

**SEASONALITY, POVERTY AND NUTRITION: A PROFESSIONAL FRONTIER**

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### Seasonal Deprivation

In India and elsewhere, much of the debate about rural poverty and nutrition has been conducted as though these were rather stable conditions which can be measured and analysed either through spot surveys at one time of the year, or through annual averages. Recent discussion of seasonality has emphasised the rather embarrassingly obvious points that rural poverty is seasonal and cyclical, that poor people are poorer at some times of the year than others, and that different classes of people are affected differently by the same seasonal changes. Seasonal analysis opens up many questions and has many practical implications. The purpose of this paper is to try to explore some of these, especially as they may apply in India.

Discussion of seasonality and poverty has been dominated by a tropical wet-dry scenario, derived from and supported by evidence from ~~the~~ Bangladesh, Gambia, Nigeria, and elsewhere.<sup>1</sup> This scenario has been substantially corroborated by other observations and research in other environments, but changes in it have been required, especially for North India where heat and cold overlap with the effects of wetness and dryness. Although the scenario provides a checklist of factors to examine, it is clear that each seasonal environment must be analysed afresh in its own right. Another finding has been the limited value of examining seasonal effects from the point of view of only one discipline or family of disciplines, because of the strong interactions between different adverse factors which affect rural people, especially those who are poorer.

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1. See e.g. Schofield 1974, Longhurst and Payne 1979, Seasonal Dimensions to Rural Poverty 1981, and Chambers 1982; for Bangladesh, see e.g. Chaudhury 1980, Becker 1981a and b, Chowdhury et al 1981, Clay 1981, and Brown et al 1982; for the Gambia, see e.g. Whitehead et al 1978, Haswell 1981, Rowland et al 1981, and Roberts et al 1982; for Nigeria, see e.g. Simmons 1981, Tomkins 1981 and Watts 1981. I have not systematically searched for seasonal analysis in India and will be most grateful for relevant references in addition to the following: Venkatachalam et al 1954, Rao et al 1974, Crook and Dyson 1981, Gupta 1981, Harriss and Harriss 1981, Rajagopalan et al 1981, and Walsh 1981.

In summary, the tropical wet-dry scenario, as it applies to poor rural people in an agricultural economy, can be described as follows.

A dry season is followed by a wet season. Towards the end of the dry season, food becomes scarcer, draught animals weaker, and more energy and time are required to obtain water. Little work is available and wages are low. Some poor people migrate in search of work. When the rains come, cultivation makes high energy demands on weak draught animals and on people. During the rains and before the first harvest, many adverse factors interact. Food is scarce, food prices high, and household cash reserves of poor families low or non-existent. Hard work is involved in agricultural activities, some of which, like weeding, can be critical for crop production. The incidence and prevalence of monsoon-related diseases is high, including variously malaria, Dengue fever, guinea worm disease, diarrhoeas, skin infections and snake bite. Impaired immune response heightens vulnerability to these illnesses. Much sickness goes untreated but poor families may also incur their heaviest health expenditures of the year (Rao 1974). Food is of less variety, is less well prepared, and after cooking is more often left standing in moist, warm conditions in which contamination through bacterial and fungal overgrowth is rapid (Schofield 1974; Barrel and Rowland 1979). Huts leak and collapse from the rains and conditions are crowded as families move in together (Gulati 1981:29). Wet and sometimes cold are experienced. Body weights decline. Poor people are concurrently liable to sickness and to debt. They borrow on adverse terms, mortgage and/or sell assets in order to obtain food and to be able to work. At this time of year, before the harvest, many rural people are most vulnerable to becoming poorer.

The hard work of harvest and of post-harvest processing comes as a climax. Especially for landless labourers, to be able to work at this time is critical because wages are high, but body reserves of energy are low. Mortality is high among older people (Becker 1981a:275). Food is abundant and food prices drop. Small farmers have to repay debts at this time, and also raise cash for the marriages and ceremonies which follow. This forces them to sell their crops when prices are at their lowest. But in the post-harvest dry season, body weights rise, and this is the healthiest and happiest time of year, and the time when conceptions are most common (Dyson and Crook 1981a and b). Then the cycle is repeated.

Women and children are especially badly affected by the adverse combinations of the wet season (Schofield 1974; Palmer 1981). Women who work in agriculture tend to terminate lactation with the onset of the rains, anticipating the hard work in the fields which is to come. Children thus

become entirely dependent on a non-milk diet at precisely the time when it is least varied, least nutritious, least in quantity, and most likely to be contaminated. Where lactation continues, breast-milk output falls. The pressure of other demands on women's time and energy reduces the time devoted to housework and child care. Infants' growth falters and weights even decline. Women are especially liable to be in late pregnancy at this time, reflecting a peak in conceptions in the healthy and well-fed period after harvest, and pregnant women in the last trimester of pregnancy can actually lose weight (Whitehead *et al* 1978). Births peak around harvest time, but birthweights are low and neonatal mortality rates high. During the post-harvest dry season, adults and children's weights recover.

To this scenario, several qualifications must immediately be made. While evidence can, to the best of my knowledge, be adduced for every statement, it is not likely that all of them will apply in every environment. Nomadic pastoralism has a different configuration (Swift 1981). Irrigation modifies the scenario. Villages and families with easy access to urban centres are probably less vulnerable than those which are remoter and more cut off during the rains. The worst time of year varies for different socio-economic groups: for small farmers who provide their own labour it may be just before and at harvest; for landless labourers it may be then or at other times when there is no work.

A major qualification for northern India is in the nature of the climatic seasonality itself. The relative ease and attractiveness of analysing rainfall data has perhaps led to some neglect of the effects of heat and cold. The three seasons of winter (cold-dry), summer (hot-dry), and monsoon rains (hot-wet) modify the scenario, especially in terms of incidence and prevalence of sickness, including pulmonary infections in the winter and diarrhoeas in summer.

A further necessary refinement is to subdivide the main seasons. Classical ayurvedic treatises on seasonality distinguish not three but six seasons - varsa (the rainy season), sarad (autumn), hemanta (winter), sisira (the cool season or season of frosts), vasanta (spring), and grisma (summer) (Zimmermann 1980:99). The most critical period for a particular stress or combination of stresses may be both short and predictable. A monthly analysis of the incidence of protein-calorie malnutrition in Coonoor showed that invariably over the four year period of the study (1950-53), peak incidence occurred in May and June (Venkatachalam *et al* 1954). Jeremy Swift (personal communication) working among pastoralists in the Sahel in Mali and Niger has found that

the most critical period is the first few weeks after the onset of the rains (not, as commonly supposed by non-pastoralists, the late dry season). Studies carried out in a village in the Gambia have found the month of August to be a time of acute stress, with high energy demands and low calorie intake, and women in their last trimester of pregnancy and lactating women losing an average of 1.4 kg of weight during the month (Whitehead et al 1978:7). It is perhaps not necessary to multiply examples. Vernacular languages often have names for such short seasonal periods, and some rural societies, for example in Bihar, organise their calendars in shorter intervals than months, these proving useful for the anticipation and description of environmental changes and human activities (Chapman 1977).

Subject to these and other qualifications, five propositions can be put forward for tropical wet seasons in rural areas in general, and for the monsoon in India in particular. They will not all always be true but can be investigated and tested for each environment:<sup>1</sup>

- i. malnutrition, morbidity and mortality have seasonal patterns and often peak during the monsoon
- ii. the poorer people, women and children are especially vulnerable to malnutrition, morbidity and death during the monsoon
- iii. the economic costs of sickness and weakness, both to society and to landless labourers and small farmers, are concentrated in the monsoon. (This is to say that the costs of not being able to work are high when work is available (labourers) and when agricultural activities must be performed (small farmers) but low at other times when there is no work. The social and personal benefits of effective health services are thus higher during the monsoon than during the dry season).
- iv. it is during the monsoon that poor people are most likely to become permanently poorer, whether through sickness or other contingencies.
- v. it is during the monsoon that rural health services, especially in less accessible areas, are likely to be at their least effective and least used in relation to need.

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1. For elaboration of these points, please see Chambers 1982:219-227.

### Seasonality Unseen

Powerful mutually reinforcing factors prevent urban-based professionals from fully perceiving seasonal deprivation.<sup>1</sup> In what follows, I shall concentrate on the monsoon season, but where the hot dry season of extreme heat is also an adverse time, as in North India, some of these factors also apply. In brief they are:

#### i. professional specialisation

The adverse factors as they impact on poor rural people entail interactions between the concerns of agriculture (crops, livestock, etc.) economics (household budgets, labour demand, wages, migration, prices, debt etc.), medicine (morbidity, mortality, immune response, preventive and curative measures etc.), nutrition and energetics (energy balance, nutritional status etc.), and sociology (dependent relations, indebtedness, weak bargaining positions etc.). For example, a poor labouring family which is sick in a remote area cannot obtain treatment during the rains, and cannot afford it, and so cannot work and earn, and so must borrow to survive, and so becomes indebted or bonded, and so remains poor, and so continues to be unable to obtain treatment. There are many such downward spirals which are very clear to rural people, but not so clear to specialised urban-based professionals, of whatever discipline, because they are trained to look closely at only one part of the syndrome of deprivation.

#### ii. biases of access and contact

Rural visits by urban-based professionals are subject to many anti-poverty biases (Chambers 1981). Areas visited tend to be accessible - near large cities, peri-urban, on tarmac roads ('tarmac bias'), on roadsides, and the centres rather than peripheries of villages. People met tend to be those who are less adversely affected by seasonality - the accessible and visible, those who are better-off, people on regular salaries, farmers rather than labourers, users of services more than non-users, and those living in areas which remain accessible during the monsoon not those which are cut off.

#### iii. dry and cool season biases

Rural visits and contacts tend to be concentrated in the dry season when travel is easier and also to avoid times which are uncomfortably hot. The same applies to much research. There are exceptions in some of

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1. For a fuller statement see Chambers 1982:227-230.

the work of specialists in diseases which are most prevalent during the rains, such as a recent study of diarrhoeas carried out during the three months of the rains in Nigeria (Tomkins 1981). Year-round surveys also avoid this criticism if they are truly sustained during the rains (when, however, the quality of the data may deteriorate). There is also a neat ethical justification for confining surveys to the dry season, namely that it is wrong to demand the time of rural people for answering questions when they are busy and when their time has a high opportunity cost. Whatever the justifications, the cognitive bias remains: many of the impressions and much of the data on which assessment of rural conditions is based are derived from the post-harvest season when people are healthiest, happiest and best fed. Even spot nutrition surveys are sometimes carried out at such times (personal communication, Jim Pines).

iv. staff transfers

The frequency of transfer of government staff in many rural areas, besides being a sort of slipping clutch in rural development administration, also hides seasonality from officials. In a study of a poor, tribal area, Dharampur Taluka in Gujarat, it was found that over the two year period of the study, there were six District Collectors, five District Development Officers, and three Project-cum-Tribal Development Officers (Gupta 1981:116). In another tribal District, the District Collector told me that he was the first person in ten years to hold that post for more than one year, and so to experience any season more than once. An on-going study of rates of transfer of different categories of officials in three relatively inaccessible districts in three different states (Banswara in Rajasthan, Jhabua in Madhya Pradesh, and Panchmahals in Gujarat) (Sharan and Narayanan 1983) is finding, at least among BDOs, that duration in post has been becoming shorter. Remote and poor districts may be especially vulnerable both to adverse seasonality and to rapid staff transfers, the two neatly combining to impede official perception of seasonal problems or action to mitigate them.

v. survey fatigue

Even when survey data are collected for a whole year, initial analysis is usually into annual aggregates. Seasonal analysis is time consuming and can be complicated. The stage at which it might be undertaken is often when both staff and funds are exhausted. The consummation of a PhD. may be painfully delayed by the time required to subject data to seasonal analysis (personal communication, R. Longhurst).

Seasonal analysis can be a casualty of the common tendency to underestimate the time and resources required for the analysis and writing up of survey data.

vi. statistical biases

One statistical bias which may exaggerate seasonal deprivation at times of hard work and during the difficult times of the monsoon could be under-reporting of food consumed. On the other hand, it seems likely that with morbidity, both incidence and prevalence are systemically under-reported during rains and relatively over reported during dry seasons after harvest. Urban-based officials may take attendance and treatment figures at health posts, clinics and hospitals as proxies for incidence and prevalence of malnutrition and morbidity. However, during the monsoon, the following forces can be expected to deter attendance and treatment:

- difficulties and discomforts of travel during the monsoon
- shortages of cash and the high cost of loans during the monsoon
- the extra time and energy involved in getting sick people to treatment during the monsoon, the extra time spent waiting for treatment, and the high opportunity cost of this time when there is work available and to be done
- seasonal shortages of drugs with the risk of no treatment or ineffective placebo-type treatment
- multiple undernutrition and sickness in the same family, making it difficult to get any of them to treatment
- preference for quicker, cheaper and more accessible traditional treatment at that time (including, as reported from Bangladesh, greater ease of obtaining loans to be repaid later by a labour contribution)
- delays in going for treatment which lead to greater incapacity, greater pain, and greater difficulty in movement, and so less likelihood of going for treatment at all
- sheer physical weakness and exhaustion in both the sick and their helpers.

These factors interact, and their opposites operate during the dry season after harvest. Clinical treatment figures are thus smoothed to conceal seasonal variations in morbidity, underestimating monsoonal incidence and prevalence and overestimating them in the post-harvest dry season. The smoothing will be especially marked where drug supplies to clinics are based on equal monthly or quarterly allocations unrelated to seasonal demands.

When these six biases are seen to be interacting and mutually reinforcing each other, it is not difficult to understand how easily multiple seasonal deprivations can be underperceived. They also make it more plausible to suggest that seasonal analysis and seasonal deprivation present a professional frontier for those concerned with rural poverty and nutrition.

#### The New Significance of Seasonality

Seasonality takes on new significance in the light of developments in the science and politics of nutrition.

On the scientific side, there can be few fields in which imprecision of concepts and difficulties of measurement combine as strongly as they do in nutrition. To be fair to nutrition scientists and human physiologists, this would seem to reflect the inherent complexity of their subject. Despite this imprecision and complexity, however, there appears to be consensus that earlier estimates of average human calorie requirements have been high (see e.g. Sukhatme 1977, Edmundson 1980, Seckler 1980, MACS 1981).

This has implications on the political side. If average calorie requirements are lower than previously supposed, then the numbers of people classified as malnourished are also lower. For example, Sukhatme's (1977:16) calculation of a revision of the 'average requirement for health' reduced Dandekar and Rath's (1971) estimate of 40 per cent for rural India to 15 per cent. As and when FAO, UNICEF, WHO and national organisations and authorities reduce their estimates of numbers malnourished, the political danger is that development cynics may then use this as an excuse for giving lower priority to anti-poverty programmes, arguing that the needs are less, that international agencies and others have exaggerated deprivation in order to justify continued financial support, and so on.

Whatever the estimates and arguments, a more accurate understanding of deprivation should lead to better measures to overcome it. And in addition, seasonal analysis opens up another aspect of the reality and countervails against the new reduced estimates of numbers who are malnourished.

Whatever is taken as a threshold of deprivation - whether indicators of malnutrition, poverty or other dimensions, seasonal analysis tends to raise the estimates of the numbers who fall below it. Using indicators of malnutrition, a longitudinal study (Brown et al 1982) of changes in nutritional status and the prevalence of malnutrition of young children in rural Bangladesh 'identified dramatic seasonal differences in the average nutritional status and in the prevalence of malnutrition as defined by a variety of anthropometric indicators,' and concluded that 'obviously, the time of year must be considered when attempting to define the nutritional status of this or similar populations' (ibid:311). In defining the prevalence of malnutrition in the population, an annual average would be misleading. For definitional and operational purposes, one major measure of malnutrition should be prevalence at the worst time of year.

Using indicators of poverty, the same point applies and can be illustrated by landless worker households in Hayami's (1978) study of a rice village in the Philippines.<sup>1</sup> This shows extreme variation in total monthly earnings, inventories and financial assets, demonstrating how very much poorer landless labourers are at some times of the year than others.

Or again, the same can be expected to apply if one accepts some threshold of ultra-poverty. In expounding his concept of the 'ultra-poor',<sup>2</sup> Lipton argues that above a certain level, characteristics and behaviour in numerous areas (nutritional, demographic, migratory, economic behaviour, etc.) vary with changes in poverty indicators in fairly smooth and predictable ways, but that below that level structural changes appear. '...the relationships of ultra-low-income economics may in many ways be as special, and as apparently anomalous, as those of ultra-low-temperature physics' (italics in the original, 1982:3). One example is that the behaviour of the ultra-poor does not follow Engel's law that as incomes rise, so the proportion of income spent on food declines. Engel's law does not operate with a substantial proportion of the Indian population (see e.g. V.K.R.V. Rao 1982:58). As income rises, the ultra-poor continue to spend over 80 per cent of their incomes on food. However, just as matter may be cooled in and

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1. See appendix diagrams.

2. Lipton writes 'The 'ultra-poor' can be identified, according to convenience of measurement - the groups identified by the measures overlap very substantially - as persons (a) with income or outlay per consumer unit (IOCU) too low to command 80 per cent of FAO/WHO's 1973 average caloric requirement for their age, sex and activity group; or (b) food/outlay ratios above 80-85 per cent; or (c) anthropometric indicators showing severe (Grade III) malnutrition on the Gomez (Harvard) scale.' (ibid 4).

out of the temperatures of ultra-low-temperature physics, so poor people may over the seasons move into and out of ultra-poverty in which this, and other 'anomalies', are found. The total number who are ultra-poor, or malnourished, or undernourished, or hypervulnerable to debt, sickness and other contingencies, varies according to the time of year. In environments which are climatically and economically highly seasonal, the total number who are deprived are those who fall below whatever threshold is used - nutritional, economic order - at any time of the year.

But the greater prevalence of deprivation implied by seasonal analysis is masked because so much of the debate is conducted in terms of averages. Averaging income or food consumption over a year may conceal periods of destitution and of undernutrition. Moreover, when the compounding of seasonal adversity is taken into account, with high energy demand, low calorie intake, sickness, and the other features of the scenario, it becomes clear that any analysis which ignores seasonality risks gross understatement of deprivation and vulnerability.

#### Women, Children, Malnutrition and Growth

All persons, especially those who are poorer, are liable to be affected by adverse seasonality. Adult men are far from immune. The relative stress experienced by men, women, boys and girls can be expected to vary by social environment as well as by time of year. All the same, women deserve attention both because of their general subordination and because children's development and prospects are so intimately affected by the condition and behaviour of their mothers.

Careful and very detailed research in the Gambia (Whitehead *et al* 1978, Rowland *et al* 1981, Roberts *et al* 1982) and Bangladesh (Chowdhury *et al* 1981, Brown *et al* 1982) has revealed seasonal variations in the physical status of women and children. No brief summary can do justice to the richness of detail and striking seasonality of the findings. The reader is referred to the originals for information concerning women, who, whether pregnant, lactating or not, appear subject to pronounced adverse seasonal stress in both environments, and poor women more than those who are less poor. These studies raise the questions whether, where, and to what extent, rural women in India are subject to similar stresses.

Seasonal stress on mothers affects not only them but also children in many ways (Schofield 1974), not least through the efficacy of breastfeeding (Chowdhury *et al* 1981; MR CDNU, n. d.) and through child care or its lack. Of special note are the effects on birthweights.

The Gambia study reveals marked seasonal variations in women's activity and calorie intake (with activity very high and calorie intake very low during the rains) (see appendix diagrams) and associated sharp seasonal variations in birthweight. Babies born in the months December-June had a significantly higher birthweight (3.12 kg and 2.30 kg) than those born in July-November (2.91 and 2.69 kg, for boys and girls respectively) (Rowland *et al* 1981:167). Over a five year period the mean birth weight for children in May, adjusted for sex (male) was 3.31 kg, a figure comparable with western values, but in June and July this rapidly fell by 0.48 kg (Roberts *et al* 1982:676). The high values coincide with the post-harvest healthy period, and the low values with the onset of the rains, high activity on the part of pregnant women and declining calorie intakes. Although the sample is very small, it is suggestive that during the early rains the mean birth weights of four infants whose mothers spent less time active than average before delivery was 3.15 kg  $\pm$  0.18 (S.E.) and of the four who spent more time active only 2.60 kg  $\pm$  0.14 (S.E.).

The association between birthweight and prospects for survival is well known. 'The 10 to 15 per cent of babies born with low birth weights now account for between 30 and 40 per cent of all infant deaths in the developing world' (Grant 1982). It may be tempting to conclude that seasonal timing of conception to avoid birth during the rains is to be encouraged, but caution is called for here. As Schofield (1974) has shown, the issue is not simple. For example, babies born during the wet season may be immediately vulnerable, but those born during the dry season become vulnerable later, when they lose passive immunity after 6 months during the following wet season. Nevertheless, the Gambian research persuasively directs attention to poor women who are in late pregnancy during the rains, and who are forced to be highly active at that time, as a group under exceptional stress, and at risk both for themselves and for their babies when born.

The Bangladesh study of children already quoted (Brown *et al* 1982) also revealed marked seasonality in child malnutrition and in rates of growth. During the months of the study a 3-or 4-fold variation was found in

- percentage of expected monthly gain in length or weight
- the prevalence of third degree malnutrition as defined by the percentage of expected weight for age
- the prevalence of moderate wasting as defined by the percentage of expected weight for length

An earlier study (Chowdhury *et al* 1981) found an actual average loss of weight for children in one month. It would seem that both sides in the 'small but healthy' controversy would do well to examine the seasonal dimensions of malnutrition and growth. The Bangladesh study found that compared with other indicators, the range of seasonal change in the mean percentages of expected length for age was relatively small, and that the seasonal changes in this indicator of nutritional status were out of phase with other indicators. Children remained relatively tall until well into the period of poorest nutritional status as defined by the other systems of classification, and seasonal improvement in length for age occurred 4 to 5 months after improvement in the other indicators (Brown *et al* 1981:308). In other words, growth apparently slowed or stopped with wasting, and with recovery it was weight that was first put on, with growth only resuming later when weight for height was more normal. In this case at least, the mapping of children into low growth trajectories appears to be a seasonal phenomenon with lagged responses, with factors which operate seasonally responsible for smallness. This suggests that smallness may often come not from some smooth process of steady adaptation, nor in contrast from random shocks, but rather from cyclical periods of relative deprivation and vulnerability.

#### Investigating Adverse Seasonal Interactions

Once seasonal analysis is embarked upon, a host of questions and speculations arise. Some of these concern changes in calorie intake, bodyweight, and metabolism; others the complex and sometimes paradoxical relationships between wasting, immune response, and the virulence of infections. A favourite subject is the seasonality of conception and birth. One conjecture is whether the paradox of Kerala, with its low morbidity, high life expectancy, low fertility, and yet low average calorie intakes, can be partly accounted for in terms of health services and a steady and reliable food supply which together mean that few people, at any time of the year, lose weight so that they can be tolerably healthy although near the lower range of individual tolerance of low calorie intake. These are fascinating questions. For practical purposes, however, of understanding the seasonality of an environment as it affects especially the rural poor, such enquiries may be something of luxury.<sup>1</sup>

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1. All the same, I intend to examine them in a subsequent paper. The paradox of Kerala in particular deserves to be analysed from a seasonal angle, not least because few observers (with, however, exceptions in Kumar 1979 and Mencher 1980) appear to have considered seasonality in trying to interpret Kerala's 'good' performance.

More immediately important are straightforward questions about more obvious seasonal interactions which are adverse. Many of these are obvious to rural people, but less so to non-rural professionals confined by their disciplines. To identify and explore these interactions, two research approaches appear especially useful. The first is case studies, like the profiles of five poor women in Kerala researched by Leela Gulati (1981). Such case studies can show interactions between poverty, physical weakness, ill health, isolation, vulnerability and so on as they affect real people in their lives, picking up much that questionnaire surveys would miss or distort. The second is multidisciplinary field research spanning the medical, social and agricultural sciences and seeking to illuminate the connections between their concerns. Both approaches are difficult. Case studies tend to be looked down on by those who regard statistical surveys as the only proper mode of research on rural conditions; and multidisciplinary research is personally and institutionally difficult to mount and execute. Because these approaches are not much used, only parts of the seasonal syndrome of deprivation are usually recognised.

In all research, whether case studies, multi-disciplinary, or conventional, there are biases to be offset if seasonal deprivation is to be understood. These include fieldwork in the dry and cool seasons and in accessible areas, and interviewing the better-off and men rather than the worse-off and women. Instead, attention can be concentrated on the worst times of year, the places where things are worst, and those who are worst affected.

In any environment, a short list of starting questions can provide first steps into the complex links between different factors. Some suggestions are:

- i. when are poor people poorest? (When are their food and cash stocks at their lowest and their indebtedness highest?)
- ii. what are the seasonal labour peaks for a. women, and b. men? (How do these affect small and marginal farmers? How do they affect landless labourers?)
- iii. what is the seasonality of morbidity, mortality, and weight gain and loss?
- iv. Is there seasonality in conception-pregnancy-births, birthweights, termination of lactation, and women's work?
- v. what do poor people eat when food is shortest and how do they obtain it?
- vi. when is the care and feeding of children at its least effective and why?
- vii. when people are at their poorest, what contingencies force them to become poorer by selling or mortgaging assets or their future labour?

In each case the question is a starter, a point of entry. But it will usually be the interconnections between dimensions - agricultural, epidemiological, nutritional, economic, demographic, social... - which provide the most useful insights. To pursue these questions, investigators have to throw away the blinkers of their professions and to be prepared to ask about, find out about, and understand, the many linkages of seasonal deprivation which go beyond their normal disciplinary concerns.

### Some Practical Implications

In sum, the poorer people are, the more subject they are to seasonal stress. The poorer they are, also, the fewer buffers they have against contingencies, and the more vulnerable they are to being made poorer. The interacting stresses and contingencies of the worst times of year make those times especially critical for them. The practical implications affect most, if not all, rural development programmes and projects which have an anti-poverty focus.

A select list of some salient practical implications is given below:<sup>1</sup>

- i. seasonal analysis. An analysis of how poor people are affected by adverse seasonality, how they cope with it or fail to cope with it, and how the worst times could be made less bad for them, should be but rarely is a standard part of appraisal and design in rural development.
- ii. stocking drugs on a seasonal basis. The common practice is to issue drugs in the same quantities throughout the year. This runs the risk of seasonal shortages. These may be exacerbated during the monsoon by breaks in communication. A system of drug issues tailored to seasonal needs is to be recommended.
- iii. seasonal preventive measures for diseases, concentrating on those which incapacitate during the wet season (and thereby reduce the capacity to work, produce and earn). Seasonal anti-malarial chemo prophylaxis combined with other preventive measures in Raigarh District, Madhya Pradesh, brought the incidence of malaria down from what was believed to be 95 per cent to a most nil, and was very popular, with poor people prepared to pay for their pills (Personal Communication, Sister Lorraine Ryan).
- iv. seasonal anganwadis and balwadis at times when mothers have to work in the fields, which are the times when children are least cared for, worst fed, and most vulnerable. Organised collective child care may have high benefits at these times but be much less needed at other times of the year.

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1. For a fuller list and more details, see SDRP 1981:226-240 and Chambers 1982:230-234.

- v. seasonal feeding programmes, for example associated with <sup>iv</sup>iii. To what extent, in what circumstances, and for whom feeding programmes may be justified is a much debated subject. Whatever one's view, the cost of such programmes can be sharply reduced and their cost-effectiveness sharply increased if they are organised on a seasonal basis in rural seasonal environments. For example, the benefits to mothers and small children of a midday meal will be much higher at a time when mothers are working in the fields, such as the time of rice transplanting, than in slack seasons when mothers do not go out to work. The nutritional and economic benefit will also be higher at the times when poor households are short of money and food.
- vi. health education and immunisation programmes in the dry and cool seasons. This is commonsense and already widespread practice.
- vii. training village health workers and mothers to handle those seasonal illnesses on their own (e.g. diarrhoeas, malaria, etc.) most likely to affect their children during periods when outside help is hardest to obtain.
- viii. counterseasonal measures to ensure a secure and adequate food supply all round the year. This requires analysis to identify when and why poor people are shortest of food, and then measures (public works employment (Maxwell 1981), quick-maturing crops to provide food earlier before the main harvest, seasonal credit, assured cheap food, etc.) to enable them to do better at that time.
- ix. lightening the work burden at times of stress, especially for women. Care is required to ensure that this does not take the form of displacement from paid work. For example, in most of India mechanical rice transplanters (fortunately difficult to make efficient) would be a major disaster for many women. The emphasis is rather on reducing drudgery in unpaid tasks, especially food processing, cooking, cleaning, fetching water, and gathering and preparing fuel.
- x. food availability and prices. Maintaining a floor price at harvest when small farmers have to sell, and then keeping the price down before the next harvest when poor people in distress are having to buy.
- xi. agricultural research based on farming systems analysis, designed to increase production, reduce risk, and spread labour demands and food supplies more evenly throughout the year. Irrigation is one major means. Another, so far rather neglected, is agro-forestry, with intercropping of trees and crops. With agro-forestry, the counter-seasonality may take the form of additional work planting, protecting, lopping or harvesting trees, fitting these activities into the slack periods in the crop cycle.

Year-round employment can also be promoted through the integration with agro-forestry of animal husbandry based on tree fodders.

- xii. reducing the rates of transfer of officials. If high and rising rates of transfer of officials, especially in remoter areas subject to adverse seasonality, impede awareness and counterseasonal actions, the reverse should also be true. One measure could be to publish annually in the newspapers tables showing recent rates of transfer by taluk, district, department, and post so that the public can be aware in detail of what is happening and pressures applied on those who control transfers to make them less frequent.
- xiii. enhancing professional awareness. One promising method for enhancing the awareness of professionals concerned with rural poverty could be through a poverty and nutrition simulation game.<sup>1</sup> The Green Revolution game (Chapman et al 1982) is already in use and rapidly spreading as a means of exploring the problems and relationships of very poor and not-so-poor farmers. It should not be difficult to devise a poverty and nutrition game incorporating seasonal dimensions. This could expose and bring home the nature of seasonal deprivation, emphasising the multiple and overlapping contingencies to which poor people are prone, and the impact on different members of a family. Perhaps there is someone who will read this paper who either knows of such a simulation game or who will invent one.

#### Conclusion

Seasonal analysis and seasonal interventions are not a substitute for other attacks on poverty. The less poor people are, the less vulnerable they are to seasonal stress. Any measure that gives poor people more control over resources and increases the stocks and flows of food and money which they command is likely also to reduce their seasonal deprivation. What seasonal analysis can do is point to cost-effective anti-poverty actions and cost-effectiveness in the timing of actions. Interventions to counter adverse seasonality are no panacea, but at the very least they should strengthen the hand of the poor by enabling them to be less poor, less vulnerable and less dependent at the times they find worst.

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1. For simulation games generally, see Taylor and Walford 1978, and for simulations and adult learning for development see Oxenham 1982.

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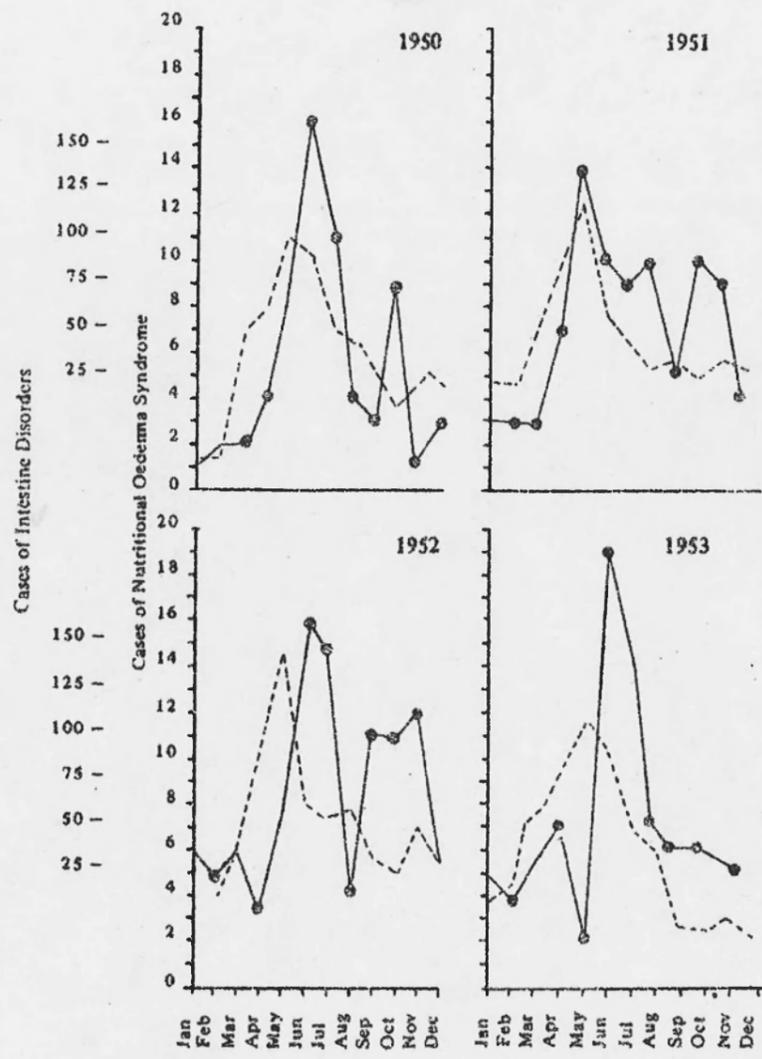
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Fig. 6.2 Monthly Incidence of Nutritional Oedema Syndrome and Infective Diarrhoea in Four Years

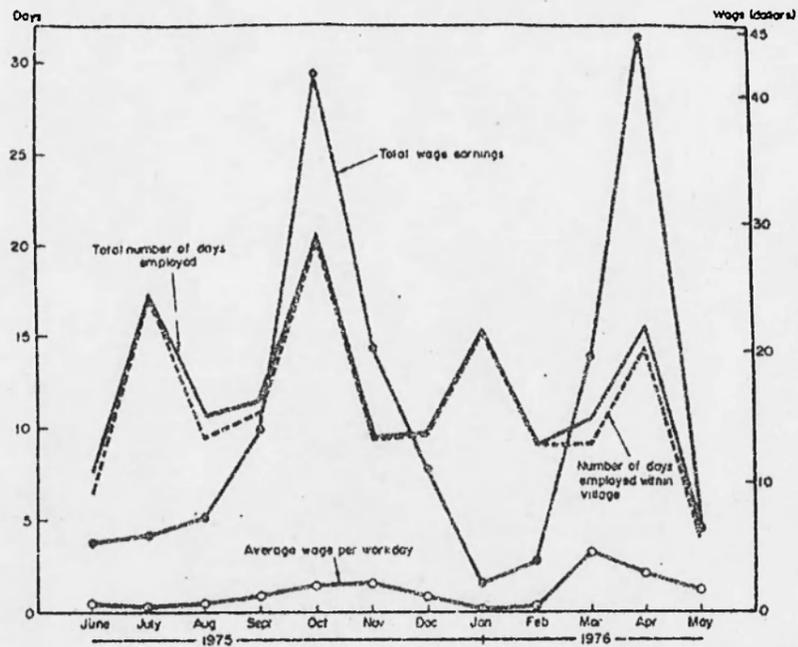


MONTHLY INCIDENCE OF  
 — Nutritional Oedema Syndrome  
 - - - Gastro-Intestinal Disorders

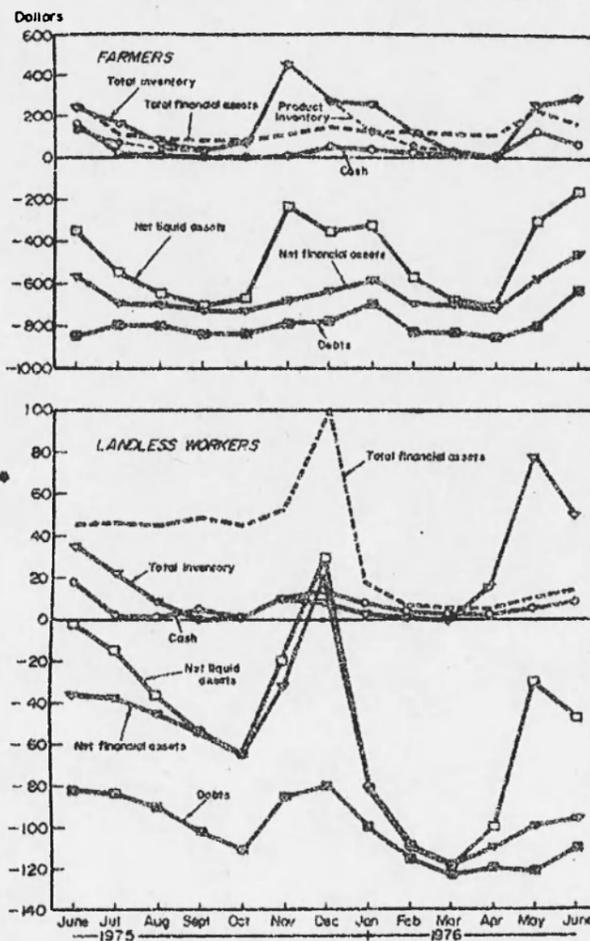
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3.5. Monthly changes in employment and wage earnings per working member of the landless worker households in the sample, 1975-76.



5.2. Monthly changes in inventories and financial assets in sample households, 1975-76.

From A. K. M. Alauddin Chowdhury, Sandra L. Huffman and Lincoln C. Chen Seasonal Dimensions to Rural Poverty, Frances Pinter, London (S. Chand & Co. Ltd., P. O. Box 5733, Ram Nagar, New Delhi), p. 60.

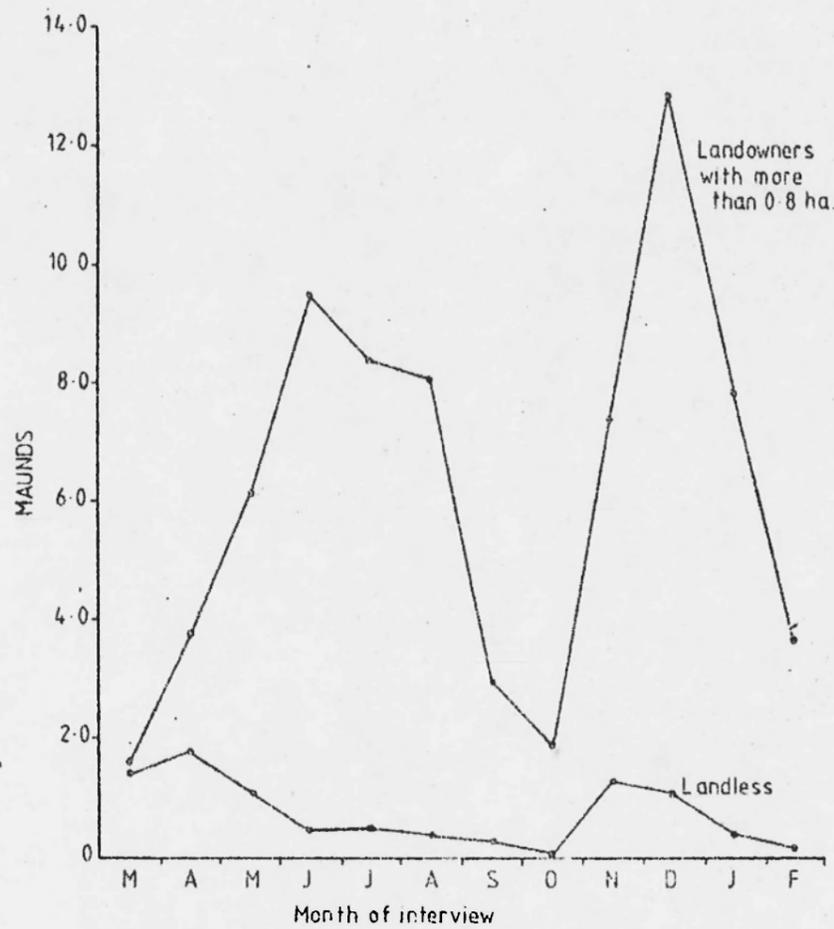


Figure 2.7 Household food stocks on the day of interview by month of interview of eight landowner households and seventeen landless households, Marlab thana, Bangladesh

From: Rowland et al 1981 Seasonal Dimensions to Rural Poverty, Frances Pinter, London, p.172.

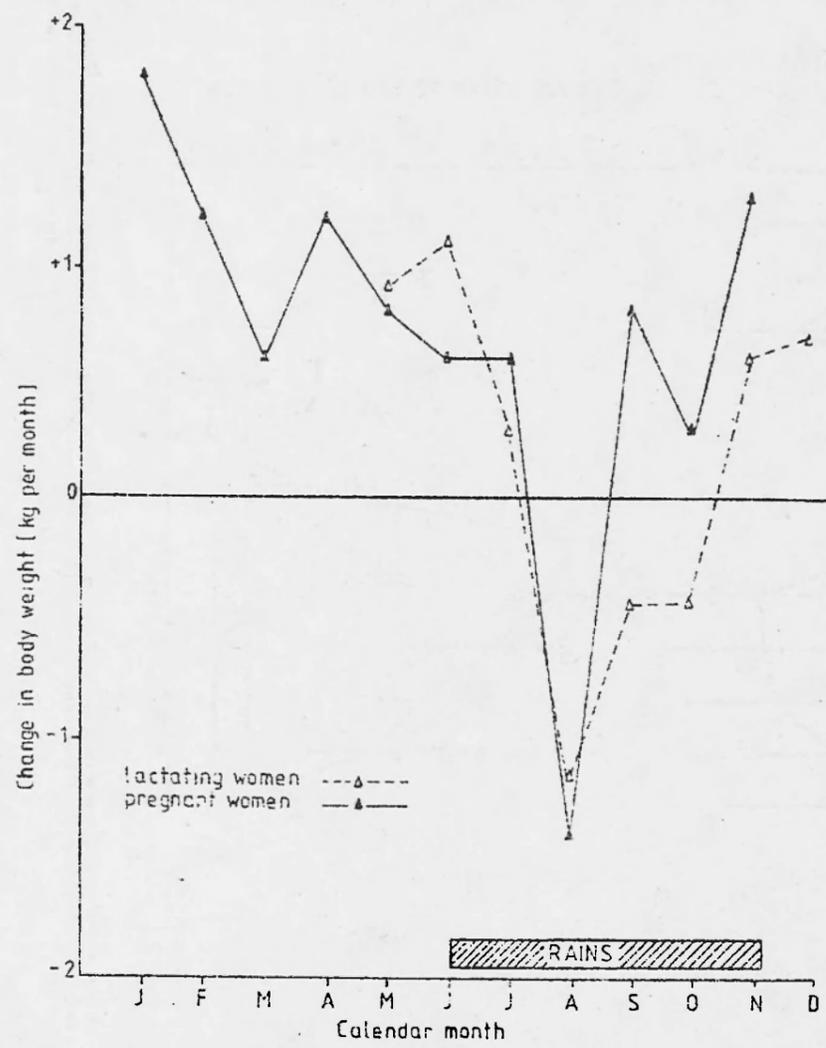
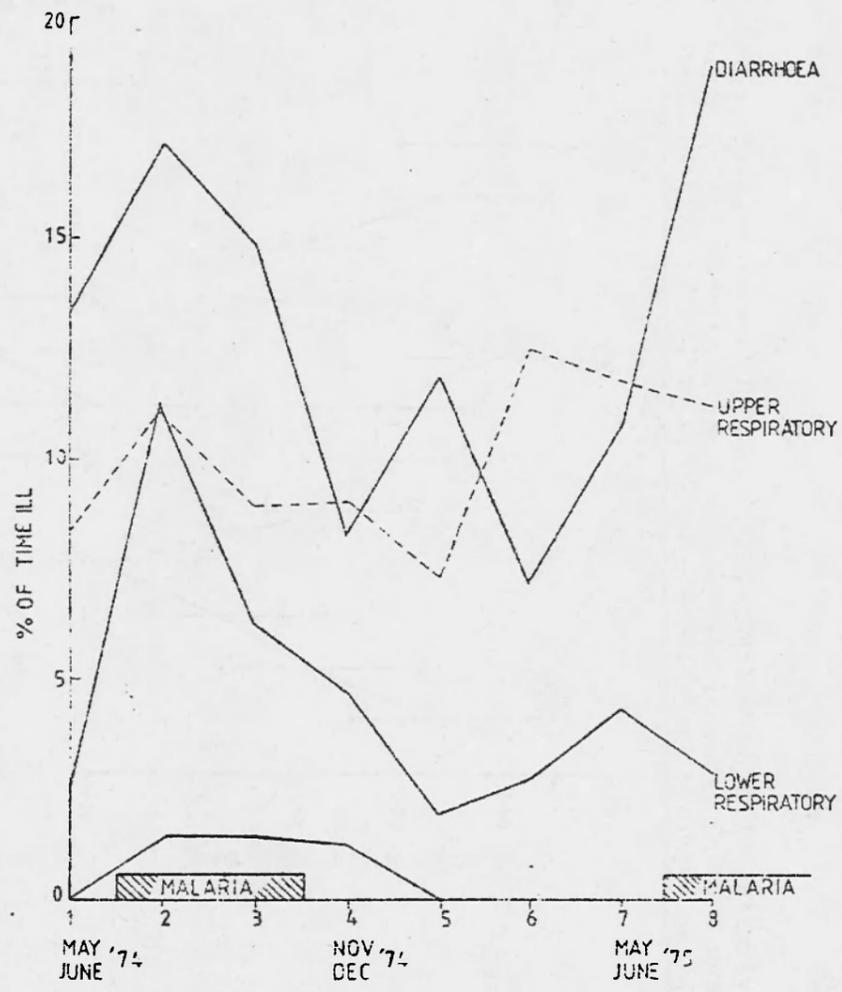


Figure 6.4 Gambia: weight loss and gain among women in Keneba, showing that even pregnant women lose weight during the rains.

From: Rowland et al 1981 Seasonal Dimensions to Rural Poverty, Frances Pinter, London, p.173.



Source: Rowland et al. (1977); Whitehead et al (1976)

Figure 6.5 Gambia: seasonal changes in disease prevalence, Keneca village.

From Roberts, Paul, Cole and Whitehead, 'Seasonal changes in activity, birth weight and lactational performance in rural Gambian women', Transactions of the Royal Society of Tropical Medicine and Hygiene, Vol 76, No 5, 1982, pp. 668-676

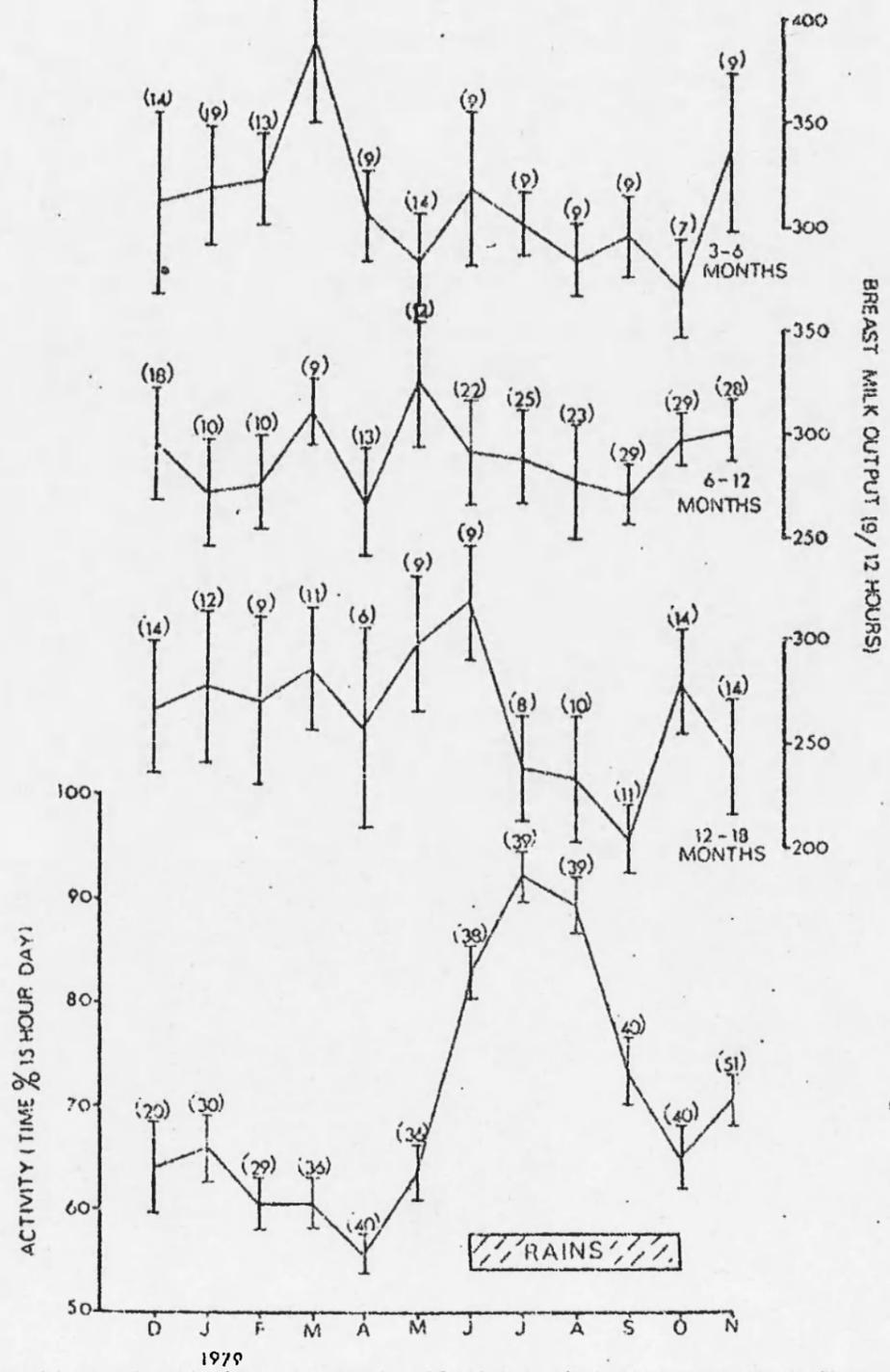


Fig. 4. Seasonal changes in the activity of the lactating women in rural Gambia (% time of 15-hour day) and 12-hour breast milk output at different stages of lactation (g/12 hours). Points represent mean values, with their standard errors represented by vertical lines. Number of subjects given in parentheses.

# Seasonal changes in nutritional status and the prevalence of malnutrition in a longitudinal study of young children in rural Bangladesh<sup>1-3</sup>

Kenneth H. Brown, M.D., Robert E. Black, M.D., M.P.H., and Stan Becker, Ph.D.

**ABSTRACT** During longitudinal field studies of the growth, dietary intake, and morbidity from infectious diseases of children between 6 and 60 months of age in two rural villages of Bangladesh, seasonal fluctuations in growth, nutritional status, and the prevalence of malnutrition were observed. The weight, length, arm circumference, and triceps skinfold thickness of 197 children were measured monthly for 15 months and compared with sex-specific local village norms and international reference populations. The percentages of expected weight for length, arm circumference for age, triceps skinfold thickness for age, and the percentages of expected monthly increments of weight and length for age were the indicators most sensitive to seasonal changes. The percentages of expected weight for age and length for age also changed significantly by month of year, but were less responsive to seasonal variation. The periods of greatest nutritional deficit depended on which anthropometric indicator was used to define nutritional status, but generally occurred during the monsoon and persisted until the subsequent harvest period. However, the fall in mean percentage of expected length for age and the increase in the prevalence of stunting occurred several months after the periods of greatest malnutrition identified by the other measurements. The importance of selecting the appropriate anthropometric techniques to detect seasonal changes and the implications of such changes are discussed. *Am J Clin Nutr* 1982;36:303-313

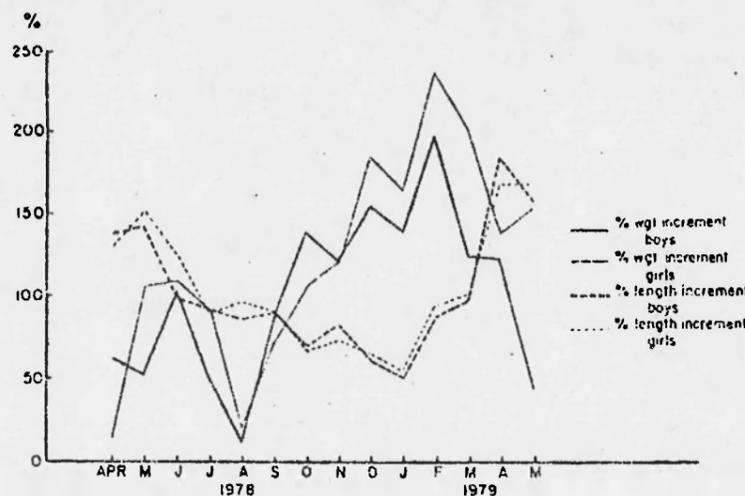


FIG. 7. Mean percentage of expected monthly increments of weight and length for age by month of year.

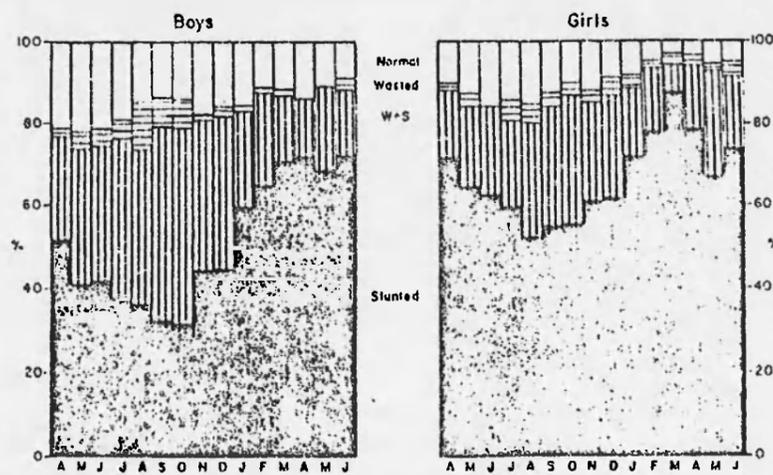


FIG. 9. Percentage of children identified as normal, wasted, stunted, and both wasted and stunted by month of year. Wasting defined as more than 2 SD below NCHS mean weight for length; stunting defined as more than 2 SD below NCHS mean length for age.