evidence confirms that antibodies directed against the surface of infected erythrocytes in the placenta are

important in protection, and are usually absent in the first pregnancy(1). In high transmission areas such as Sub-Saharan Africa, malaria in pregnancy is predominantly asymptomatic and yet is a major cause of severe maternal anemia and low birth weight babies. In low transmission areas, such as in many parts of Asia and Latin America, women have a little acquired immunity to malaria by the time they become pregnant and so infections are often symptomatic and are more likely to become severe and result in maternal and fetal death.

On the basis of the above review, it is clear that the clinical consequences to mother and child, of malaria in pregnancy, and the magnitude of the problem, are enormous. However, we have very little information from Asia and Latin America, and even for Africa we are currently unable to make an evidence based statement on whether the overall burden of malaria in pregnancy has increased, decreased or remained at a steady state in the past few decades. At present there are substantial knowledge gaps regarding the burden of malaria in pregnancy, that impede our understanding of, and ability to control this important public health problem.

Rapid assessment of the burden of malaria in pregnancy has recently been developed and done in Asia (Bangladesh, India, Burma, Indonesia), in low transmission areas of French speaking Africa (Madagascar, Senegal, Niger, Mali ,and Mauritania), and will soon be done in North and Central America. However, these assessments have not always been done over a sufficient length of time (a full year). The first gap of knowledge is on the effect of a single plasmodium infection or asymptomatic infection on the burden of malaria in pregnancy. The second gap is on the effect of malaria in pregnancy (by gravidity) on infant and child health as well as the long-term cumulative effect of malaria on pregnancy. The third gap is on the burden of malaria in the first trimester

and it's correlation with adverse outcomes. (2)

## The Economic Burden of Malaria in Pregnancy

There are two possible approaches to estimating the economic burden of malaria in pregnancy. Microeconomic approaches are used to measure the effect of the disease on an individual or household, while macroeconomic approaches measure the effect of the diseases on an entire society. Taking a traditional micro level approach, economic cost can be categorized as direct, indirect and intangible and can be measured from the perspective of the government (mainly Ministry of Health ) ,and households.

The direct costs of malaria in pregnancy can be divided into:

1. the cost arising from interventions targeted at all pregnant women in malaria endemic settings.
2. the additional costs arising as a consequence of malaria infection in pregnant women .

Direct cost to the health service arising from specific interventions for preventing or treating malaria in pregnancy include the cost of the Intermittent Preventive Treatment in Pregnancy (IPTp). Direct costs associated with malaria infections in pregnant women include the immediate costs of maternal infection and also the immediate and long term costs of treating the consequences of maternal infection on the infant, most of which relates to mitigating the consequences of low birth weight. Immediate costs are those of additional outpatient consultations, hospitalization, staff time, diagnostic tests, drugs and other supportive treatment. The cost incurred by the mother (or her household) include those of obtaining additional health care such as transport, drug costs and consultation fees.(3)

## Case Management of Malaria in Pregnancy (4)

\*Diagnosis of malaria in pregnancy:

In most malaria endemic regions women do not have access to parasitological diagnosis or even to treatment. In areas of high transmission, to leave parasitaemic but asymptomatic adults untreated is common practice. The assumption is that the natural immunity of such individuals will control the infection. However, in pregnant women the presence of malaria parasite, even transient without symptoms, is harmful for the mother and fetus, whether or not placental malaria is detected at delivery. The biological diagnosis of malaria during pregnancy is also essential to avoid the unnecessary exposure of the mother and fetus to antimalarial drugs. New treatments of malaria are more expensive and to confirm the diagnosis of malaria before treatment is cost effective, especially if one takes into account the added risks, both morbid and iatrogenic, to the fetus. The confirmation of malaria diagnosis can be done either by microscopic examination (the current gold stained) or by use of a rapid diagnostic test that detects specific parasite antigen. An experienced and well-equipped microscopist can detect 15 parasites per  $\mu\text{L}$  of blood. In most non-pregnant malaria cases, this is well below the pyrogenic density threshold above which patients present with symptoms. However, during pregnancy asymptomatic low parasite densities and parasites sequestered in the placenta are harmful to the mother and the fetus, so the sensitivity of microscopy is insufficient in these cases. Together with the practical strains of microscopy, the lack of sensitivity impairs the detection of pregnant women who need treatment and assessment of the efficacy of anti-malarials. More recently, rapid diagnostic tests have been developed. Such tests are practical but do not have the sensitivity needed in pregnancy. Polymerase chain reaction (PCR) is used in research settings or genotyping and detection of malaria parasites and is marginally more sensitive than microscopy. A microscopic blood examination or rapid diagnostic tests can be done either because a pregnant woman presents with symptoms (or a history of symptoms) compatible

with malaria, or a part of systematic antenatal screening (bearing in mind the limitation of detection). In all malarious areas, every time a pregnant woman is seen in an antenatal consultation, a blood test for malaria should be done and positive cases treated appropriately. In areas of intense and stable transmission, the absence of evidence of plasmodia in peripheral blood on a single occasion does not exclude infection. Parasitaemia can fluctuate and be kept under the level of detection (total biomass of about 1,000,000,000 parasites) by acquired immunity or self-medication, and *Plasmodium falciparum* can sequester in the placenta. These factors complicate the assessment of the efficacy of anti-malarial drugs and underline the need for more diagnostic tools. The earlier in pregnancy and the more frequent the antenatal consultations and blood screening, the more likely a malarial parasite will be detected and treated. This early detection and treatment has been shown to reduce the placental burden, a key step in reducing the harmful effects on the fetus. In the presence of a well implemented, effective, and safe prevention strategy (intermittent preventive treatment and vector control) the frequency of antenatal visits could be limited.

## Current Recommendations For Case Management

### Uncomplicated *falciparum* malaria

#### First trimester

First episode quinine 10mg/kg three times a day for 7 days preferably with clindamycin 5mg/day three times per day for 7 days.

Subsequent episodes: repeat treatment with quinine, clindamycin as above, Artemisinin based combination therapy (ACT) that is locally effective, or artesunate 2mg per day for seven days with clindamycin as above

#### Second and third trimester

First episode: ACT that is locally effective or artesunate plus clindamycin as above. - Subsequent episodes:

artesunate plus clindamycin as above; or quinine plus clindamycin as above.

### Prevention

Intermittent preventive treatment with sulfadoxin-pyrimethamine where efficacy remains.

### Severe malaria

Artesunate 2-4mg/kg intravenously at hours 0, 12, and 24 and continued for 24 hours until the patient can tolerate artesunate 2mg/g per dose and clindamycin 5mg/kg three times daily for 7 days,

### OR

Intravenous quinine: loading dose 20mg/kg given over 4 hours after the loading dose is started, followed by 10mg/kg every 8 hours for 7 days. Once the patient has recovered sufficiently to tolerate oral medication both quinine 10mg/kg and clindamycin 5mg/kg three times daily, and continued for 7 days.

### Non-falciparum malaria

Chloroquine phosphate (1 tablet contains 250mg salt equivalent to 155.3mg base). Dose is 10mg/kg base once a day for 3 days followed by 5mg/kg base on the third day. For chloroquine resistant p.vivax, amodiaquine, quinine or artemisinin derivatives can be used.

### Prevention

Chloroquine phosphate 600 mg base on admission followed by 300 mg base per week.

# A Study on Abnormal Behavior Among The Youth Living in The Suburbs

**Key words:** Norms, Abnormal Behavior, Youth, Social Disorganization, Suburb.

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## ABSTRACT

**Introduction:** Norms are the rules of behavior. The order and conformity in any society is bound to the harmony on these rules. Any actions which do not conform to the accepted norms in a society and violate them are called abnormalities. The crucial goal of the study was to sociologically study the social abnormality among Iranian youth.

The analytical approaches of the study centre on social disorganization. To elaborate on the analytical approaches, Anomie, General Strain, Delinquent Subcultures, Control, Differential Association and Power Control theories are applied here.

**Materials and Method:** The research method was 'survey' for measuring the abnormality and we use self-reported data for data collection. The sample population was 630 young people living in the suburbs of Sari, Babol, and Nowshar (northern cities in Iran) which was estimated through cluster sampling of multiple stages.

**Results:** The results of the research showed that the rate of abnormalities among the youth of suburbs of those cities was average.

**Conclusion:** Based on the results obtained from Multiple Regression, association with others, family problems, control failure, labels, alienation, religious beliefs, and socioeconomic status are the significant variables to abnormalities. The path analysis showed that the socioeconomic status, alienation, and abnormality labels affect the family problems and also affect the association with abnormal companions and those in turn influence on the abnormality of the individual.

## Introduction

Fast population growth, change in the political and economic construction of rural society, industrial development based on montage and dependent industries, lack of deep harmony between the cultural and technical development, in other words, unfit development in Iran in the present time, cause some irregularities and disorders of which their result is the growth of social abnormalities and deviations in the cities. Civic environments for immigrants who separate from their culture and choose outskirts of cities as their residence cause a kind of agitation and disturbance in these areas, so that abnormalities in some areas of northern cities decrease the quality of civic life and most of the people who live with better economic status try to live on the outskirts of cities, in special and fenced towns.

Hence there are some questions for this research as follows:

1. Are the youths who live on the outskirts areas basically abnormal?
2. What is the degree of abnormality between them if there is abnormality?
3. What are the factors that cause abnormality?

The analytical approaches of the study centre on social disorganization. In 1989 Sampson and Groves proposed a model of social disorganization. In this model, neighborhoods with low socioeconomic status, high residential

mobility, racial heterogeneity, and family disruption were predicted to have sparse local friendship networks, low organizational participation, and unsupervised youth groups. Although Sampson and Groves' study has been hailed as "the most complete examination of the systemic social disorganization model that has ever been attempted" (Bursik and Grasmick 1993:43), to date their model of social disorganization has rarely been tested.

Further, tests of their model have been limited to one data set using data from neighborhoods in Britain (Sampson and Groves 1989; Veysey and Messner 1999). Given the structural differences (e.g., crime rates and racial composition) between Britain and American neighborhoods, whether Sampson and Groves' theoretical framework will be supported using American data sets remains unclear. In addition, findings from recent research suggest that there is a more complex relationship between some of the concepts in the model than was originally captured. This model has been recently retested by Sun and et al (2004), Kubrin and et al (2003), Lowenkamp et al (2003).

To elaborate the analytical approaches, Anomie, General Strain, Delinquent Subcultures, Control, Differential Association and Power Control theories are applied here.

## Methodology

The method which is used for this research is called survey. In reality,

the type and aims of this research effectuate to prefer it to other methods, which affect on normality.

**Data collection instrument:**

In this research, based on statistical sample, the type of study used is questionnaire for collecting data. Validity of the questionnaire is due to the Keronbakh Alpha Method as follows:

Table 1. Validity Coefficient

Variable	Questions	$\rho$
Family problems	5	0.77
Piety	7	0.74
External control	5	0.68
Relatives abnormality	3	0.77
Abnormality	29	0.93

**Measuring the Variables**

**Dependent variables:** To measure abnormality, the Self- Report method is used.

**Independent variables:** Socio-economic base variable: This index is based on Duncan (Miler & Salkind, 1991) socio-economic index which is a combination of average indexes of income, education level and job.

**Family problems:** It means that there are some problems which endanger family equilibrium and aren't in the direction of aims and profits of a family. Family problems variable is the combination of quarrel and family problems, which consist of verbal disputes, thrashing and leaving home by parents.

Glockm and Sturk indexes are used to measure religiousness (Glockm & Sturk,1981). This method is one of the

best methods to measure piety. Piety is a combination of believing in God, believing in Resurrection, feeling closeness to God, participating in religious ceremonies, saying prayers, fasting and accepting the veil.

External social index is the degree of a person's control by family, neighbors, police and relatives.

Abnormal relatives: This index is a combination of family, relatives and friend's abnormality.

Measuring the degree of variables:

To measure variables degree, five-sector questions are given to participants and they are used to express variables measuring degree based on this question.

Then, the averages of person's marks in every question and total questions are recognized.

Based on this mentioned criteria, ordinal scale is used to measure variables.

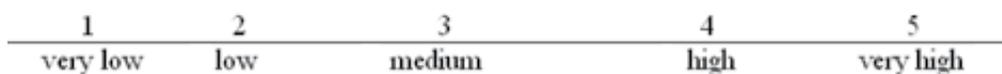
In descriptive report, the results are expressed in three levels: low, medium and high.

Sample consists of 630 youths (15 to 29 years old) who live on the outskirts areas of three cities: Babol, Sari and Noshahr.

**Results**

Table 2: Abnormality degree

Degree	Frequency	Percentage
Very low	4	0.7
Low	232	38.7
Medium	218	36.7
High	137	22.9



**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.774	.600	.594	28.83648

**Anova**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	685897.5	7	97985.353	117.836	.000
	Residual	458179.9	551	831.543		
	Total	1144077	558			

Very high	8	1.3
Unanswered	31	0
Total	630	100

Findings show that 51.1% of youths are in low social abnormality level, 39% of them are medium, 77% of them are high, and 1.1% of them are very low and very high.

1. Results show that there are seven variables; socio-economic status, religiousness, person's friend, alienation, label, social control and family problems which have direct and pure correlation with abnormality (by controlling or fixing other variables).
2. Relatives that a person associates with (by effectiveness .38)
3. Socio-economic base (by effectiveness .05)
4. Social control or external social control (by effectiveness .20)
5. Religiousness (by effectiveness .21)
6. Family problems (by effectiveness .13)
7. Label (by effectiveness .14)
8. Alienation (by effectiveness .15)

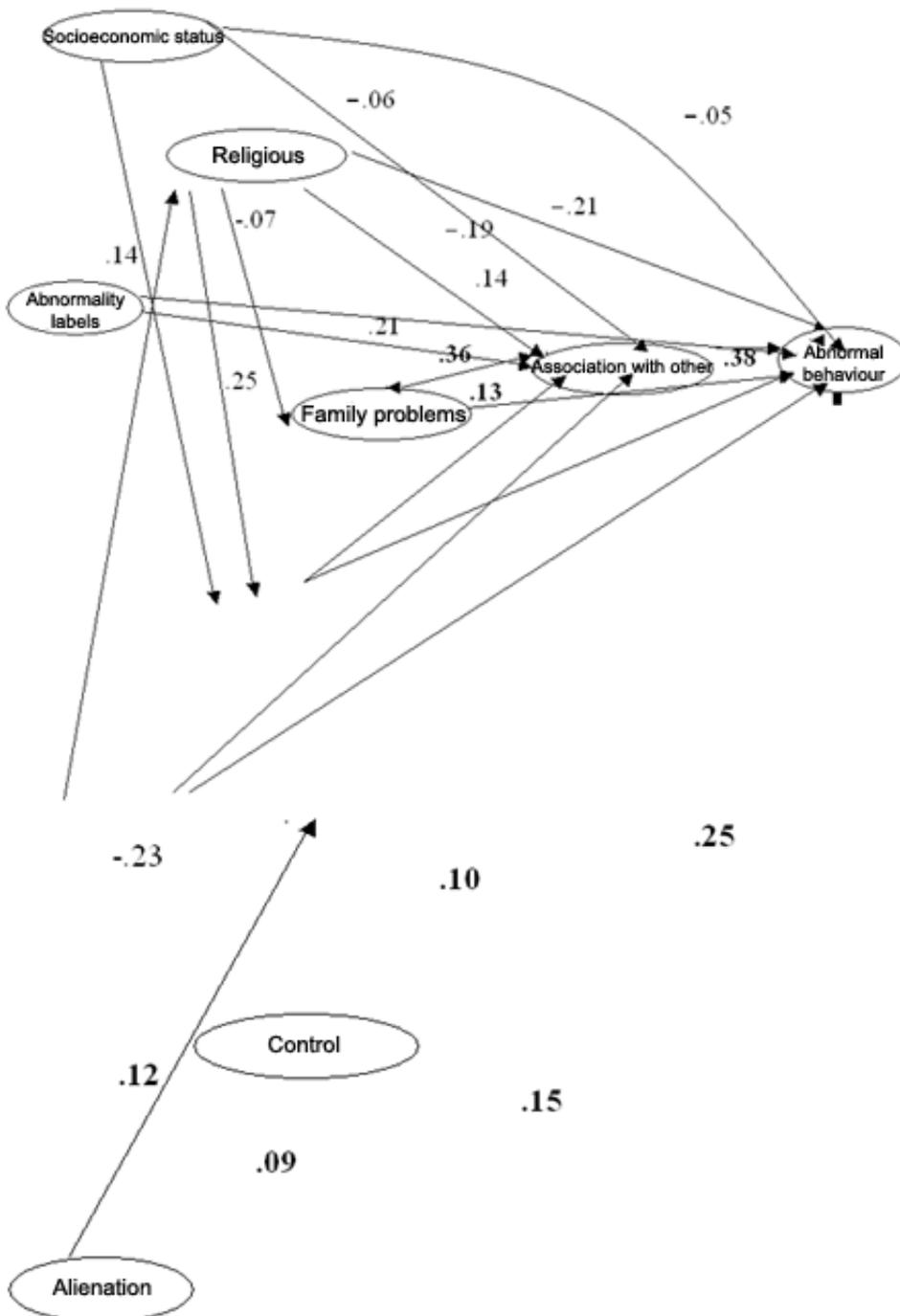
Multi-variables correlation coefficient between the abnormality index (R) and seven abnormality indexes such as friends, socio-economic base, social control, alienation, label, religiousness and family problems is .77 and R Square (R<sup>2</sup>) is .60.

By interpreting the results, it is found that close to 60% of abnormality index changes are chosen by seven mentioned indexes.

**Coefficients**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	148.721	10.172		14.620	.000
	Family Association	1.489	.366	.128	4.073	.000
	Control Label	6.098	.530	.377	11.506	.000
	Alienation	-3.063	.475	-.196	-6.453	.000
	Religious Status	2.621	.578	.137	4.532	.000
		3.718	.741	.149	5.016	.000
		-1.506	.212	-.212	-7.107	.000
		-1.803	.952	-.052	-1.894	.059

Based on the diagram, effective factors on youths' abnormality can be interpreted as follows:



Path analysis diagrams show that independent variables not only have a direct effectiveness on abnormality but also they have indirect effect on dependent variable.

First path: socio-economic base not only has a direct effect on abnormality but also it can be effective on abnormality via social control.

It means that if the socio-economic base was low, a person's social control would be low. Relation between the social control and abnormality is vice-versa.

On the other hand, socio-economic base affects on person's abnormality via abnormal friends.

Second path: alienation not only is directly effective on abnormality but also it is indirectly effective via abnormal friends. More alienation causes less religiousness and increases a person's abnormality. Furthermore, decreasing piety makes persons associate with abnormal friends. This increases abnormality. Decreasing piety is effective too because it can affect on family problems and then a person's abnormality.

Third path: feeling of abnormal label by person not only has direct relation with abnormality but also it can be effective via abnormal friends. It means that everyone who knows himself by the abnormal label often associates with abnormal friends.

## Conclusion

Due to research question it can be said that the abnormality degree of the youths who inhabit the outskirts of sample cities is medium.

According to the research theoretical framework and based on acquired results from multi-variables and path analysis it can be inferred that abnormality as a direct variable arises from various factors which are in casual relationship with each other and all its changes are shown by causation variables.

In this model, socio-economic base, alienation, label affect on family problems and associating with abnormal friends and them, finally affect on person's abnormality.

Based on the research theoretical

model, constructive factors such as low socio-economic base, alienation and abnormal label in outskirts areas are effective forces to negate society, which obliges inhabitants to accept behavioral models. In this area, social control constitutions such as family and schools would have failed. They can't act normally. Most of outskirts inhabitants are not able to acquire successful indexes through customary instruments. As a result, they feel anger, deprivation, umbrage and repulsion which influence them.

Due to social pressure and seclusion, and special low-level increase and cause unfit neighboring relations. These independent subcultures cause a set of values and beliefs which are in contrast to customary normality. Inhabitants of this area behave abnormally to harmonize with the subculture values of low-level.

Constructive factors such as low socio-economic base, movement and motion, ethnic and racial harmony and separated families cause low organizational cooperation, feeble control and weakness of friendship, relations which strengthen abnormal behaviors in this area.

When an outskirts young person compares himself with his friend in another part of the same city with better social and financial status (for example, from a financial and academic point of view) he feels stress which causes abnormality.

Outskirts area youths, especially boys, can't acquire these standards. They can't acquire verbal and social skills and values of the medium-level.

As a result, they feel privation and their abnormal behavior is practically a protest against abnormalities and values of medium-level in the society.

Privation from legal instruments on one hand and existence of illegal opportunities in outskirts areas on the other hand effect abnormal acts.

Based on the mentioned situations, even people who live in the outskirts area of a city, if they want to learn behavioral values and support by parents, friends, teachers and neighbors can stand against abnormality. But situations in the outskirts area are contrary to this. Decreasing feel-

ings of dependence, lack of continuous cooperation in social activities, lack of faith to the validity of social and behavioral rules and learning abnormalities, values and abnormal behaviors, all, cause the existence of constructive factors in this area.

Totally, constructive factors in outskirts areas decrease religiousness, social control and family problems and they finally oblige persons to associate with abnormal friends which increase a person's abnormality.

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# Health Facilities Differential in the World with Special Reference to Bangladesh

**Key words:** Index of health facilities, country's rank and Bangladesh.

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## ABSTRACT

Attempts have been made in this study to rank almost all countries of the world according to constructed index of health facilities. USA was at the top ranking position in 1990 but in 2000 it came down to 2nd position. The study reveals that Bangladesh was at 36th position in 1990 and increased their facilities for health during 1990 to 2000 but it did not come out from the low ranking group. Bangladesh should follow the top ranking country's policies regarding the health sector.

## Introduction

Born in 1971 after a devastating war, Bangladesh is a land of immense beauty and potential. In its short history, Bangladesh has faced a daunting challenge of improving the health of its people and has made remarkable progress. Over the last two decades, Bangladesh has witnessed a large decline in mortality despite economic backwardness and inadequate health services. During the period 1990 - 2000, the crude death rate dropped from approximately 11.1 to 9.2 per 1,000 population. In the same period the infant mortality rate also dropped from approximately 89 to 73 per 1,000 population (World Population Prospectus, 2006). Bangladesh ranks among the extreme poor and most densely populated countries in the developing world, with less than 45 percent of its population having access to primary health care services beyond childhood immunization and family planning (UNDP 1997).

Equity in health is defined as "the absence of systematic and potentially remediable differences in one or more aspect of health across populations or population subgroups defined socially, economically, demographically, or geographically" (ISEqH 2001). More simply, these are health inequalities which are deemed unfair or unjust. Its principles are derived from the fields of philosophy, ethics, economics, medicine, public health, and others. The subsets of health inequalities that are judged unjust or unfair constitute health inequities. A recent examination of data from Matlab indicated that the gain in mortality reduction for children during the last twenty years was much greater for females and in children from the extreme poor households (Bhuiya et al., 2001).

While the decline in mortality is impressive, it is not known whether the decline is due to increased health facilities. Especially, were health facilities improved in all countries of the world as well as in Bangladesh during the period 1990 - 2000? The study attempts to address the above question along with the determination of the index of health facilities (IHF) for different countries of the world and their corresponding ranking position.

## Data Sources and Construction of Index

The study is based on the data of WHO. We have mainly used World Health Statistics 2006 (WHO, 2006) data prepared by WHO.

The present study considers only a few sets of variables related to health facilities. Many are left partly owing to unavailability of data at the country levels. The index of health facilities (IHF) has been constructed using the variables such as number of physicians, number of nurses, number of midwives, number of dentists, number of pharmacists, number of public and environmental health workers, number of community health workers, number of other health workers, number of lab technicians, number of health management and support workers and number of hospital beds. Calculation of single variable index is made as follows:

Let  $X_{ij}$  denotes value of  $i^{\text{th}}$  variable for  $j^{\text{th}}$  country. We may get an index called the single variable index at the country level by using the following formula:

$$IV_{ij} = \frac{(X_{ij}) - \text{Min}(X_{ij})}{\text{Max}(X_{ij}) - \text{Min}(X_{ij})} \times 100$$

Where, (Xij), Min (Xij), Max (Xij) and IVij are, respectively, the actual, minimum, maximum and index value of X over the countries.

Based on each indicator, which include more than one variable, weight for each variable has been measured as

$$W_{ij} = \frac{1}{\sqrt{\text{Var.}(IV_{ij})}} \div \sum_{i=1}^k \frac{1}{\sqrt{\text{Var.}(IV_{ij})}}$$

Where, Var.(IVij) denotes the variance of index value of j<sup>th</sup> variable for j<sup>th</sup> country and k is the number of variables. The choice of weights in this manner ensures that large variations in any one of the indicators will not unduly dominate over the contribution of the indicators and distort inter country comparisons.

Thus using the weight and index value, a weighted combined index is obtained using the following formula:

$$C_{ij} = \sum_{i=1}^k W_{ij} \times IV_{ij}$$

Where, Wij and IVij denote, respectively, the weight value & the index value of ith variable for jth country and

k is the number of variables.

The above index is computed in the same fashion as Gupta (1989) and Rahman (1999).

### Country Variation: Index of Health Facilities

We would like to identify the ranking position of each country of the world on the basis of IHF in 1990 and 2000. Due to lack of the relevant indicators of the IHF, only 172 countries for 1990 and 173 countries for 2000 have been included in our study. For 1990, 172 countries are divided into three groups where first 57 countries, scored 0.01 to 0.48, are categorized as low ranking and next 57 countries, scored 0.49 to 1.43 are categorized as medium ranking countries. And last 58 countries are categorized as high ranking countries whose score are 1.44 to 5.1. Table 1 shows the country's ranking position in 1990 by IHF.

Here we observed that USA (score 5.1) was at the top ranking position and Somalia (score 0.01) at the lowest ranking position. That means the health facilities were more available in USA than the other countries. Bangladesh ranked 36th position whose score were 0.24 and at the lower group according to IHF in 1990.

**Table 1:** Countries by their Index of Health Facilities in 1990

IHF Group	Countries
Low (0.01 - 0.48)	Somalia (1), Lao People's Democratic Republic (2), Niger (3), Burundi (4), Haiti (5), Chad (6), Democratic Republic of the Congo (7), Central African Republic (8), Guinea (9), Afghanistan (10), Madagascar (11), Papua new guinea (12), Angola (13), Eritrea (14), Ethiopia (15), Lesotho (16), Benin (17), Senegal (18), Sierra Leone (19), Burkina Faso (20), Cote D'ivoire (21), Mauritania (22), Mozambique (23), Togo (24), Bhutan (25), Djibouti (26), Liberia (27), Indonesia (28), Comoros (29), Ghana (30), Uganda (31), United Republic of Tanzania (32), Cameroon (33), Congo (34), Rwanda (35), Bangladesh (36), Cambodia (37), Viet Nam (38), Nepal (39), Cape Verde (40), Morocco (41), Nicaragua (42), Sri Lanka (43), Pakistan (44), Sudan (45), Zimbabwe (46), Gambia (47), Solomon Islands (48), China (49), Fiji (50), Nigeria (51), Yemen (52), Thailand (53), Myanmar (54), Honduras (55), Guyana (56), Jamaica (57).
Medium (0.49 - 1.43)	Peru (58), Suriname (59), Zambia (60), Malaysia (61), Egypt (62), Iran (63), Botswana (64), Malawi (65), Trinidad and Tobago (66), Guinea-Bissau (67), Philippine (68), Kenya (69), Ecuador (70), India (71), South Africa (72), Algeria (73), Bosnia and Herzegovina (74), Gabon (75), Equatorial guinea (76), Romania (77), Samoa (78), Belize (79), Chile (80), Paraguay (81), Libyan Arab Jamahiriya (82), Turkey (83), Namibia (84), Vanuatu (85), Guatemala (86), Iraq (87), Tunisia (88), Mongolia (89), Albania (90), El Salvador (91), Kuwait (92), Mauritius (93), Armenia (94), Serbia and Montenegro (95), Bolivia (96), Oman (97), Georgia (98), Saudi Arabia (99), Republic of Korea (100), Sao Tome and Principe (101), Tajikistan (102), Bahamas (103), Swaziland (104), Singapore (105), Colombia (106), Latvia (107), Mexico (108), Kyrgyzstan (109), Bulgaria (110), Poland (111), Costa Rica (112), Democratic People's Republic of Korea (113), Croatia (114).
High (1.44 - 5.1)	Dominican Republic (115), Ukraine (116), Republic of Moldova (117), The Former Yugoslav Republic of Macedonia (118), Syrian Arab Republic (119), Argentina (120), Kazakhstan (121), Slovenia (122), Venezuela (123), Brunei Darussalam (124), Panama (125), Portugal (126), Slovakia (127), Estonia (128), Hungary (129), Barbados (130), Saint Vincent And the Grenadines (131), United Arab Emirates (132), Cyprus (133), Maldives (134), Spain (135), Lithuania (136), Japan (137), Austria (138), Russian Federation (139), Uzbekistan (140), Germany (141), Czech Republic (142), Denmark (143), Bahrain (144), Belarus (145), Switzerland (146), France (147), Azerbaijan (148), Canada (149), Uruguay (150), Greece (151), Saint Lucia (152), Italy (153), Turkmenistan (154), Brazil (155), Sweden (156), Belgium (157), United Kingdom of Great Britain and Northern Ireland (158), Norway (159), New Zealand (160), Malta (161), Luxembourg (162), Lebanon (163), Australia (164), Israel (165), Tonga (166), Cuba (167), Finland (168), Iceland (169), Jordan (170), Ireland (171), United States of America (172).

Note: parentheses indicate the corresponding ranking position in second column

Table 2 provides the country's ranking according to IHF in 2000 where the IHF groups are same as the group of 1990 except the high (1.44 – 10.14). We observed that USA (score 6.97) came down to the 2<sup>nd</sup> position and Romania (score 10.14) came at the top ranking position in 2000. We may conclude that Romania (77<sup>th</sup> position in 1990) improved very much in their health sector than the other countries and came out from the medium group within only ten years. Bangladesh (score 0.29) came at 37<sup>th</sup> position in 2000 which was 36<sup>th</sup> position in 1990. It is an indication that population health was better in 2000 by getting more health facilities though it didn't come out from the low ranking group. We also observed in our calculation that all countries scored more in 2000 than their corresponding 1990's score. That means in all countries health facilities were increasing with the passing of time.

Table 2: Countries by their Index of Health Facilities in 2000

IHF Group	Countries
Low (0.01 - 0.48)	Somalia (1), Lao People's Democratic Republic (2), Niger (3), Haiti (4), Democratic Republic of the Congo (5), Afghanistan (6), Chad (7), Burundi (8), Guinea (9), Madagascar (10), Papua New Guinea (11), Angola (12), Central African Republic (13), Benin (14), Ethiopia (15), Burkina Faso (16), Cote D'ivoire (17), Senegal (18), Eritrea (19), Mauritania (20), Lesotho (21), Togo (22), Mozambique (23), Sierra Leone (24), Liberia (25), Djibouti (26), Comoros (27), Ghana (28), Bhutan (29), Congo (30), Uganda (31), Cameroon (32), United Republic of Tanzania (33), Cambodia (34), Indonesia (35), Nicaragua (36), Bangladesh (37), Viet Nam (38), Cape Verde (39), Nepal (40), Pakistan (41), Rwanda (42), Morocco (43), Solomon Islands (44), Gambia (45), Sri Lanka (46), Sudan (47), Zimbabwe (48), Yemen (49), Fiji (50), Nigeria (51), China (52), Honduras(53)
Medium (0.49 - 1.43)	Peru (54), Jamaica (55), Thailand (56), Myanmar (57), Malaysia (58), Malawi (59), Zambia (60), Guyana (61), Suriname (62), Ecuador (63), Botswana (64), Egypt (65), Philippine (66), Trinidad and Tobago (67), Iran (Islamic Republic of) (68), Gabon (69), South Africa (70), Guinea-Bissau (71), Kenya (72), Belize (73), India (74), Algeria (75), Paraguay (76), Libyan Arab Jamahiriya (77), Guatemala (78), Chile (79), Vanuatu (80), Namibia (81), Turkey (82), Equatorial Guinea (83), Bosnia and Herzegovina (84), Samoa (85), Iraq (86), El Salvador (87), Tunisia (88), Mongolia (89), Oman (90), Saudi Arabia (91), Singapore (92), Bolivia (93), United Arab Emirates (94), Tajikistan (95), Kuwait (96), Serbia and Montenegro (97), Bahamas (98), Albania (99), Colombia (100)
High (1.44 - 10.14)	Mauritius (101), Kyrgyzstan (102), Armenia (103), Sao Tome and Principe (104), Georgia (105), Mexico (106), Republic of Korea (107), Venezuela (108), Swaziland (109), Syrian Arab Republic (110), Brunei Darussalam (111), Costa Rica (112), Republic of Moldova (113), Dominican Republic (114), Democratic People's Republic of Korea (115), Argentina (116), Latvia (117), Poland (118), The Former Yugoslav Republic of Macedonia (119), Bulgaria (120), Uzbekistan (121), Panama (122), Croatia (123), Slovakia (124), Cyprus (125), Slovenia (126), Ukraine (127), Maldives (128), Portugal (129), Hungary (130), Barbados (131), Kazakhstan (132), Saint Vincent and the Grenadines (133), Turkmenistan (134), Austria (135), Spain (136), Azerbaijan (137), Saint Lucia (138), Bahrain (139), Germany (140), Switzerland (141), Denmark (142), Estonia (143), Japan (144), Belarus (145), Canada (146), Uruguay (147), Lithuania (148), Czech Republic (149), France (150), Russian Federation (151), Greece (152), Israel (153), Italy (154), Sweden (155), Norway (156), Lebanon (157), Brazil (158), Luxembourg (159), Belgium (160), New Zealand (161), United Kingdom of Great Britain and Northern Ireland (162), Malta (163), Australia (164), Cuba (165), Jordan (166), Tonga (167), Netherlands Antilles (168), Iceland (169), Finland (170), Ireland (171), United States of America (172), Romania (173)

Note: parentheses indicate the corresponding ranking position in second column

## Conclusion

Study of health facilities by country is a complex one. A sound conclusion on this phenomenon is difficult if significant data are not available. The performance of the health care sector obviously remains an important

factor (UN, 1988). It is true that universal attainment of an acceptable level of health and welfare services should be the main purpose of health development. Health and welfare systems development should be advocated by all as a social movement for human development.

## Recommendations

1. More studies are needed and the policy makers should have to delineate necessary laws, regulations, funds and personnel regarding health facilities to achieve a high standard of living and highest life expectancy;
2. Timely, accurate and sufficient data should be published to demonstrate the situation of health facilities which helps the policy makers and experts to make their policy and decisions for a country's development;
3. Also the top ranking country's policies should be followed by other countries to improve their health sector.

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# Improving Opportunities for Learning in Postgraduate Physician Training Program

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## SUMMARY

Active participation of learners in any Postgraduate training programs needs to be critically examined, by an internal review process. This should depend on the best evidence based medical education principles. An evidence-based review of morning reports, lectures in postgraduate training programs, outpatient clinics and journal clubs is presented. Morning reports should emphasize active participation of all residents without humiliation. Lectures do not enhance higher order thinking. Residents should spend more time in outpatient clinics. Journal clubs are an essential strategy.

## Introduction

Postgraduate training programs aim to produce professionals competent in their knowledge, skills and attitudes. These programs need to prepare candidates to meet the demands of real life practices in a continually changing and fast growing medical field. The final goal is clearly to improve patient care. There are multiple teaching methods that can be employed in a training program. This would provide different learning styles for different candidates.

The active participation of candidates in the learning process, the presence of clear aims and objectives for each activity, the relevance of what is to be taught to candidates and the presence of a two way feedback mechanism between candidates and their teachers are all important. Some common problems relate to vague objectives and expectations, and lack and or deficiency in promoting problem solving skills and attitudes<sup>(1)</sup>.

The objective of the article is to present an evidence-based review for some of the common learning interventions undertaken in Arab Family Physician postgraduate training programs, we hope to establish and or initiate a critical internal review.

## Morning reports

Morning reports are meetings where junior and senior staff meet to discuss the newly admitted cases, and they can function as an instructive teaching conference providing a broad coverage of topics. There is no doubt that there are unique educational opportunities in the morning report. It stands out as the only large, formal conference generally used for the evaluation of case management and the overall performance of medical residents. The cases discussed in a well designed morning report are

closely comparable to the curricular contents designed by supervising health authorities.

The objectives of the morning report need to be clear in the minds of program directors, supervising staff and residents. The majority of residents thought that the main purpose of a morning report should be educational.

The practice of listing all admitted cases and reciting a few words about each case and stating where the patients are located should have a very limited time in morning reports. Morning reports should not be just listing of cases without any educational discussions around them. The discussions should be clinically relevant to residents. In addition, the discussions should not be conducted in a threatening environment, where the focus of residents is on the fear of poor performance rather than enjoying the challenge of learning. Patient guidance and respect for residents will yield more positive benefits and the learners will be more effective, more responsible and develop better problem solving skills<sup>(2)</sup>.

The most frequent instructional method used during morning report was case-based presentation, followed by discussion.

The most important features of coordinators and physicians attending morning reports are excellent general medical knowledge, an ability to ask effective questions, and good interpersonal skills. The cases for presentation are best selected by residents. It was concluded in one study that residents do an exceptional job of selecting difficult diagnostic cases for discussion at morning report<sup>(3)</sup>.

The way of distribution of seats where consultants are in front and residents are in the back row should

be discouraged. It is advisable to have all attendees setting in a circle where interactions are stimulated. Presence of food and drinks during morning report tend to enhance interactions as well.

The coordinator should use the board to write pertinent information from presentations. The presentation itself should be concise and it is better to be presented from copied or printed notes to avoid missing information or providing inaccurate information. They should not take more than 5 minutes<sup>(4)</sup>. The practice of overwhelming the post-call resident(s) with detailed questions exposing their lack of knowledge in an ironic way should be strongly discouraged. This creates a threatening environment and impedes learning. The coordinator may run the morning report in a stepwise approach. After the history is presented, there should be a pause and a question raised as to further relevant information that is needed. A brief discussion is then conducted aimed at improving history-taking skills. Then before proceeding to the physical examination findings, another question is raised by the coordinator about what physical findings based on history presented, should be looked for.

After the presentation of the physical findings, a senior resident is asked to summarize the case and develops a problem list with differential diagnoses and management plan. An open discussion might be conducted now; on whether any modifications should be undertaken in the plan described.

Investigations are presented and another question is raised on the interpretation of these investigations and if the plan will change or not. A senior resident is asked again to discuss the therapeutic interventions that she/he will consider in this case. Finally, the presenter (who should be from the post-call team) is asked to present the rationale of what treatment the patient received. The depth of discussion should be based on the number of residents present from each level.

These types of questions in a stepwise approach are advocated in order to stimulate higher level of mental functions like thinking, analysis and synthesis of data. This is to avoid the exchange of low-level factual information, not optimal for promoting problem-solving skills.

The morning report should include a summary of what was learned, presented by one of the residents. It should also include the formulation of a clinical question with a direct relation to the case presented that needs to be researched in the literature. The result of the research work can be presented briefly the next day. The presence of attending physicians should help residents to create effective and relevant questions. When useful, updates on previous cases discussed in morning reports should be presented. This is to help create an overall understanding of the natural history of certain presentations and build up clinical experience.

## Lecturing

Unfortunately lectures remain the most common form of teaching methods used in the medical field.

Lectures can be informative and even inspirational if they are done properly<sup>(5)</sup> and used skillfully they permit the dissemination of unpublished or not readily available materials, and allow the instructor to precisely determine the aims, content, organization, pace and direction of presentation. They can be used to arouse interest in subject, complement and clarify text material, can address certain individual learning preferences, and allow for gradual development of complex concepts and theories<sup>(6)</sup>.

Lectures were defined by some experts as "a process by which the notes of a teacher become the notes of a student without passing through the minds of either"<sup>(7)</sup>.

There is documentation in the literature of learners' dissatisfaction with non-challenging lectures. It was shown that student concentration in lectures rose sharply to reach a maximum in 10-15 min, and fell steadily thereafter.

Large group formats tend to

encourage passive learning, however what is required to be developed in postgraduate education is active participation in the learning process with residents taking full responsibility for their own education. Lectures should not be regarded as an effective way of teaching skills, changing attitudes, or encouraging higher order thinking. All these are considered essential skills for training doctors<sup>(8)</sup>.

It was shown that lecture-based and problem-based learning formats in postgraduate education are both effective. However, problem-based programs appeared to be more effective than the lecture-based programs in improving performance<sup>(9)</sup>.

It is clearly described in depth in the literature that the good teacher can use many different techniques for the sake of effectiveness. The good teacher is more than a lecturer<sup>(7)</sup>. There are multiple efforts developed by experts in medical education directed to educators to help them maximize learning outcomes from lectures<sup>(6)</sup>. These guidelines are encouraging the principles of integrating and actively involving learners in the delivery process of lectures.

Program directors and participants in residents' education in our local training programs need to consider newer teaching methodologies and move beyond didactic lectures.

Interacting with learners during the learning interventions is essential for success. A meta-analysis on continuous medical education (CME) activities concluded that didactic sessions do not appear to be effective in changing physician performance<sup>(10)</sup>. Only interactive CME sessions effect professional practice and, on occasion, health care outcomes<sup>(10)</sup>.

## Outpatient training

The learner will get more benefit from being in direct contact with patient problems and complaints and if an adequate number of patients is available and proper time is given, positive achievements are expected<sup>(11)</sup>.

On the other hand outpatient training can be criticized for the minimal

time given to instruction and most importantly inadequate feedback from consultant or teacher<sup>(12)</sup>.

There is a move towards community-based and community-oriented medical education. The in hospital inpatients (both mean the same) represent a tiny proportion of actual numbers of sick people in the community and their problems and management issues are different. The training of future doctors should emphasize what the doctor will face in his/her real practice. Therefore, there has to be greater emphasis on outpatient training for our residents. Unfortunately, the focus of some of our local training programs is to provide medical coverage for their wards without paying attention to the needs of our residents. This is happening at the expense of providing quality training to residents by specifying adequate time in outpatient settings. There are suggested tips published in the literature for programs willing to incorporate more training in outpatient settings, including issues like: making training in the ambulatory setting a priority, and how to teach and evaluate in the examination room<sup>(13)</sup>.

On the other hand, teaching in outpatient clinics is still less well structured and in its infancy compared to teaching in the hospital settings.

In this regard it is essential to enhance quality of teaching in outpatient settings<sup>(11, 13)</sup>.

## Alternative instructional methods

Considering learning as an active process, we suggest that the teacher should act as a facilitator. Many alternative approaches can be used to improve the instructiveness of apprenticeships or clinical clerkships.

**One minute preceptor (teacher):** A one minute preceptor follows a series of ordered steps, that is teaching general principles; help the learner to be aware of the omissions and errors, confirm the case by available diagnostic tools, stimulate reasoning thinking, knowledge and taking into consideration the history, clinical examination etc. toward improving or correcting the way the

learner deals with the case described, by Ferrenchick et al (1997)

Enhancing independent learning can save time, and benefit both the teacher and the learner as DaRosa et al (1997) mentioned.

This will include the case of the week, which has the benefit of adding more clinical attachment, also the opportunity it provides for the learner to discuss and exchange information and ideas and to provide best feedback.

By this method, critical thinking will be encouraged as described by Spencer (2003). Also the implementation of a mentor and conference system will enhance the educational process by providing feedback for students.

Clinical problem solving on the other hand will help the learner be better and more efficient in diagnosing cases in the proper way (illness script development). Many programs have tried to rely on a PBL curriculum and approach, but have not fully achieved the criteria outlined in Barrows taxonomy of PBL, despite the fact that these programs were innovative in many aspects. (Foley et al 1997).

In medical education, problem based learning may help the student in producing tentative explanations for the phenomena under study and the task also will be to discuss these problems and explain them as suggested by Geoffrey et al (1992).

## Journal clubs

Journal clubs are now considered an essential component of any training programs. They are included in almost all training programs in all specialties. There is no ideal format for journal clubs to be conducted, but the most common format as outlined in the literature was for a club that is conducted once per month, where 2-3 original research articles are discussed, in the presence of knowledgeable leaders. It may be helpful for a biostatistician to be present as well<sup>(14)</sup>.

Articles should be selected by residents and they should be related to cases and problems originating from their own practice. They should be distributed in advance to all

participants in the club, so everybody will have a chance to go over the studies. It is less useful practice for journal clubs to be conducted where most of the participants receive the papers to be studied only at the time the club meets. Presentations should be short and concise. Residents critically appraising the studies may use checklists for evaluating different studies on diagnosis or on therapy. The publication of the Users' Guides to the Medical Literature series (now published in a book<sup>(15)</sup>) has fueled the implementation of journal clubs devoted to evidence-based medicine in many postgraduate training programs.

The goal is to avoid boredom from listening and following a lengthy presentation. It also leaves time for discussions on how to apply the evidence in the practice. Here is where the presence of experts is really needed.

There are certain characteristic for journal clubs with high attendance and longevity, these are: mandatory attendance, availability of food, and perceived importance by the program director<sup>(14)</sup>.

There is good evidence in the literature that addresses the learning achieved in journal clubs. The two most important objectives achieved in one study among community medicine residents with strict criteria for conducting a weekly journal club were acquisition of critical appraisal skills and keeping up with current literature<sup>(15)</sup>. In a systematic review of all studies on journal clubs to evaluate their effectiveness, there was a statistically significant improvement in epidemiology and biostatistics knowledge, change in reading habits, and increase in the use of medical literature in practice.

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# Serum Zinc Concentration in Iranian Pre-eclamptic and Normotensive Pregnant Women

## SUMMARY

In this case-control study, serum zinc concentration was measured in a study group consisting of 40 pre-eclamptic Iranian women.

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## Introduction

Zinc (Zn), is the most abundant micronutrient in the human body, and has gained much popularity for its illustrative role in enhancing reproductive health. Zn is required for optimal cellular function working with more than 300 enzymes in a variety of fashions, serving as a catalyst for numerous reactions or acting as a cofactor, or simply playing a structural role as a stabilizing component<sup>[1]</sup>.

In developing countries, where improper or inadequate nutrient intake is a special challenge, chronic Zn deficiency or nutriture imbalance may have a disturbing influence on maternal health and pregnancy outcome<sup>[2]</sup>.

Physiological alterations in Zn concentration has been associated with the prevalence of pathological conditions in pregnancy including the common hypertension disorder known as pre-eclampsia. Although the etiology of this heterogeneous syndrome remains unknown, there is a claim that minerals, including Zn, may be important and beneficial in preventing this pregnancy malady<sup>[3]</sup>.

Nominal information is available on Zn status during pregnancy-induced hypertension in our community.

Therefore, the general purpose of this study is to evaluate serum Zn concentration in pregnant women with pre-eclampsia and compare these results with Zn levels in normotensive pregnant women in order to discover a possible link between Zn and pre-eclampsia and determine if this factor could be used as a potential means for early diagnosis of this dangerous medical problem.

## Patients and Methods

The study group was comprised of pre-eclamptic pregnant women in their third trimester (n=40) with a mean age of 25.6±4.7 years (range 18-35). An equal number (n=40) of normotensive pregnant women with a mean age 26.3±4.5 years (range 18-37) were recruited as the control group. A detailed general physical examination was performed on all study participants before inclusion of each individual in the protocol. Excluded were patients with diabetes, kidney or liver problems, pre-existing hypertension and smokers.

Blood pressure (BP) was measured by trained nurses and pre-eclampsia was defined as BP <sup>3</sup> 140 Hg systolic and <sup>3</sup> 90 mm Hg diastolic on readings of at least 6 or more hours apart accompanied by proteinuria > 300

mg/liter in a 24 hour urine collection.

For Zn serum analysis, samples were carefully collected in metal-free tubes in order to ensure no contamination and stored at -86°C at the Cellular Molecular Research Center until they were analyzed by atomic absorption spectrophotometry [Unicam] according to established methods.

For quality control assurance, each sample was measured in triplicate and a calibration curve was established with a commercial solution with known Zn concentration (seronorm) The CV of repeated zinc analysis of pooled serum was approximately 4%.

Serum levels of Hemoglobin (Hb) and albumin were measured with routine laboratory methods and expressed as g/dl.

Statistical significance for the comparison of mean was determined using Student's t-test and Pearson correlation appropriate software (SPSS 10 for Windows). P values of <0.05 were considered significant.

## Results

The mean serum Zn concentration in pre-eclamptic patients was 64.12±10 mg /dl, ranging from 40.5-85.0 mg/dl. The lowest reading was

from an 18 year old pregnant mother. The mean serum value was higher for normotensive pregnant women, with a finding of 98.72±8.7 mg /dl, ranging from 82.1-1.02mg /dl. This difference was found to be statistically significant. (P<0.001).

Pre-eclamptic patients had significantly higher mean systolic and diastolic pressure of 149.5±6.18 and 92.79±3.1, respectively than those who had normal pregnancy. About 50% of patients gave birth to babies of 2500 g or less body weight. There was significant correlation between serum zinc concentration of mother and birth weight of infant (P<0.001).

On further analysis there was no correlation statistically between patients' serum albumin and Hb when comparing to control subjects. Table 1 lists results.

**Table 1:** Comparison of characteristics between pre-eclamptic and normotensive women

	Pre-eclampsia (N=40)	Normotensive (N=40)
Age (year)	25.6±4.7	26.3±4.5
Zinc (mg/dl)	64.12±10	98.72±8.7
Blood pressure: systolic (mmHg)	149.5±6.1	112.5±8.4
Blood pressure: diastolic (mmHg)	92.7±3.1	67.0±5.8
Hb (g/dl)	11.6±0.42	11.4±0.43
Albumin (g/dl)	4.39±0.539	4.43±0.0475
BMI (kg/m <sup>2</sup> )	27.3±3.9	25.1±2.4

## Discussion

Several investigators in recent years have reported that reduced levels of Zn may have a positive association to pre-eclampsia. Kumra<sup>[4]</sup> showed serum Zn concentration to be 43% lower in pre-eclamptic women when comparing to normotensive controls (P<0.0001). Lazebnik<sup>[5]</sup> reported the Zn levels to be 19% lower in expectant women with hypertension than in healthy control subjects (P<0.002).

In a study with 21 pre-eclampsia patients in their third trimester Ilhan *et al.*,<sup>[6]</sup> found a significant decrease in serum Zn concentration (82.94±28.93 mg/dl) when comparing to normotensive women (125.19±24.23). (P<0.005). Similarly, our data provided evidence of a decrease in serum zinc concentrations in pre-eclamptic pregnant mothers.

In a double-blind study, using Zn

supplementation on low-income pregnant women, Hunt *et al.*<sup>[7]</sup> showed that incidence of pregnancy induced hypertension was significantly lower than in the placebo group (P<0.0003).

Conversely, others have refuted any association between hypozincemia and pre-eclamptic conditions and contradictory results have appeared in literature.

Lao<sup>[8]</sup>, working with 45 Chinese patients found no differences exist in either plasma or erythrocyte Zn levels between pre-eclamptic women and control group. A Zn supplementation study with middle-class pre-eclamptic women in Demark<sup>[9]</sup> reported results similar to Lao's. In another study with supplemental Zn in 246 British women with pre-eclampsia, Mahomed *et al.*<sup>[10]</sup> found a higher incidence of pre-eclampsia with low socioeconomic status. Tamura<sup>[11]</sup> also reported no significant association between plasma Zn concentration and several types of hypertension during pregnancy.

Despite intense efforts and research aimed at elucidating the causative factors of pre-eclampsia during pregnancy, the incidence of which is still between 3% and 10%, diverse views on its pathogenesis remain<sup>[12]</sup>.

Progressive depletion of zinc during the course of healthy pregnancy due to physiological changes is a normal process. In developing countries, a variety of other factors also may disturb serum Zn homeostasis in child-bearing women. Further, deterioration of Zn levels in pre-eclamptic patients has been attributed to serum estrogen, cortisol levels or Zn transport proteins, as well as interaction of Zn with toxic metals like cadmium by some authors<sup>[13, 14]</sup>.

Recent thinking is also turning to oxidative stress as a possible factor in the pathogenesis of pre-eclampsia and complications may arise from free-radical contribution;<sup>[15]</sup> that is, an imbalance between maternal pro-oxidants and antioxidants may likely promote genesis for pre-eclampsia.

Zinc, an antioxidant, is a catalyst for the endogenous antioxidant enzyme superoxide dismutase (SOD) which

has been demonstrated to be reduced in red blood cells in pre-eclampsia<sup>[16, 17]</sup>.

Thus, this suggests the low concentration of Zn may be a link between oxidative stress and pre-eclampsia.

While our findings can be considered consistent with others who have looked into the relation between Zn and pre-eclampsia, the existence of contrary evidence only highlights the obvious need for more prospective documented studies to find the exact cause-effect relationship of Zn imbalance in women at risk for development of pregnancy induced pre-eclampsia.

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