RURAL ENERGY SITUATION
Consequences for Women's Health

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This article examines the interrelationship between women's work, the growing scarcity of energy resources for survival, and its impact on women's health and nutrition. Women contribute 53 per cent of the human energy required for survival tasks. And yet they eat far less than they require. Women's calorific intake is about 100 calories (per woman per day) less than they expend, whereas men show an 800-calorie intake surplus. The article raises some very important questions with regard to women's work, their food intake, access to health care and women's morbidity patterns and examines the energy - health - nutrition syndrone. This is based on a paper presented at the Conference on 'Women and Poverty' in Calcutta, 1983.

Dorland's Medical Dictionary defines the word syndrome as "a combination of symptoms result-from a single cause or so commonly occurring together as to constitute a distinct . . . . . entity". It is hard to find a more apt definition of energy, health and nutrition and their relationship to poverty.

It may be felt that poverty has an impact on the health and nutrition of all the poor, regardless of age and sex. Is there something unique about its impact on women ? Or inversely, do women bear an additional burden - in terms of their health, nutrition, or anything else - in a poverty situation ? This paper attempts to show that they do - and also why strategies for women's health and nutrition need to be emphasised within strategies for general development.

In the field of nutrition, most strategies have been aimed at increasing food intake indirectly or directly (Natarajan, 1974; and NIPCD, 1976: Batliwala, 1978). Women are targets of the latter programmes only during pregnancy and lactation. On the other hand, there has been little or no study of the possible effects of reducing energy expenditure - or to put it simply, reducing the overwhelming drudgery of the poor, and especially of poor women. This is not proposed as an alternative to raising food intake, but as an additional (and possibly critical) facet of improving women's nutrition and health. Such energy saving, as we shall see, is not only a nutritional asset, but may also release a significant amount of women's time.

The greater work load on women has been observed for centuries and rather embarassedly reduced to a sheephish joke by men. But until recently, there was no detailed study of the relative work outputs of women and the nature of such work. In 1981, however, the Application of Science and Technology to Rural Areas (ASTRA) (a cell of the Indian Institute of Science, Bangalore) published the report of their three-year field study of rural energy consumption patterns (ASTRA, 1981). The study was conducted in rural, Karnataka with a sample of six villages comprising 560 households and a population of 3,452.

One of the most significant results of ASTRA's study, was the role of human energy - and specifically women's energy - in the rural energy matrix. Table 1 summarises the findings :

Table 1 : Pattern of Village Energy Supply & Consumption

Source-wise contribution		Sector-wise consumption	
Source	Per cent	Activity	Per cent
Human	7.7	Agriculture	4.3
(Men)	(3.1)	Domestic	88.3
(Women)	(3.8)	Lighting	2.2
(Children)	(0.8)	Transport	0.5
Animal	2.7	Industry	4.7
Firewood	81.6		
Kerosene	2.1		
Electricity	0.6		
Other	5.3		

Source : ASTRA, 1981, "Rural Energy Consumption Patterns - A Field Study", Bangalore, Indian Institute of Science, p. 80.

If we exclude firewood, we find that human beings were the most significant energy contributors - even more than animals. Moreover, if we disaggregate human energy, men, women and children contribute 31%, 53% and 16% of human energy, respectively. The ASTRA study also showed that most human energy was spent not so much on economically productive activities but on survival tasks such as gathering firewood, fetching water, and cooking.

What is the role of women in these activities, and what is the magnitude of the burden on them

Table 2 :

Time and calorie expenditure on domestic and agricultural activities and their calorie cost (for man, woman and child)

Activity	I Hours/day M	W	C	II Calorie cost (cals/minute) M	W	C	III Calorie/day M	W	C
(A) Domestic									
(1) Gathering firewood	0.33	0.41	0.24				115	122	74
(a) Walking to source				5.2	4.4*	4.6*			
(b) Return trip with load				6.4	5.5*	5.7*			
(2) Fetching water	0.02	0.78	0.13				7	232	40
(a) Walking to source				5.2	4.4*	4.6*			
(b) Return trip with load				6.4	5.5*	5.7*			
(3) Cooking	0.02	2.28	0.18	2.5*	2.1*	2.2*	3	287	24
(4) Carrying food/walking to farm	1.00	1.14		5.2	4.4*	4.6*	312	301	—
(5) Livestock grazing	1.63	0.47	1.03	2.8	2.4*	2.5*	274	68	155
Sub-Total	—	—	—	—	—	—	711	1010	293
(B) Agricultural									
(1) Ploughing	0.18	—	—	5.5	4.7*	—			
(2) Irrigation	0.30	—	—	3.3	2.8*	—	59	—	—
(3) Transplanting	0.08	0.33	—	5.1*	4.3*	—	59	—	—
(4) Weeding	0.08	0.33	—	5.1*	4.3*	—	25	85	—
(5) Harvesting	0.18	0.19	—	5.3*	4.5*	(Manual)	25	85	—
(6) Winnowing	..	0.09	—				57	51	—
(7) Threshing	0.14)			5.3*	4.5*	—	—	24	—
(8) Manuring	0.13)	0.04	—	5.4	4.6*	—	45)		
(9) Nursery	0.07)			4.0*	3.4*	—	31)	35	—
(10) Harrowing	0.03	..	—	3.5*	3.0*	—	15)		
(11) Transporting (by bullock cart)	0.05	..	—	6.5*	5 5*	—	12	—	—
				2.0*	1.7*	—	6	—	—
Sub-Total	—	—	—	—	—	—	334	280	—
(C) Other Activites (Sweeping, cleaning, child care, personal care, play, sitting etc)	9.79	7.94	8.42	1.5*	1.5*	1.7* (average)	878	715	655
(D) Rest & Sleep (approx)	10.00	10.00	14.00	—	—	—	550	500	650
Total	—	—	—	—	—	—	2473	2505	1598

Col. I : Source : Compiled from data given in ASTRA, 1981 : *Rural Energy Consumption Patterns : A Field Study* Indian Institute of Science, Bangalore.

Col. II : *All estimated or approximated figures.

(i) N. L. Ramanathan and P. G. Nag, : *Energy Cost of Human Labour*, National Institute of Occupational Health, Ahmedabad.

(ii) R. Rajalakshmi, 1974 : *Applied Nutrition* (Second Edition), Oxford and IBH, New Delhi.

compared to that on men? To determine this, we have to examine the hours per day spent on domestic and agricultural activities and translate these into calorie costs. Table 2 (col I) present the break-up of hours per day spent on agricultural and domestic activities by men and women.

The most significant aspect of Table 2 (col. I) is that while women average about 6 hours a day on survival-related and agricultural tasks, men average only 4 hours a day on the same. Also, the ASTRA study did not monitor other domestic work such as cleaning, sweeping, washing of clothes and utensils and child care, all of which are calorie-intensive and all of which are performed almost exclusively by women. On the other hand, most of the other (i. e., non-enumerated) tasks carried out by men are sedentary in nature - such as visiting the tea shop, trips to panchayat offices, talking with friends, and so on.

We have now to translate the activities of men and women into calorie costs and compare them with calorie intake. However, this is not as simple as it seems for once again the neglect of women in social research or the ideological biases within existing information systems becomes a handicap.

Ramanathan and Nag have reviewed virtually all calorie cost studies in the country for various activities in their paper *Energy Cost of Human Labour*. They found energy cost estimates for only 10 agricultural activities, compared to 70 industrial and military activities. Furthermore, there were no female equivalents for these agricultural tasks, as though women have not been participating in agriculture for several millenia !

The unkindest cut of all is when we find that the few women's energy costs (10, to be precise) which have been measured are clubbed under the category of 'sedentary people' and include such pleasant tasks as sewing, knitting, typewriting, piano-playing and singing. Where have 90% of India's women gone - the ones who work from morning to night at back-breaking domestic and economic tasks and also carry the burden of pregnancy and child care?

Under the circumstances one is forced to approximate the energy expenditure of women in the concerned tasks by using the fomula :

$$\frac{\text{energy cost/minute/adult male} \times \text{Basal Metabolic Rate female}}{\text{Basal Metabolic Rate male}}$$

(the BMR for moderate workers is used throughout the formula)

This gives us the estimates of energy cost per minute per activity for men and women presented in Table 2 (col II). Please note that all starred figures are estimates based on the above formula.

We are now ready to calculate the activity-wise energy output per day for man and woman, shown in Table 2 (col III).

A note of explanation in needed here : Agricultural activities are obviously seasonal but here they have been averaged over the whole year to obtain a daily figure, which is more appropriate for determining daily energy output and comparing it with calorie intake. Thus, during some months of the year, agricultural activities will account for much higher energy expenditure than shown in Table 2 (col. III)

We see that the calorie (energy) expenditure of women is higher than that of men. The difference appears more marginal than I suspect it really is. First of all, the 'other' activities of men, could not be clearly enumerated.

The shortage of off-season employment opportunities makes it doubtful that they spend a lot of energy in non-agricultural activities. Therefore one can postulate that during off-seasons the total calorie expenditure of men may be significantly lower than that of women.

Secondly, we see that most of the energy expenditure of women is on daily, life-supporting tasks which must be performed regardless of season and which are generally not shared by men - viz, cooking, fetching water, gathering firewood, washing, cleaning, and child care.

Thirdly, many of the above activities create a demand for human energy because of the scarcity of other energy resources. If cooking fuel and water were readily available close to the user and the efficiency of stoves improved, a saving of nearly 500 calories per day per woman could be effected. Is there a need to bring about such an energy saving at all ? If food intake more or less matches calorie output, there would appear to be no cause for concern. ASTRA's nutrition survey (unpublished) in the village Ungra (based on monitoring of food purchase and use over a two-month period) found that the average individual intake per day was around 2300 calories.

But this, like all other nutrition surveys in the country, assumes an equal distribution of food within the family - a highly questionable assumption.

The staple diet in this area is 'ragi' which is cooked to a dough and separated into balls for eating. When local women were questioned as to how they distribute the balls, their answers provided the following ratio : 2 balls for a man, 1.5 for a woman and 1 for a child. Obviously this would be a questionable basis for disaggregating the overall calorie consumption of the family - but it gives us a rough idea of intra-familial inequalities in food-distribution. It also shows that food intake is determined not only by work output, but also by social and cultural factors which have to be studied, described and tackled.

Let us for a moment, return to the above ratio and assume it is valid. Applying it to the overall cereal consumption per day per family (4.24 kg) the relative food intake per man, woman and child would then be 3270 calories, 2410 calories and 1640 calories per day respectively. **This means an intake deficit of nearly 100 calories per day per woman, whereas a man has an intake surplus of nearly 800 calories.**

A deficit of 100 calories a day doesn't look serious until we link it to other facts : (i) The vast majority of the population have worm infestations, and these parasites can 'steal' as much as one-fourth of the total food intake. (ii) This intake level for women is a 'maintenance' level which makes no allowances for the additional 500-600 calories required during pregnancy and lactation - and Kamala Jaya Rao (1980) has shown that one-third adult Indian women are in that condition at any point in time, without the benefit of additional nutrition during these 'vulnerable' periods.

All of the nutrition programmes in the country are aimed at pregnant and lactating women - though how much of this extra nutrition actually reaches these women is a moot point (Natarajan, 1974). But what of the nutrition deprivation suffered by girls from infancy to pregnancy? And what of the women who have fulfilled their reproductive roles, but must continue to work for their family's survival without enough food to meet their needs?

Health hazards of cooking stoves and fuels

Beyond the nutrition factor there are other ways in which the village energy system affects women's health. Domestic fuel scarcity is only one part of the crisis women face. **Having obtained some form of fuel,** poor women are forced to cook on stoves which are both primitive and inefficient. The traditional chula, used in the vast majority of Indian homes, ranges from a crude pit or U-shaped pile of bricks to the more sophisticated fired clay or metal stove. The cooking efficiency of these stoves is dismally poor : between 3 and 10% (Geller, 1980). Since the fuel efficiency of a stove determines not only fuel consumption (and hence fuel-gathering time) but also the length of time spent in cooking, the traditional chula condemns women to spend at least 3 hours a day on cooking, and that too for most of their lives!

As if this were not a severe enough penalty, some recent studies have highlighted the extreme health hazards to women and girls where conventional bio-mass fuels like firewood, cowdung and crop wastes are used as cooking fuels (SNDT, 1983).

Dr. Kirk Smith, energy programme chief of the Resource Systems Institute of East-West Central Honolulu, conducted a study in rural Gujarat in association with the National Institute of Occupational Health (Ahmedabad) and the Jyoti Solar Energy Institute (Baroda). The study was conducted in 4 villages of the Kaira District. Smith's team found that traditional bio-mass fuels emit more Toxic Suspended Particulates, (TSP) benzo-a-pyrene, carbon monoxide and polycyclie organic pollutants than fossil fuels. Thanks to the crudity of stoves and the poor ventilation of the rural home, these fuel emissions produce a deadly disease trap for women and girls - for the study found that the women begin regular cooking at around 13 years of age (Indian Express, 1983).

Clinical studies by the Kirk Smith team found that women spending around 3 hours a day on cooking were exposed to 700 microgrammes of particulate matter per cubic metre, compared to the safety level of 75 microgrammes. The benzo-a-pyrene inhaled alone, was equivalent to smoking 20 packets of cigarettes a day. (SNDT, 1983)

In another study conducted by the Jawaharlal Institute of Postgraduate Medical Education and Research (JIPMER), 20 albino rats were exposed to cow dung smoke and soon developed chronic bronchitis, bronchiolitis and emphysema. The JIPMER Study suggested this as a possible cause of the high incidence of bronchinal disease among women and older girls in India (Indian Express 1983). In light of these facts, it is not surprising that respiratory disease is one of the major causes of death among women in India (SNDT, 1983).

One of the solutions developed to combat this problem is the 'smokeless' chula. The 'Nada' chula and 'Dholadhar' chula, among others, are some of the most sucessful designs. Designers and disseminators have reported not only fuel savings of 50% with these chulas, (IGDP, 1982) but the remarkable changes they have wrought in the lives of women and children; the fuel saving has released precious time which has been used in a variety of ways, including, as one woman put it, to "just lie down and rest" (Sarin, 1983).

Unfortunately, women's ill-health and undernutrition is not of equal concern to all. There is a growing school of thought which uses theories of biological adaptation (the 'homeostasis' theory) and clever statistical gymnastics to prove that there is in fact no such calorie gap (Sukhatme, 1981).

The doyen of this school is Prof. P.V. Sukhatme, a biostatistician with considerable clout who, a decade ago smashed the theory of the 'protein gap' in the diets of poor people. He demonstrated that the protein gap only occurs when there is a *calorie* gap - but when overall intake of calories is sufficient, the amount of protein is also adequate (Sukhatme, 1972). He was undoubtedly responsible for elbowing out the vested interests who would have liked to manufacture and market supplementary protein to people who had barely enough to eat.

Today his work has taken quite a different direction - a direction which has frightful implications for women. To grossly oversimplify his theory, he states that just as there is inter-individual variation in food intake, there is also an intra-individual variation. So at times we eat more, and then we eat less. Thus, ascribing some arbitrary norm such as 'recommended daily allowance' is meaningless, since both inter- and intra-individual food intakes will fall into a normal bell curve, with the majority of people in the centre and a few at either extreme, even though everyone is healthy (Sukhatme, 1981). From here, he goes on to state, that the only two indicators of malnutrition (either in the form of overnutrition or undernutrition) are : whether body weight remains basically constant (i. e., it is maintained), and whether the normal level of activity (for which read 'work') is maintained. He believes that anyone who meets the above criteria cannot be termed malnourished.

Sukhatme also does not want us to be carried away by Western norms of how tall or heavy we should be. A thin, small person is neither stunted nor underwight - she/he has merely 'adapted' to efficiently use the little food to be had while continuing to labour away for survival.

Therefore, this 'calorie-gap' suffered by women and by many of the poor is of little consequences because they 'adapt' themselves and carry on. A comfortable theory indeed ! Women, in fact, are the stumbling block in Sukhatme's theory. Can women 'adapt' to calorie deficits of 500 or 600 calories during pregnancy and lactation ?

Even if they can, Sukhatme ignores the possibility that such adaptation over a lifetime may have disastrous consequences on health. Is this why more women die, and die earlier than men ? (HFA, 1981) Is this why maternal mortality is so high - 400/100,000 ? Is this why the average birth-weight of poor babies is as low as 2.5 kg (NIN, 1971), leading to so much child wastage ? In other words this may be the starting point of the vicious circle of maternal undernutrition, low birth-weight babies, high infant mortality and high fertility. In this context, health care services can play an important role in alleviating the health problems of women to some extent - but do they?

First of all, women's health has been confused with maternal health — once again on the assumption that women and maternity are one and the same thing. The only women-oriented programmes in the national health sector have been Maternal and Child Health Schemes and to some extent Family Planning. The health system has yet to waken to the fact that there are a large number of women in need of health care who are neither pregnant nor lactating.

Secondly, the outreach of health services is very poor with respect to women. Examination of in-and-out-patient records of medical institutions reveals that for every three men who avail of these facilities only one woman does so. This is by no means because women are healthier, but because in the Indian family, the importance given to a woman's ailments is considrably less than that given to a man's illness.

Thirdly, the very nature and structure of the health service system mitigates against its reaching women. Our health system is institution-based. Women have neither the time, mobility, child care facilities nor the leisure to travel long distances at great expense to seek out the services available in hospitals and health centres, often at the loss of a day's wage. A domiciliary system which reaches the doorstep would automatically benefit more women than today's set-up.

Finally, in our culture, it is women who can best reach out to and care for other women. Yet in the present health services, male functionaries heavily outweigh the females. Although the number of women doctors has been steadily rising, few of these are working in the rural areas. It is the lone cadre of Auxiliary-Nurse-Midwives, poorly paid, poorly supervised and equipped, sexually harassed and overloaded with work, who are the sole guardians of women's health. Even the celebrated Community Health Worker Scheme, defeated our hopes when over 80% of those selected and trained turned out to be men.

Conclusions

The scarcity of other energy resources in a rural area creates a demand for human energy - particularly in survival-related tasks. When human energy is expended, women contribute the greatest share. But in comparison to this energy output, women get a lower share of food intake, and face a nutritional deficit. Added to the work burden, women also suffer further energy deprivation due to repeated pregnancies and breast feeding, high morbidity and intestinal infestations. Health care can alleviate this burden to some extent, but women apparently have less access to health care facilities due to the nature and structure of these services. These factors naturally affect all the poor, but women are more seriously affected because of their low status, and their social and economic roles.

I cannot presume to offer solutions—the complexity of the problem is mind-boggling. But I can and do raise a series of questions which must be answered if we are to even begin tackling the problem. The questions are :

(1) What is the actual pattern of women's work in different regions?

(2) What is the energy cost of the activities performed by men, women and children in different socio-economic groups - both urban and rural?

(3) What are the effects of human energy saving on nutrition status - with and without increasing food intake?

(4) Are the calorie intake norms or recommended daily allowances for women at various activity levels realistic?

(5) What is the actual food intake of women (at all ages and biological stages) and men ?

(6) How do women utilise the time released by the provision of alternative energy resources for survival tasks ?

(7) What is the actual extent and pattern of morbidity amongst women ?

(8) What is the outreach of health services to all women, and what is the level of utilisation of the former by the latter ?

In conclusion, and although I have said I can offer no solutions, the interrelationship between energy scarcity, women's work, nutrition and health suggests a three-pronged strategy :

Women's deprivation is occurring at three levels: the socio-cultural level, the environmental level and the service-programme level. The erosion of rigid patriarchal system has to occur, and all women's movements are aiming at this. Improving the availability of energy resources with priority for the activities performed by women (collecting fuel and water, cooking, and so on) is another facet of the strategy, and one where alternative technology can play an important part. Finally, there is an urgent need to restructure and expand the scope of existing programmes to reach out to women and draw them into the health care network.

How best all this can be achieved is a matter for further debate and discussion. But it is clear that the major thrust has to be on the political front, by mobilising women to analyse their situation and articulate their demands.

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commodities would offer Tanzania more options than that of devaluing its currency or curtailing its development programs. The amelioration of terms of trade would offer Tanzanian coffee farmers better returns on the crop they now produce, obviating the need to expand production at rates of 5 and 6 percent per annum. Improved terms of trade would also alter the economic circumstances of women and offer the possibility of better health and nutrition for themselves and their families. The New International Economic Order holds the promise of a future for Tanzania radically different from the grim one currently predicted.

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a) Awakening the Women : To understand the reality of the bhutali phenomenon in all its different dimensions. (In the minds of many woman there is a lurking doubt that the bhutali may be real. This comes to the fore especially in the minds of women affected by unfortunate events and they support their husbands in the hunt for the witch). This awakening is part of the wider struggle of the women for emancipation and equality. This awakening must also form part of the general awakening of the male population. (The men too have a tremendous fear of the witch and which is the reason for the vehemence with which they act to annhilate her). Since the bulk of the population is illiterate, the process of awakening will have to make extensive use of drama, song and discussion.

b) Improved Health is the cornerstone : Because if one goes through the earlier part of this paper one notices that the event that triggers the witch hunt, is in most cases 'unexplained' disease or death. The deterioration of the adivasi health system is a major area of concern when one looks at the bhutali problem. Any effort will have to be directed to attain three goals :

i) A re-evaluation and change of the adivasis understanding of health, disease, and health care.
ii) Taking health to the grass-roots in the form of more radical health care systems and creative responses to the health problems iii) Developing a local integrated system of preventive health care.

c) The Enlightened Bhagat is the Key : As the central person in the traditional health care system of the adivasis, the bhagat plays a crucial role (whether positive or negative). Hence any action for integrated creative health care would necessarily need to include the 'enlightened bhagat'. (Any attempt to substitute the present with a parallel system even if it provides a superior and more efficient system would be counter-productive). Those 'enlightened bhagats' would have to be involved in a process that is geared to : i) improving diagnostic skills. ii) identification of herbal remedies and their medicinal porperties, together with methods of cultivating and preserving various herbal plants. iii) Development of supplementary skills and medicine to complement those areas where the local systems and remedies are insufficient. iv) Development of preventive health care as a system in its own right with the bhagats.

d) Education to develop scientific attitude : A consistent programme to introduce a scientific temperament coupled with the struggle against superstition should run through the whole effort which would integrate the various parts as one integrated look at life and its different processes.

This short paper tries to put forward what we are thinking and hoping to put into effect. We need assistance and co-operation at every step. Your solidarity is as necessary as our efforts. We hope you will become part of this process of struggling for the liberation of the adivasi and the women in particular.