

Nutrition and Fertility

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There are indeed very few studies that have been undertaken to examine the interrelationship between nutritional level of an individual and her fertility level. But whatever has been done so far in the field points out to a very complex relationship between the two. It is to be noted here that almost all the studies reviewed by these investigators were interested to find out the effect of malnutrition on reproductive behaviour of women and children, and in general, there was consensus among the researchers to the fact that only malnutrition in acute form might have an adverse effect on the reproductive functions of women. But their fertility behaviour is also conditioned by infant and child mortality resulted mostly from an interaction of infection and malnutrition. On the other hand, it is assumed that proper and adequate nutrition level, implying a higher quality of life of a people, has a long term conducive effect on the desire to limit one's family size.

Nutrition and Fertility: Theoretical Perspective

Nutrition does not affect fertility directly but instead acts by modifying one or more biological and behavioural factors. The biological factors are age at menarche, menopause, fecundity, postpartum amenorrhoea, ovulatory interval, etc. The intermediate fertility variables are the most immediate determinants of fertility, and through them, the socio-economic and biological environment operate to influence fertility. We would try to explore the theoretical aspects of the possible links between the nutrition of the mother and child on the one hand and fertility on the other.

Nutrition and Menarche

There appears to exist a possible link between nutritional standard of a girl and her menarche, the age at which the first menstruation occurs. In an analysis of age at menarche among a group of Alabama girls, Frisch (1) found that malnourished girls reached menarche an average of two years later than their wellnourished counterparts. Indirect evidence supporting this finding is provided by negative correlation between socio-economic status and age at menarche reported in a variety of societies such as in Sri Lanka (2), Poland (3), etc. and by the secular decline in age at menarche in European population in the late nineteenth and early twentieth centuries a decline that has been attributed to improving diets (4). If nutrition affects menarche as seems probable, and if menarche affects age at marriage as is the case in some traditional societies where menarche indicates that a woman has become marriageable, then the nutritional status of women would influence her age at marriage through variations in age at menarche.

Nutrition and Menopause

The relationship between these two are found to be often conflicting. McMahon (5) reports that lean women reach menopause slightly earlier than average, but Gaszmann (6) is unable to find any relationship between age at menopause and anthropometric measure. In a study of Ceylonese women (2), it is estimated that urban women attained menopause on average 2.4 years later than rural women. Other investigators (5,6,7) reports no significant effect of socio-economic status on age at menopause. A rising secular trend in age at menopause is found among Polish women (8), but not among women in England (7), in view of absence of a clear cut finding, further study of this topic is necessary before any definite conclusion can be drawn.

Nutrition and Marriage

Apart from affecting the timing and duration of marriage through other intermediate variables, such as menarche, menopause, etc. nutrition level of a couple has a direct bearing on the length of marriage life. Malnutrition being one of the determinants of general mortality, would affect duration of marriage which itself is dependent on survival of both spouses.

Nutrition and Intrauterine Mortality

Although calorie intake during pregnancy is known to be one of the determinants of birth weight (9), the effect of current nutrition on intrauterine mortality is less clear. A negative rela-

tionship between socio-economic status and intrauterine and perinatal mortality is now well established (10,11,12,13). But it appears to be unrelated to current maternal nutrition (11). Experimental studies in animals, however, have shown that severe nutritional deprivation-a situation which occurs with human being during acute famine related starvation-does affect the survival of the foetus (14,15).

Nutrition and Fecundability

Conception is dependent on the production of viable ova and sperm as well as on the occurrence of intercourse. All these factors are apparently affected by severe restrictions in dietary intake. Menstruation and ovulation stop when a woman suffers severe weight loss (16,17) and many women become amenorrhoeic during famine (18). Chronic severe malnutrition disturbs the function of the endocrine system, resulting in atrophy of the gonads, hypo-pituitarism and reduction in urinary gonadotropins (19). In starving males, semen volume, sperm count and sperm mobility are significantly reduced and interest in sexual activity markedly declines (20).

In Bangladesh where there are wide monthly fluctuations in the food supply associated with the harvests, no systematic monthly fluctuation in the regularity of menstruation has been observed (21). In rural Guatemala, the conception interval was found to be unrelated to the mothers nutritional standard (22).

Nutrition and Postpartum Amenorrhoea

Various studies (23,24,25) suggest that the postpartum amenorrhoea period-a period of infertility in women following child birth is lower for malnourished, lactating women than for their well-fed counterparts. Postpartum amenorrhoea among lactating women has been found to be negatively related to socio-economic status (26,27,28). Postpartum amenorrhoea is dependent on duration of breast-feeding which is linked with maternal nutrition. Maternal nutrition has also significant implications for infant mortality. It is to be admitted here that at our present state of knowledge, very little is known about the effect of the nutritional level of mother in shortening or lengthening the period of amenorrhoea associated with breast-feeding but variations in the length of amenorrhoea accompanying lactation observed for different populations (29) however, suggested that nutritional level of the mother may not be unimportant. From a review of data (30) it has been suggested that breast-milk production, particularly volume and perhaps, duration may be related to not only current maternal nutritional status, but also child-hood nutritional history.

Because the infant nursing patterns are likely to be related to milk production, it is possible that this may be a link relating poor maternal nutritional status to prolongation of lactational amenorrhoea.

To sum up the discussion, we may say that improved maternal nutrition by its potential to prolong lactation may decrease fertility, although obvious that many other factors are operating to shorten lactation and to affect ovulation. There is at least a possibility that those women who wean their infants early because cessation of lactation could nurse longer if they were better nourished and thereby delay their pregnancy.

Nutrition Fertility Relationships: Existing Evidences

Studies pertaining to finding out nutrition-fertility relationship point out to a rather confusing picture of how these two affect each other.

Frisch (1) provides the broadest over-view of the potential relationship between nutrition and reproductive performance. She suggests that under-nutrition has been a major determining factor in holding down the fertility of poor couples in historical populations as well as in the developing countries far below the 'human maximum'. In this context it is important to note that Frisch uses as her frame of reference for healthy wellnourished population, the Hutterite women, whose completed fertility averaged 10 to 12 children. This she contrasts with the more commonly observed completed fertility of 6 to 7 children seen in many Western countries during the 19th and early 20th century as well as in the present day developing countries. Frisch attributed 'hard physical work and poor living condition' as the possible reason for the relatively small completed family size of the lower socio-economic classes in about 1850-1860 in Britain.

Stein and Susser (31) also reviewed historical records but of a much more dramatic event: the 1944-45 Dutch famine occurring in the world war II. They examined the effect of famine - a period of extreme and general scarcity of food - on fertility and their study is believed to be the most completely analysed in respect to fertility. The data were collected from three sources: (i) the birth registrations from 16 famine cities, (ii) records from the military induction procedures covering virtually all 18 year old male survivors living in the Netherlands, and (iii) the records from 5 large maternity hospitals. The average calories provided in the daily food rations were estimated from official sources. In the famine area, a distinct decline in the number of birth were evident, beginning 9 months following onset of acute starvation.

With the liberation of the famine-affected cities, there was a rapid recovery in fertility. The primary effect of the famine was to reduce conception rates; there was no clear evidence of a rise in foetal deaths. The dramatic decline in fertility with the famine as well as a sharp rise following availability of food suggested that psychological as well as physiological factors were playing a role in suppressing conception rate.

While the effects of famine on fertility are dramatic, it is not clear how these observations help in elucidating how chronic malnutrition, such as seen in many developing countries, may affect fertility. This is because of, a famine represents an acute social and psychological as well as physiological insult on a population, whereas many adaptive mechanisms have evolved in populations with chronic malnutrition.

In fact, the studies devoted to finding out nutrition fertility relationship in developing countries point out to the same conclusions; fertility is almost scale-neutral to nutritional level. In a study of Bangladesh women, Chowdhury (32) found that moderate chronic malnutrition has very limited effect on human fertility. In Bangladeshi women, age at menarche and duration of lactational amenorrhoea are the only biological components of fertility affected by malnutrition. Other components such as regularity of ovulation, permanent sterility and intra-uterine mortality are not affected by malnutrition. Chowdhury also found that with the improvement in the nutritional standard of women, the fertility rate increases by a few percent only. In a study of Senegal, Cantrelle, et al (33) could not find any definitive co-relation between nutrition and fertility, and according to them, effect of nutrition on fertility is minimal.

To sum up, we can say that there is a lack of consensus among the researchers as to whether nutrition really affects fertility or the conception capacity itself. Even the researchers, who found such casual relationship, are unable to ascertain the exact mechanism through which it works. The depressing effect on fertility of famine and extreme starvation is found to be temporary and is subsequently counterbalanced by hyper-fertility. Moreover, famine represents extremely rare situation and the social scientists are not concerned much with a situation. On the top of it, policy makers cannot advocate mass starvation of people to achieve a reduction on the birth rates.

The solution must be explored elsewhere and it is where we are to keep a long term perspective in view. It is a truism that with socio-economic development, the standard and quality of life increases with attendant, among other things, better food intake. This in turn leads to improvement in health condition of the people leading to a ultimate reduction in ma-

ternal, infant and child mortality. The cumulative effect of such reduction will bring forth the parental confidence about their off-springs' survival. Such behavioural change in expectation will induce them to adopt a small family size norm. Other conducive effects of better nutrition among women, particularly the lactating mothers are the improvement in the quality and quantity of breast-milk as well as extension in the lactating period too. Prolonging breast-feeding leads to concurrent extension in post-partum amenorrhoea of women, thus inducing a delay in subsequent pregnancy. In short, we can say that it is only through providing better nutrition to the people we can, in the ultimate analysis, bring down their fertility level, although the short term effect may appear to be contrary. Such a strategy for nutritional improvement, does not conflict with other development goals of the nation and in fact, it is very much in line with them.

Conclusion

In developing countries like Bangladesh, the importance of nutritional development as a means to improvement of health and quality of life can hardly be over-estimated. In fact, nutritional situation is very precarious in this country where a vast majority of the people cannot even meet the minimum of the recommended dietary requirements. But what is more alarming is that the situation is worsening over time, in view of excessive population growth in a resource-scarce economy. The vicious circle of population and resultant unemployment, poverty and malnutrition need to be broken.

The obvious policy option for the government is to increase the supply of food staff. But herein, the policy intervention is also needed to ensure distributive justice to the needy ones. If food is our problem, this is further aggravated by lack of nutrition knowledge among the population, especially among the expectant and nursing mothers regarding their own and their children's nutritional requirements. As such, it would be worth-while on the part of the government to initiate extensive nutrition education programme alongwith its development programme for agriculture. But the nutritional programme should be accompanied with not only motivation aspect of family planning, but also with necessary contraceptive supplies and services.

A 'Package Programme' having components of employment and income generating activities, nutrition education and family planning services for the people, especially for the women folk and the mothers, will be needed on extensive scale to achieve the ultimate goal of improving socio-economic condition of the people, concurrent with a reduction in birth rates,

But success of such programmes is contingent upon general awareness of the target people, which can only be created through providing formal and informal education, especially to the rural women,

To square up our discussion, it is to be emphasised, even with the risk of repetition, that although nutrition does not have much impact on fertility in the short run, nutritional improvement-which is the ultimate indice of socio-economic development-of a population-must remain the policy goal of all our development activities. Once we can achieve this, we can expect a societal environment which would take care of family planning by itself.

Summary

This review is intended to focus on the various studies undertaken to examine the relationship between nutrition and fertility. It is evident from different studies that nutrition does not affect fertility directly but acts by modifying factors such as age at menarche, menopause, fecundity, postpartum amenorrhoea, ovulatory interval, socio-economic condition and fertility behaviour. Fertility behaviour is also influenced by infant and child mortality. Malnutrition when it is very severe might have adverse effect on the reproductive function of women, on the otherhand improved quality of life, better nutrition and increased confidence on child survival have effects on the desire to limit one's family size.

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