Diet, Disease and Death in Colonial South India

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There is an abundance of evidence to suggest that a large number of the people in colonial south India suffered continually from a number of deficiency diseases. Their susceptibility to these diseases was a result of inadequate diets. However, the nutrition-mortality link has not received adequate attention so far.

THE existing studies on mortality trends in colonial India have very little to say on the nature of relationship between nutrition and mortality. In fact, even much less has been said and written about the extent of malnutrition and its consequences on the incidence and prevalence of diseases in colonial India. While paucity of empirical data is an important reason for lack of such studies, there has been no attempt even to put together the available information in this respect.

It is important to note here that an analysis of the nutrition-mortality link should be preceded as far as possible by an empirical understanding of the extent of malnutrition and its consequences with respect to a given period and population. Such preliminary exercises have not yet been carried out to the extent it is possible with the available data, which as a result limit our understanding of the demographic trends in colonial India. Consider for example, Sumit Guha's essay on 'Mortality Decline in Early Twentieth Century India',[1] in which he questions Ira Klein's immunological hypothesis[2] and puts forward an alternative explanation for the decline in mortality rates during inter-war colonial India. He suggests that "the Indian population in the second quarter of the twentieth century lived longer because the weather gods enabled it to maintain a stable level of malnutrition rather than alternatively plunge between adequate nutrition and severe malnutrition as it was doing earlier."[3] He supports his argument (a) by adopting the view that human beings can adjust to moderate variation in food intake (as argued by Sukhatme that "the energy requirement of an individual is not static but is dynamic over a wide, though limited range..."),[4] and (b) by observing that the food intake during inter-war period stabilised though the per capita food availability declined in the same period. Thus he says, "the bulk of the population managed to remain just above the lower limit of this range, whereas earlier at least a significant minority had periodically fallen below the lower limit."[5]

A series of important issues and questions arise in this context which have not been considered by Guha's abovementioned essay. Some of them are: what exactly is the range, in quantitative terms, that Guha (and Sukhatme) is talking about with particular reference to the inter-war period? Is the present estimate of the minimum energy requirement applicable to the inter-war period? (given Sukhatme's view that energy requirement of an individual is dynamic over time, which is why an individual adapts himself to lower energy intake): Is it possible to draw a single upper limit and lower limit for the entire Indian population, which differed in more than one respect from one region to another?; What percentage and which age group(s) of the population "remained just above the lower limit"? What percentage of the Indian population remained moderately or severely malnourished during normal times? In fact, controversy still exists as to the exact relationship between nutrition and mortality, particularly in determining the "threshold, critical malnutrition level", beyond which malnutrition could cause mortality. Mortality mechanisms are complex, as Livi-Bacci puts it: "while it cannot be claimed that nutrition-mortality link is the sole key to the explanation of mortality, it cannot be also be denied that nutrition does play a role in determining the level of mortality of the past."[6]

These questions need to be answered before one can accept Guha's hypothesis to explain the mortality decline in the inter-war period. Guha merely states Sukhatme's argument and considers it as a valid explanation for the inter-war phenomenon without presenting the available, though limited, empirical data on the dietary habits of the various sections of the population. He spends considerable space in order to cast doubt on Klein's argument that mortality declined during inter-war period on account of changes in host-parasite relations and the development of natural immunity among the people. But he does not provide any detail on the diets of the Indian population in support of his argument.

The food intake and their value varied considerably, and as a result the prevalence of diseases too varied across the regions in British India. In fact, as Michael Worboy shows, malnutrition was 'discovered' as a problem of imperial importance to the colonial government only during the inter-war years.[7] In colonial India, the extent of malnutrition came to be recognised more acutely by the colonial government from the late 1920s. The purpose of this essay is primarily to present the available material on the extent of malnutrition and the prevalence of diseases caused by malnutrition in colonial south India. It attempts to highlight certain important studies carried out and the insights derived from them during the inter-war period, which formed an important phase in the development of nutrition science in India. It relies heavily on the findings of the studies reported in various medical journals, and certain records of the government of Madras. The details of these studies are presented in Sections II and III, while Section I briefly mentions the prevailing views among the nutrition workers in India by the end of 1930s. Section IV concludes by raising few more questions that we need to face in order to have a better understanding of the mortality decline in inter-war period in colonial India.

I

By the end of 1930s an enormous amount of information had been collected on the value of diets and their relationships with the prevalence of diseases among the various sections of the populations in British India. Although in many respects there were gaps in the knowledge of food habits and their influence on the health of the people, nutrition workers in India had by late 1930s gained certain important insights into the physiological requirements of the human body under different climatic and environmental conditions. This is evident from the following words of W R Aykroyd, made in late 1941:

> Within the last 30 years science has reached definite conclusions as to what constitutes a good diet for human beings. The principles of correct feeding are fairly well understood and 'optimum' dietary standards based on these principles have been drawn up by League of Nations Commissions and other authoritative organisations.[8]

Yet, it was Aykroyd again who cautioned the nutrition workers in India in 1938 thus:

> Common sense must always be used in drawing up new diet schedules, or in assessing the adequacy of existing ones... Standards of calorie requirements are applicable only to reasonably large numbers...

and not to individuals. The relation between calorie requirements and such factors as work, activity and climate must be born in mind.[9]

Two important but related issues received more attention of the nutrition workers (in fact all over the world) particularly since the Great Depression of 1929-33. One was the question of evolving a 'balanced diet' and the other was the need to understand the relationship between nutrition and infection, or to put it differently, the incidence of nutritional diseases. And both these questions were seen clearly as having a bearing on the economic nature of the problem. The various dietary surveys and the laboratory experiments conducted in different parts of the country during the 1920s and 1930s with a view to understand the abovementioned issues formed an important stage in the evolution of nutrition science in India. They proved rather conclusively that the nutritional standards of the European countries would not be appropriate for the people in the tropics; they also showed that even within a society, individual requirements vary. As Aykroyd put it in 1938:

> But experience has shown that human beings can adapt themselves, at a low level of vitality and with their powers impaired, to an insufficient ration, and scarcely realise that they are under-fed. The nutrition worker, in setting up standards of food requirements, ignores the remarkable faculty of the body to adapt itself to semi-starvation.[10]

This was an important insight. But the adaptive nature of man, as perceived by the nutrition workers in India in 1930s, did not discourage them from attempting to set a balanced diet, though no one could satisfactorily define it in quantitative terms. Talking about an ideal dietary and nutritional standards in India, an editorial of *Indian Medical Gazette* in 1936 commented thus:

> The diet of a nation should be composed of available foods based on scientific knowledge of their values and they should not be unduly manhandled either in the factory or in the kitchen. The ideal in feeding of a people should be to provide a 'square meal' which in the language of modern dietetics may be defined as one which is well balanced from the point of bulk as well as flavour and in the approximately correct proportions of essential constituents.[11]

The same editorial, while commenting on the incidence of nutritional diseases, observed that a considerable proportion of the people may be suffering from a 'well-balanced deficiency' in diet and therefore were not showing any sign of malnutrition. Often it was lamented that,

> there are innumerable American and excellent English books on dietary, but most of these, except for the teaching of general principles, are of little use to the workers in India. In the first place, the dietetic requirements of the people of India are not the same, either quantitatively or qualitatively, as those in temperate and cold countries, and attempts to draw up standard diets without appreciating this fact would lead to both waste and an unsuitable diet.[12]

Therefore, it was felt necessary to have complete data on the value of the foodstuffs available in India and prepare a balanced diet. The 1930s, as already indicated, witnessed a growing and genuine interest in the field of nutrition science, which as a result produced vast, though not complete, data on the composition of various foodstuffs in India. However, the studies conducted were not adequate considering the vast and diverse patterns of diets followed by different communities in India.

The publication of *Health Bulletin: The Nutritive Value of Indian Foods and the Planning of Satisfactory Diets* in 1938 by Aykroyd was essentially an attempt to present "our present knowledge of what constitutes an adequate or optimum diet... based on an enormous amount of research work on human beings and laboratory animals carried out in many countries."[13]

The *Health Bulletin* was meant to serve as an authoritative guide book for planning a balanced diet. Its publication was hailed and welcomed by many as it was an attempt to collate and synthesise the available information for the purpose of planning a balanced and affordable diet:

> This brochure contains much... information that will be invaluable to those in India who have to judge or plan diets, whether they be medical men or otherwise. The general principles are dealt with briefly and figures are given for the caloric requirements of the average Indian... there are many gaps in our knowledge of the nutritive values of Indian foodstuffs, but enough is known to justify the compiling of this 'health bulletin'. Its publication will do away with one of the most serious handicaps under which the nutrition worker in India has been labouring.[14]

This represented a crucial stage in the practical application of knowledge in the formulation of public policy in colonial India. The main difficulty encountered by the nutrition worker was an economic one: how to devise a well-balanced diet that could be afforded by an average Indian? As B N Gangulee put it in 1939:

> Thus there are two sides to the problem; the scientific side which enquires what are the laws and standards of rational diet; and the broader social side which must attempt to answer the question, how can the optimum diet indicated by the science of nutrition be ensured to the community as a whole. Only when an answer is provided to both these

TABLE 2: RELATIVE EFFECTS OF EXPERIMENTAL DIETS ON RATS

Diets	Mean Body-Weights (Grams)	Body-Weight Gain in Percentage
Sikh	235	60
Pathan	230	58
Mahratta	225	54
Gurkha	200	40
Kanarese	185	35
Bengalee	180	33
Madrassi	155	23

Source: Gangulee, p 230, see note 15.

TABLE 1: A TYPICAL 'ILL-BALANCED' DIET AND A 'WELL-BALANCED' DIET (BOTH YIELDING 2,600 CALORIES)

(in Ounces per consumption unit per day)

Food	Ill-balanced Diet	Well-balanced Diet
Cereal	23	17
Pulses	0.5-1.5	3
Milk	none or negligible amount	8
Leafy vegetables ...	0.5-1.0	2
Non-leafy vegetables ...	2.0-5.0	4
Fruit	negligible	2
Vegetable fats and oils	less than 1.0	2
Fish, meat and eggs ...	0.5-1.0	2–3 (if no milk is included)
	Approximate chemical composition (assuming cereal to be milled rice)	
Calories	2,600	2,600
Protein (g)	55	80
Fat (g)	25	70
Calcium (g)	0.25	1.00
Phosphorus (g)	0.90	1.20
Vitamin A (IU) ...	1,100	3,000
Vitamin C (mg) ...	60	150

Source: W R Aykroyd (December 1941), p 2; see note 8.

questions can we consider the problem of nutrition solved.[15]

And there were also a few who felt that the solution to the problem of malnutrition could come about only through a social revolution.[16]

II

Various studies conducted during 1930s in different parts of India clearly showed that a very large proportion of the population suffered from undernutrition and malnutrition, and that as a result, they became susceptible to infections of various sorts draining their mental and physical energy.[17] Also, a number of investigations of the peasant and working class dietary habits in different parts of India led to another view that their diet was usually adequate in its calorific value, but was not well balanced. As one investigator of diets in colonial India said in 1938, "...the low standard of health among the bulk of the Indian population is not so much due to under-feeding as to ill-feeding..."[18] The purpose of this section is to provide details on the diets of the south Indian population and thereby infer the extent to which they were under- and mal-nourished.

A typical ill-balanced Indian diet as compared to what was considered a well-balanced diet appeared as given in Table 1.

Both the diets have the same caloric content or energy value. Taking 2,600 calories approximately as the daily energy requirements of an Indian adult male, both the diets would have satisfied hunger. But the more varied "well-balanced diet, containing less of cereals and more of everything else, is infinitely more satisfactory in quality..."[19]

The variations in the physical stature and the health of the people from one region to another in relation to their diets drew the attention of the early nutrition workers in India. By the end of 1920s, R C McCarrison showed experimentally for the first time that the diet of the south Indian people on an average was perhaps the poorest as compared to those of other regions.[20] This study along with many later studies showed that a general deficiency in diet was more or less prevalent all over British India. In a series of striking experiments conducted by McCarrison at Coonoor in 1920s, he sought to determine for the first time the relative values of seven typical Indian dietaries "by feeding a group of albino rats on foodstuffs resembling as far as possible those that are habitually consumed by the Sikh, Pathan, Mahratta, Gurkha, Kanarese, Bengalee, and Madrassi communities".[21] He noted that the rats fed on the 'Madrassi diet' gained least weight over a period of time, while those fed on the Sikh diet gained the maximum weight during the same period. Table 2 gives the relative effects of the experimental diets on rats:

Let us now consider the diets of the rice-eating population, particularly of south India.

Among the various cereals cultivated in British India, the area under rice exceeded that under all the others put together. This was particulary true in the provinces of Bihar, Bengal, Orissa and Madras where rice was the staple food of the majority of the population. Table 3 gives a comparative picture of the diets of the "poor rice-eaters" in various parts of India. The figures given below were published in 1941 "based on surveys carried out in widely separated parts of the country—areas some of which are several thousand miles distant from each other". Talking about the diets of the rice-

TABLE 5: SCALE OF AVERAGE CALORIE REQUIREMENTS

Age Group	Coefficient	Calorie Required
Adult male (over 14)	1.0	2,600
Adult female (over 14)	0.8	2,100
Child 12 and 13 years	0.8	2,100
Child 10 and 11 years	0.7	1,800
Child 8 and 9 years	0.6	1,600
Child 6 and 7 years	0.5	1,300
Child 4 and 5 years	0.4	1,000

Source: Aykroyd, *Health Bulletin*, 1938, p 2; see note 9.

TABLE 3: MEAN INTAKE OF VARIOUS FOODSTUFFS

(Ounces per consumption unit per day)

	Madras Presidency			Bengal	Assam	Orissa	Central	Kashmir*	Tehri**
	Rural Area	Tea Plantation Labourers	Families with Leprosy: Madras City	Rural Area	Tea Plantation Labourers	Rural Area	Provinces Rural Area		Garhwal
Rice	15.0 (millet 5 oz)	18.0	14.0	25.0	19.0	19.0	26.0	26.0	16.0
Pulses	1.3	1.0	0.8	0.4	0.9	1.0	1.1	0.6	1.8
Leafy vegetables	0.3	none	negligible	0.2	0.8	1.4	1.5	5.2	0.5
Non-leafy vegetables	1.5	3.0	3.0	7.0	4.0	6.0	3.0	2.0	4.7
Vegetable fats and oils	0.5	0.5	0.5	0.3	0.3	0.3	0.2	0.9	0.2
Fish, meat and eggs	negligible	1.5	1.4	0.7	0.7	0.6	negligible	0.2	negligible

Notes: Condiments and sugar in small quantities were also included in the diets.
* The families included in this survey consumed a little milk (2.2 oz per consumption unit per day).
** One of the Punjab states in the Himalayan foothills.
Source: Aykroyd (1940), p 343, see note 22.

TABLE 4: AVERAGE INTAKE OF CALORIES, PROXIMATE PRINCIPLES, CALCIUM, PHOSPHORUS, AND IRON PER CONSUMPTION UNIT PER DAY

	Average Number of Consumption Units	Protein (g)	Fat (g)	Carbo-hydrates	Calories	Percentage of Total Calories Derived from Cereals	Calcium	Phosphorus (g)	Iron (mg)
Group I	5.8	35.9	4.4	368.9	1,664	95.4	0.60	0.75	22.4
Group II	5.7	48.0	20.7	446.4	2,173	83	0.48	0.97	23.9
Group III	4.3	62.7	26.9	488.9	2,399	87	0.31	1.51	32.8
Group IV	2.8	57.6	67.5	445.9	2,607	57	0.47	1.01	20.3

Source: Aykroyd and Krishnan (1937), pp 671-73, see note 23.

eaters in India (based on the data as shown in Table 3), Aykroyd observed that,

> the diets of the poor rice-eaters are very similar in composition throughout India... The available data justifies the following statements: the poor rice-eater in India consumes, in addition to his staple cereal, only very small quantities of other foods such as pulses, vegetable, and meat. Milk is taken in negligible amounts or notat all. While foods other than those listed [above], such as fruits, may occasionally be consumed, the table gives a fairly accurate picture of the composition of ordinary daily diets [of the rice-eating populations] ....
>
> If the diets shown are worked out in terms of protein, minerals, and vitamins, and the results compared with the standards suggested by the Technical Commission on Nutrition and other standards drawn up by physiologists, it is found that the rice-eater's diet falls short of such standards in almost every important constituent.[22]

While this was the general impression about the value of the daily diet of the rice-eating populations in India, the diets of the various sections within south India seemed even more deficient in content and quality.

In relative and absolute terms, the south Indian diet was grossly deficient practically from every point of view—total calories, total and animal proteins, total and animal fats, carotene, vitamin A, B2, and C, iron and calcium. The result was the low powers of resistance and endurance to infection.

In an effort to estimate the diet values of the peasants in south India, W R Aykroyd and B G Krishnan undertook a survey of a number of villages in 1936.[23] It is worthwhile summarising the essential features of this important study for it formed the basis on which a number of suggestions were made later in order to evolve a meaningful policy and thereby correct the ill-balanced diet of the population.

This survey was the first of its kind and was also a fairly comprehensive one conducted on the dietaries of south Indian peasants. It covered 44 families, totalling 274 persons, from various districts over a period of 20 days. A notable feature of this survey was that it attempted to assess the economic position of the population surveyed. Gross income of each family was assessed roughly taking into account the value of the crops produced and the wages obtained from coolie work and other labour. The sample population was divided into four groups; their essential features are given below:

Group I: Eight families in Overtownpet village, Chingleput, consisting 67 persons. They were tenants with an average holding of three acres of land per household. Average annual income of this group was reckoned as between Rs 50 and Rs 80 per family.

Group II: Four families in Karumpakkum village, near Chingleput, consisting 28 persons. They were distinctively more prosperous than Group I. Their annual income was between Rs 200 and Rs 300.

Group III: Twenty-nine agricultural families in various villages in the neighbourhood of Mayanur, Trichinopoly district, consisting of one 168 persons. "This included families of different income and economic status, and regarded as a cross section of a village community. At the upper limit, there was a brahmin family owning 10 acres of wet land and a considerable quantity of livestock whose annual income was about Rs 300; at the lower limit, there were families supported by coolie work, leasing an acre or so of dry land, and owning one or two head of cattle with a gross annual income under Rs 100. The average family income of this group was somewhat higher than in Group I, being in the neighbourhood of Rs 100 per annum.

Group IV: Three families not engaged in agriculture, near Mayanur, consisting 11 persons. The income of these families was between Rs 350 and Rs 500.

Group I was the poorest of the four. Table 4 gives details of the average intake of calories, proteins, fats, etc, for each group of families surveyed. Some of the significant findings of this survey were: (1) In 31 out of the 44 families studied, milk and milk products were absent in the diet; (2) Except in case of a few prosperous families, foods other than cereal were consumed in very small quantities; pulses formed an important ingredient in the diet of the south Indian villagers; (3) Protein and fat intake was low, particularly protein and fat of animal origin was almost absent; (4) Vitamin A was present in 'infinitesimal quantities' in the diet of 39 of the 44 families; and (5) Many diets were found deficient in vitamin C.

The most significant outcome of this study was the realisation that the problem of undernutrition and malnutrition in south India was more serious than had yet been understood and appreciated. In terms of adequacy of calorie intake, one-third to one-half of the families was estimated to be underfed. The central concern of this survey was to work out the minimum energy expenditure budget of a south Indian peasant. More precisely, Aykroyd and Krishnan's village survey tried to answer the question: "How far are the diets of the various families sufficient in quantity?" They did not consider the generally accepted European or American standard as useful in order to compare the observed calorie intake and therefore they felt it necessary to calculate the minimum requirements of a south Indian peasant, subject to nature of work performed and the local conditions. But it is difficult to work out the calorie requirements when intake is restricted by poverty or other circumstances. Aykroyd and Krishnan were very much aware of this: "A complaint of hunger is perhaps better evidence of insufficient calorie intake than a textbook deduction."[24]

TABLE 6: FREQUENCY DISTRIBUTION OF CERTAIN DISEASES PER 1,000 OF SICK PERSONS COMPARED WITH NUTRITIVE VALUES OF DIETS IN FIVE MAIN PROVINCES IN INDIA

Divisions	Diet Values Expressed as Average Weight in Gram of Experimental Rats	Distribution of Diseases per 1,000 of the Sick Persons				
		Pulmonary Tuberculosis	Leprosy	Beriberi	Gastro and Duodenal Ulcers	Diarrhoea and Dysentery
North India	233	1.60	0.30	0.02	0.05	13.50
Central India	220	1.01	0.84	0.02	0.18	13.75
Bombay	198	2.01	0.70	0.02	0.06	15.00
Bengal	180	2.12	0.96	0.50	0.30	19.80
South	155	2.61	2.95	1.03	2.60	19.20

McCarrison's results as quoted in S C Seal, 'Diet and the Incidence of Diseases in India', Indian Medical Gazette, 73 (May 1938), p 295.

TABLE 7: INCIDENCE OF PHRYNODERMA, ANGULAR STOMATITIS AND BITOT'S SPOTS

		Number Examined	Number Showing More Than One Clinical Sign	Percentage	Number Showing Phrynoderma	Percentage	Number Showing Angular Stomatitis	Percentage	Number Showing Bitot's Spots	Percentage
Coonoor	Boys	779	115	14.8	67	8.6	68	8.7	16	2.1
	Girls	274	41	15.0	29	10.6	21	7.7	1	0.4
Mettupalayam	Boys	377	65	17.2	29	7.7	48	12.7	21	5.6
	Girls	71	2	2.8	1	1.4	1	1.4	1	1.4
Calicut	Boys	426	52	12.2	2	0.5	43	10.1	35	8.2
	Girls	76	5	6.6	1	1.3	4	5.3	2	2.6
All children		2003	280	14.0	129	6.4	185	9.2	76	3.8

Source: Aykroyd and Rajagopalan (1936), p 431, see note 41.

respiratory system. These two accounted for about one-quarter of the total number of sick persons admitted in hospitals in Madras. Also he believed that the high incidence of leprosy and tuberculosis in Madras presidency was related to the poor diet of the rice-eaters. Table 6 shows the frequency distribution of certain disease per 1,000 of the sick persons compared with the nutritive values of diets in the five main divisions in colonial India.

This led to a belief that "the distribution of certain diseases is in inverse ratio proportional to the nutritive values of their diet irrespective of climate, race, environments, etc."[32] Significantly, though leprosy and tuberculosis were found to be common among people whose diet was ill-balanced, they were more common in regions where rice was the staple food, containing little protein and vitamins. Hence, they were more common among the people of Bengal and Madras than among those whose staple diet consisted of wheat, jowar, or other grains richer in protein and among those who took milk and milk products.

Besides these, a number of widely prevalent 'deficiency diseases' were identified among the people. Studies revealed that "apart from the clinically defined diseases, a subclinical state of deficiency is the primary cause of the general ill-health and lowering of resistance of the people and is indirectly responsible for the most severe ravages of this country by the various tropical diseases such as malaria, kala-azar, tuberculosis, leprosy, cholera, anaemia, diarrhoea, etc."[33] These 'deficiency diseases', though less obviously manifested, came to be realised as were of greater practical importance than the more obvious but less common diseases. As McCarrison put it: "the milder grades of deficiency of certain food-essentials—particularly of vitamins and mineral elements—were much more widespread among the people than the severe grades; and that they led as surely, though slowly, to a lowering of vital processes, to impaired resistance to microbic and other pathogenic agents of disease and to the development of maladies of many kinds".[34]

An important fact that came through a number of surveys was that malnutrition was more marked among the poor of the towns and cities than among the poor of the countryside. This was true not only of the general population, but also of the children in south India. The main reason for this urban-rural difference in malnutrition level was found in the quality of rice consumed, which formed the bulk of the daily diet of both urban and rural populations.

The highly polished/milled rice (taken widely by the urban people) was less nutritious as compared to the home-pounded or roughly milled or parboiled rice consumed by villagers. In most parts of India parboiled rice—i e, rice which is steamed before milling—was consumed in preference to raw milled rice. A diet largely composed of raw milled rice, with little of pulses, vegetable, etc, contained insufficient vitamin B1, which gave rise to beriberi; whereas, "parboiled rice retains a considerable proportion of its vitamin B1 content even when highly milled".[35]

Beriberi was in endemic form in certain parts of the presidency where milled rice was the staple article of daily diet.[36] More importantly, it was mainly confined to a narrow tract on the east coast in the districts of Ganjam, Vizagapatnam, Godavari, Krishna, Guntur and Nellore.[37] About 95 per cent of the 40,000 cases reported annually in the Madras presidency occurred in these districts. "In this area, the population consumes raw rice, whereas elsewhere in south India, and throughout most of the country, the poorer classes prefer parboiled rice."[38] Early in 1920s, after conducting his valuable survey on the causation and prevalence of beriberi in the Madras presidency, McCarrison observed:

> Beriberi in Madras is a place disease. Its peculiarly limited distribution in this presidency appears to indicate that there are telluric, climatic and hygienic factors, as well as conditions relating to the storage of rice, concerned in its causation that require consideration equally with the dietic factors. It is true that *a cause* of Beriberi is well known—deficiency of vitamin B—but *causes* of Beriberi are not yet well known.[39]

In fact, the rural-urban difference noted above was more due to another important factor: while in the rural areas at least some amount of one of the millets formed a part of the diet, in urban areas there was a social prejudice against millets, particularly against ragi. Millets were generally regarded as the food of the poor villager and also as the food of the prisoners. Raw milled rice was the staple food of the educated class. Such prejudices were observed even among the children. This was brought out clearly by Aykroyd and Krishnan in their study in 1937 on the state of nutrition of school children in south India.[40] They took a sample of 714 boys and 955 girls in the age group of four to 20 (the majority of whom fell in the age group 9 to 17) from 24 hostels situated in various parts of the Madras presidency. Many of the hostel superintendents had expressed that they had the greatest difficulty in persuading the children to eat ragi and other kinds of millet, even when millet was the staple food of the district from which they came.

A few important studies had been conducted in 1930s to record the incidence of malnutrition and symptoms of deficiency diseases among the children in south India. We will mention here one of them carried out by Aykroyd and Rajagopal in 1936.[41] Their study covered about 2,000 school children from three different towns and compared the incidence of the following deficiency diseases among them:

(a) *Angular stomatitis:* deficiency of some part of the vitamin B2 complex was consid-

TABLE 10: INCOME AND EXPENDITURE OF LABOURERS IN MADRAS CITY (1935)

Income Per Family	Below Rs 120 Per month	Rs 20 to 30	Rs 30 to 40	Rs 40 to 50	Rs 50 to 60	Rs 60 to 70	Above 70	All Families
No of families	47	167	198	118	69	20	20	639
Per cent in each income group	7.4	26.1	31.0	18.5	10.8	3.1	3.1	
No of consumption units per family	3.03	4.19	4.89	5.26	6.15	7.63	6.08	4.92
Monthly income per consumption unit (Rs, annas, pais)	5-12-6	6-0-8	6-15-6	8-8-7	8-13-4	8-7-2	12-3-3	7-9-6
Monthly expenditure per consumption unit of food (Rs, annas, pais)	3-5-0	3-5-8	3-8-1	3-14-8	3-12-0	3-10-2	5-3-6	3-10-8
Percentage of total income spent on food	57.06	56.34	54.93	50.41	49.25	48.81	48.58	52.63
Expenditure on milk per consumption unit (Rs)	0-1-2	0-2-4	0-3-5	0-4-7	0-4-1	0-4-0	0-7-11	0-3-6

Source: Aykroyd (1941), p 7, see note 8.

Suggesting a standard of dietary for the country was impossible, because of the variable conditions of life, racial habits, physique, and climate in different parts of India. The few studies conducted so far had showed clearly that the average intake of almost all the communities, even if supplied the calorie requirements, provided no margin to serve as 'reserve energy'. Therefore, it was felt that "in suggesting a standard of dietary, we should bear in mind that it must not only provide the bare nutritional requirements but must ensure a margin of safety and a degree of resistance to disease".[25]

However, Aykroyd and Krishnan attempted "in a rough and ready fashion" to estimate the minimum energy requirements of a south Indian peasant. Assuming that the south Indian peasant spends eight hours of the 24 in sleep, eight hours at work, and eight hours 'sitting at rest', his energy expenditure budget was thus worked out as follows:

8 hours	sleep at	54**	432*
8 "	work at	180**	1440*
8 "	sitting at rest	86**	688*
			2,560*

* calorie ** calorie per hour

"All things considered", they observed, "we are inclined to estimate the *minimum* daily calorie requirements per consumption unit of south Indian peasant families as lying in the neighbourhood of 2,500."[26]

Although the figure 2,500 calories was considered as the minimum for all practical nutrition work, e g, in drawing up diet schedules for institutions, Aykroyd and Krishnan cautioned that it represented only an average: "... all individual cases falling somewhat below it need not be regarded as under-fed". However, considering this figure as reasonable, the calorie intake in Groups I and II was definitely insufficient. In the Group III, the mean intake approaches the minimum requirement "but conceals (since the intake of a number of families was in excess of the minimum) under-nutrition in a considerable proportion of families". Thus they felt justified in stating that one-third to one-half of the families studied did not consume enough food during the period of investigation. The survey in Chingleput district took place in January 1936, while the rest was carried out during July-August of the same year.

What we see clearly from the information presented above is that a large proportion of the south Indian population were not only underfed but also ill-fed. As per the *Health Bulletin* of 1938, the minimum calorie requirements for the "average man" and those for different age and sex were as follows:[27]

As for the dietary requirements of infants in India, the *Health Bulletin* could give only tentative recommendations, since "up to the present the subject... has not been fully investigated by scientific methods". The following were the estimated daily requirements of 'average normal infants' of various ages.

1st week	200 calories
1st month	350 "
2nd month	400 "
3rd month	450 "
5th month	600 "
8th month	700 "
12th month	800 "

Such estimates of minimum requirements formed the basis for estimating the extent of malnutrition as well as the ill-effects of malnutrition. Based on different sets of assumptions, different estimates were made as to the extent of malnutrition in colonial India1. Aykroyd estimated that the proportion of underfed in normal times was about 30 per cent of the population.[28] John Megaw of the Indian Medical Service put the figure around 60 per cent in 1935.[29] In the next section, we shall turn to certain important consequences of the ill-balanced and often inadequate diets of the 'poor rice eaters' in colonial south India.

III

The effects of malnutrition attracted the attention of the colonial authorities greatly since the late 1920s, as we have already pointed out and by the end of 1930s significant progress had been made in the understanding of the physiological requirements and the food habits of various sections of the population. As for the ill-effects of undernourishment, the following words of Aykroyd made in 1946 after years of working in India summarise the situation:

> It is impossible to estimate accurately what proportion of disease in India has its roots in malnutrition. But there is plenty of evidence that it is one of the most important factors underlying the dismal public health situation.

Further he went on to say,

> In view of what is known about the deficiencies of Indian diets, it is not unreasonable to suppose that the incidence of diseases which become more prevalent in times of food scarcity is influenced by diet in normal times.[30]

In fact, the famous experiments of McCarrison with rats in 1920s led him to believe that,

> The great majority of the rats in that experiment enjoyed good health when fed on a well-constituted diet such as is used by Sikhs of the better class, while the great majority of those fed on an ill-constituted diet, such as is commonly used by the poorer classes of this country, developed diseases of two chief kinds: *respiratory and gastro-intestinal.*[31]

More specifically, McCarrison observed that the diet in common use by the people of Madras, which was very poor and ill-constituted, was largely responsible for the high incidence of diseases of digestive and respiratory systems. For example, he showed that among every 1,000 sick persons in the hospitals in Madras in 1933, about 180 suffered from diseases of the digestive system, and 76 suffered from diseases of the

TABLE 8: CLINICAL SIGNS OF DEFICIENCY DISEASE IN 'POOR' AND 'BETTER CLASS' SCHOOLS (COONOOR)

		Number Examined	Number Showing One or More Clinical Sign	Percentage	Number Showing Phryno-derma	Percentage	Number showing Angular Stomatitis	Percentage	Number Showing Bitot's Spots	Percentage
'Poor' schools	Boys	158	50	31.6	26	16.5	25	15.8	10	6.3
	Girls	62	12	19.4	8	13.0	6	9.7	0	..
'Better Class' schools	Boys	621	65	10.5	41	6.6	43	7.0	6	1.0
	Girls	212	29	13.7	21	9.9	15	7.1	1	0.8

Source: Aykroyd and Rajagopalan (1936), p 433, see note 41.

TABLE 9: STATEMENT ON MEDICAL EXAMINATION OF PUPILS OF SRI MINAKSHI SUNDARESWARA VIDYALAYA, KARAIKUDI, RAMNAD DISTRICT, 1927 TO 1930

Diseases and Defects	September 1927	October 1928	September 1929	October 1930
Malnutrition	52	71	73	105
Skin, other diseases	3	--	--	2
Eye diseases	3	20	24	39
Dental diseases	2	1	1	--
Others				

Source: K S Srinivasa Iyer, 'Medical Inspection of Schools', *Bulletin of the South Indian Medical Union*, 21(12), December 1930, p 240.

ered the causative factor; fissures at the angles of the mouth usually found in association with the lesion of the tongue;
(b) *Phrynoderma:* considered as due to vitamin A deficiency; it relates to dryness of skin (described as toad skin); the subject whose skin is thus affected is often afflicted with sore mouth; the progressive wasting of the child suffering from malnutrition is usually manifested in the condition of the skin;
(c) *Xeropthalmia:* an eye trouble caused by deficiency of vitamin A, a cause for blindness; their incidence was noted by observing patches of foamy yellowish-white substance (known as Bitot's spots) appearing on the conjectiva...

These were considered "the conspicuous symptoms of malnutrition". Table 7 shows the incidence of these symptoms among the children of Coonoor, Mettupalayam, Calicut, as reported by Aykroyd and Rajagopal. It shows that nearly 25 per cent of the children examined suffered from these three diseases alone.

In the same study they also compared the incidence of the same deficiency diseases among the children in 'poor' and 'better-class' of schools in Coonoor town and found them considerably higher in the 'poor' school.[42] The 'poor' schools included two schools for the children of the dhobies (washermen) and sweepers, while the 'better-class' school included children from economically better-off families, though many children of the very poor parents also attended these schools. Table 8 summarises the comparative positions of the children of the poor and better class schools in terms of phrynoderma, angular stomatitis and xerophthalmia (Bitot spots).

The extent of malnutrition among the children was thus evidently very high in the entire Madras presidency. The Madras corporation's reports regularly recorded a high incidence of xerophthalmia and stomatitis due to diet deficiency among corporation school children in Madras city. Generally, the corporation schools were attended by the children of the poorest classes. During the years 1930 to 1934, nearly 20 per cent of the children in the corporation schools in Madras was found to be suffering from malnutrition.[43] Regular medical examinations of the children conducted in other parts of the presidency also revealed a high incidence of malnutrition among the children, as can be seen, for example, from Table 9 of a school in Karaikudi town in Ramnad district for the period 1927-1930. It shows clearly that at least one-fourth of the children were malnourished. It may be noted here that such a high percentage of malnourished children was also common in the Bengal and Bihar provinces where rice formed the bulk of the diet.[44]

The data given above are obviously selective, but they certainly reflect the poor state of health of the children in colonial India:

> poor physique, impaired vigour, gastro-intestinal disturbances, low resistance to infections and other pronounced symptoms of malnutrition—all these features are common among schoolchildren throughout a great part of India.[45]

Many later studies confirmed that malnutrition, particularly protein malnutrition was a problem of very considerable magnitude in the poorer communities of south India. They showed a high prevalence of frank cases of kwashiorkor, and marasmus (emaciation) among the children in south India. Someswar Rao et al's survey in late 1950s of the extent of protein malnutrition in south India estimated that 1 per cent and 1.7 per cent of children suffered from frank cases of kwashiorkor and marasmus.[46] Their survey covered about 4,500 children from families whose monthly income was less than Rs 100, in the states of Kerala, Madras (presently, Tamil Nadu), Andhra Pradesh and Karnataka.

Besides these symptoms of malnutrition, there were also other disorders, such as rickets, osteomalacia, dental carries, caused by nutritional deficiencies. For example, it was found that the incidence of badly formed or decayed teeth was widespread among the rice-growing parts of India.[47]

A diet deficient in protein, iron, vitamins, etc, also had adverse effects on maternal and infant mortality rate. By late 1930s sufficient medical evidence had been collected to show that nutrition was at the bottom of the problem of maternal mortality. A deficient diet of the mother was found to cause cessation of growth of the child in the foetus. This was an important cause for the high incidence of feeble and premature birth of infants all over colonial India; and premature birth was certainly a cause for the higher infant mortality. In colonial south India, neonatal deaths accounted for about 50 per cent of the total infant deaths. Recent studies have implicated maternal malnutrition as an important cause of the high infant mortality in many developing countries. Aaron Lechitg's study in this respect suggests that "both short- and long-term maternal nutrition status may be causally related to infant mortality."[48] This does not mean, as he points out, that other factors, namely, medical care and environmental sanitation are not important determinants of infant mortality.

In one of their many pioneering studies, Balfour and Talpade observed in 1932 that "the unsatisfactory conditions of the infants may have been either due to lack of protein or to lack of vitamin B" in the diet of the mothers.[49] Later in 1962, talking about pregnancy wastage, C Gopalan referred to a survey carried out in south India which

> revealed that among poor women whose dietaries during pregnancy provided 1,400-1,500 calories and about 40 grams of protein daily, 20 per cent of pregnancies had terminated in abortion, miscarriages or still births.[50]

Also, the effect a still birth as compared to a live birth on the survival chances of a undernourished mother was significantly higher. This was brought out clearly in 1929 by Ubhaya and Adisheshan in their study of the factors associated with maternal mortality in south India.[51] They surveyed 7,324 confinements registered in Madras, Madura, Trichinopoly and Coimbatore during the period October 1927 to September 1928. Among the confinements analysed, there were 7,176 live births and 166 still births; the proportion of latter to the former being 2.31. The overall maternal death rate was 17.89 per 1,000 births. But what is more important to note here is that "the maternal death-rate in the case of confinements resulting in still births was a little over 5 times the death-rate in the case of confinements resulting in live births".

Pregnancy-anaemia, largely nutritional in origin, was found to be one of the chief causes for the high maternal mortality in India, particularly among the working class.[52] This was confirmed to be true in the case of Madras city also, as showed by an investigation conducted by A L Mudaliyar in 1932 into the causes of maternal deaths in the various city hospitals.[53] Of the 436 maternal deaths out of 26,207 confinements, he found that pregnancy-anaemia caused 50 deaths (about 12 per cent). Mudaliyar's study suggested that this was largely due to deficiencies in food intake. Also, his study found that the deaths due to toxemias of pregnancy, considered as the consequences of dietetic deficiency, was about 10 per cent. Although malnutrition *per se* may not have caused these maternal deaths; it would have certainly aggravated in some sense the development of toxemias of pregnancy.[54] Of course, sepsis continued to be the chief cause for maternal deaths.

As for the extent of malnutrition among the working class population in colonial south India, very little information is available. Much of what we have is related to the workers in Madras city. There was no systematic enquiry into the living conditions of the working class until the survey of the Family Budgets of Industrial Workers in Madras city was undertaken in 1935.[55] The family budget survey sought to analyse what a working class family actually spent, not only on the bare necessaries of life but also on the social obligations, on "the satisfaction of certain wants springing from the social conditions in which people were placed and reared up."

It observed that the food consumed by the industrial workers was deficient in calories, and proteins, fat, minerals and vitamins except B1. Table 10 gives the findings of the above mentioned survey on the diet of the

industrial workers in Madras city. The ill-balanced diet was estimated to cost from Rs 2 to Rs 3 per adult per month, depending on the nature of cereal and differences and fluctuations in food prices. The cost of the well-balanced diet was estimated as Rs 4 to Rs 6 per adult per month.

Two important findings of this survey which are related to level of malnutrition among the working class should be mentioned here (Table 10).

> ...monthly expenditure on food, even in the lowest group, was slightly above that necessary to purchase an ill-balanced diet sufficient in quantity. Presumably, therefore, the majority of families were above the starvation level—they had enough to eat.
>
> The percentage of total income spent on food averaged 52.6 per cent in all families. [But the] expenditure on food per consumption unit did not rise proportionately to income per consumption unit.

The average amount spent by all families surveyed on food per unit of consumption per month was Rs 3-10-8 as against Rs 6 per unit of consumption per month required for a well-balanced diet.[56] Only the highest income group (with income above Rs 70 per month) could spend enough on food to purchase a well-balanced diet. It should be noted that the amount spent on milk increased but in small amount until the highest income group is reached. Aykroyd's explanation for this trend does sound reasonable.

The probable explanation is that an ill-balanced diet is the normal diet of the poor in south India, and poor families will not readily make sacrifices in other items of expenditure to purchase a diet of superior quality. It is only when income reaches a level which allows needs other than food to be fulfilled with relative ease that more money is devoted to buying a better diet.[57]

Similar tendencies were also noted in family budget enquiries carried out in Ahmedabad, Sholapur, Howrah, and Bombay, on the industrial workers with monthly income ranging from below Rs 20 to Rs 80 per family.[58]

While the Family Budget of Industrial Workers in Madras City suggested that the majority of workers were above the starvation level, C W Ranson's observations in 1938 on the workers' state of health in Madras seem to contradict it: "considering that the figures furnished by M/s Binny and Co for 1919 were average wages and that there must have been many employees who received less than the average, a large number of the workers should have been living under what were virtually famine conditions."[59]

What may be said in general terms about the working class is that the usual diet available to the bulk of the industrial labour was not balanced and was inadequate in calorific value. As the memorandum submitted by the medical authorities to the Royal Commission on Indian Labour in 1929 stated, "it [the diet] is too bulky; it contains a very small amount of milk, butter, and animal fats and consequently does not give any appreciable power of endurance and resistance."[60]

IV

There is an abundance of evidence to suggest that a large number of the people in colonial south India suffered continually from a number of deficiency diseases; their susceptibility to these diseases was a result of their diets which were defective in many respects, particularly in terms of 'protective food'. Under- and malnutrition meant not only low resistance to infections, loss of vitality and productivity, but in many cases also death. A large number of deaths in colonial south India may have been due to malnutrition *per se*, aggravated by the onset of certain infectious diseases. It is not possible to get a precise figure of the impact of malnutrition on mortality in the past; but it needs to be pointed out here that the question of nutrition-mortality link so far has not received adequate attention by the scholars working on demographic change in colonial India. It is necessary to first assemble together the available data on the regional variations in the diets of the Indian population before and during inter-war period in order to prove or disprove as to whether the bulk of them suffered from moderate malnutrition but remained stable and just above the minimum requirements to survive. Until then, Klein's immunological hypothesis may remain undisproved, though it also does not squarely answer certain questions such as the following: How was it that immunity developed by early 1920s and not earlier or later, given the fact that for a long period of time the people were exposed to these diseases, without much improvements in their diet standards?; Which age group of the population had more immunity to these diseases? What about the children: were they more or less immune to these diseases?. Their diets were certainly poor and aided spread of infectious diseases. Nearly half of the total deaths were among the children. Why did such a trend continue? Was it because they never developed sufficient immunity to escape from attacks of these infectious diseases?. If immunity did develop around early 1920s, why is that till today certain parts of India, particularly the states of Bihar and Orissa, continue to experience a high mortality rates?; they have been exposed to these diseases at least for as long as the rest of India.

Many such questions can be raised. The lesson I derive from scanning through the results of the studies on diets and its relationship with diseases in colonial south India conducted in 1920s and 1930s is that we should not be overhasty in explaining the mortality decline in the inter-war period. More empirical analysis is required before we can arrive at even a preliminary view on the nutrition-mortality link.

Any discussion on the nutritional status of a given population of the past has to be cautious for a number of reasons, one of them being the lack of information. While discussing the value of contemporary studies on nutrition for historians, Scrimshaw remarks that "Nutritional mechanisms and consequences that can be discerned only with great difficulty from the usually sparse and inadequate historical data can often be understood with reasonable certainty through access to detailed contemporary information and analysis".[61] We need such an indepth study. What I have presented here may be considered a small step in that direction.

Notes

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DISCUSSION

Breast-Feeding: Beyond Economics

Shanti Ghosh

THE articles by Gupta and Rohde (*EPW*, June 26, 1993) and Mina Swaminathan (*EPW*, September 25, 1993) have raised interesting issues. Let me say at the outset that breast-feeding remains the ideal food for the baby and exclusive breast-feeding for the first four-six months leads to better nutrition, better growth and virtual freedom from infection. There are innumerable other advantages but I will not go into them here. It is a bond between the mother and the baby leading to tremendous emotional satisfaction to both. Almost all Indian rural women breast-feed naturally without thinking of the benifits either nutritional or psychological. The milk is there, they have seen-everyone around them breast-feeding and so they breast-feed the baby automatically. They do not think of the economic benefits and the amount of money saved. Thinking in economic terms somehow reduces the mother to a good milk-yielding cow, even though in the context of the national economics this might evoke a great deal of academic interest.

The subject of maternal nutrition and breast-feeding has evoked a great deal of interest. Earlier studies by the National Institute of Nutrition had shown that undernourished women secrete 500-800 ml of milk [Ramachandran 1989]. More recent studies using electronic balances for measurement of milk intakes of infants have confirmed this. Women in developed countries can secrete 600-1000 ml of milk a day but milk intake of infants born to undernourished women was lower [WHO 1985]. That infant modulates maternal milk yield is widely accepted. Infants of undernourished women weigh less from birth through infancy compared to those born to better nourished women. The nutrient need of smaller babies is less than of bigger babies. Most Indian babies continue to grow well for four-six months on breast milk alone. WHO Collaborative Studies have shown that when infants of similar birth weight and body weight were investigated, there were no significant differences in volumes of milk produced between undernourished and well-nourished mothers, supporting the hypothesis that infant size is one of the determinants of the volume of milk secreted. Maternal under-nutrition does not seem to have any adverse effect either on initiation of lactation or the duration of lactation.

Lactation involves considerable nutrient expenditure for the mother, the estimated caloric expenditure varies between 400-700 K cal/day. There is no deposition of body fat during pregnancy among poor women to meet the extra need during lactation. Majority of lactating women from low income groups subsist on diets which provide 1200-1600 K cal/day irrespective of whether they are lactating or not. The expenditure involved in producing 500-600 ml of milk per day is about 450-600 K cal per day. Under normal circumstances such a large energy deficit is likely to result in weight loss of 1.5-2.0 kg per month. Even though women continue to work both inside and outside the home, the alterations in body weight during lactation are of too small a magnitude to make any difference to energy needs. With cessation of lactation again it is no more

than adequate for maintenance of body weight. This is a complex and intriguing issue. Some ill understood adaptive changes occur in lactating women so that energy balance is maintained in spite of marked variation in energy expenditure.

Plasma prolactin levels are higher and remain at the elevated level throughout the period of lactation in women from undernourished communities. It has been speculated whether high protective level may play a vital role in ensuring preferential transfer of nutrients to breast milk in under-nourished women. They may have an anabolic role and result in more efficient utilisation of available nutrients by the mother. Most women can produce adequate amount of milk for the baby for four-six months. The reason for giving up breast-feeding are normally flimsy like breast not being heavy with milk and wrong advice by health workers, etc.

Massive food supplementation is not feasible. Available data suggest that there is no substantial improvement in maternal nutrition status even in supervised food supplementation programmes [Prentier AM et al 1980]. The women should be encouraged to eat an extra helping of the family food. This needs very sustained and relevant health and nutrition education and not a supplementary feeding programme. The ICDS programme in India, provides a unique opportunity to study this problem, since food supplementation to pregnant women during the last trimester of pregnancy and to lactating mothers is a part of the programme.

Most women have to work, either the unpaid family work or household chores, fetching water and fuel, working on the family land, etc, or paid work to augment the family income. This is where the problem comes in. They are not often able to take the baby with them and so the baby is breast-fed at longer intervals, compromising the baby's nutrition as well as adversely affecting the breast milk yield. There are no easy solutions to this problem. Expressing breast milk and leaving it for a caretaker (a) granny or even a eight-ten-year old sibling) to give it to the baby does not seem practical because of lack of hygienic standard at home. Day care centres could fill the care taking role in the urban areas, but it is difficult to organise them in the rural areas as the place of work is often at a great distance from the village. Besides the quality of the day care centre would have to be of a high standard otherwise what the baby gains in breast milk will be lost in frequent infections. It is a dilemma and yet hats off to a majority of women who still manage to breast-feed in spite of all these problems. This is not to say that every effort should not be made to device locally suitable child care centres and adequate resources made available for them. Community's support is vital and perhaps we can look forward to that as a result of the 73rd Amendment of the Constitution which hopefully will empower the community, both men and women.

Mina Swaminathan is right when she says that most poor families are not giving the necessary amount of milk to the baby which would cost Rs 460 a month. That is exactly the point Gupta and Rohde are making that because of the high cost, the baby is fed inadequate amount of diluted milk leading to malnutrition and so the alternative of breast milk with all its difficulties is still a far better alternative. One could not agree more with Swaminathan when she says that comprehensive reviews of laws and policies and evaluation of schemes and programmes based on recognition of the triple role of women as mothers, producers and consumers will be needed to develop support services for breast-feeding mothers.

There is no doubt that milk companies with their skilful marketing strategies make inroads into the practice of breast-feeding and influence the health professionals (note the number of medical meetings and conferences supported by milk companies) families and public. Tinned milk is portrayed as a suitable substitute and the advertisements seem to encourage a woman to become doubtful about her capability to breast-feed. Health workers by and large are not able to give the right support either. This is not just an urban phenomenon but has permeated many rural areas also. Problems are many and I often wonder how the vast majority of women are able to cope with it, but surely cope they do. The problems are worse in urban areas with very little or no family support, need to work, often long distances away from home and the tantalising displays of milk tins and bottles in the shops.

The role of breast-feeding in preventing conception needs to be stressed much more. Breast-feeding prevents more pregnancies than all the contraceptives combined. It is postulated that breast-feeding is responsible for reducing the potential fertility by 30 per cent in Asia. There are so many arguments in favour of breast-feeding, national economics being one of them.

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