

**Health, Agriculture, and Rural Poverty:
Why Seasons Matter**

by

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This paper argues that in many tropical environments the wet season is the most critical time of year, especially for the poorer people, women and children. Commonly at that time malnutrition, morbidity and mortality peak; the costs of sickness - to society in lost agricultural production, and to families in food and income foregone - are at their highest; sickness is most liable to make poor people permanently poorer; and health services are likely to be at their least effective. But systematic biases prevent urban-based professionals from adequately perceiving this seasonal deprivation; they tend to underestimate morbidity in wet seasons and not to recognise its social and agricultural impacts. More needs to be known about impoverishment through seasonal sickness, about micro-level seasonal linkages, and about zones of adverse seasonalities; and priority is indicated for research on tropical diseases with seasonal impacts on agriculture. More immediately, seasonal analysis has practical implications for the management of health services, including the supply of medicaments, preventive and curative measures, crèches for working mothers, and the selection of community health workers able to provide care at the times of greatest need. Finally, decentralised seasonal analysis is proposed. This would bring rural health and agricultural staff together to identify local linkages between health, nutrition, agriculture and poverty, and then to plan and implement programmes geared to the seasonal needs of the poorer and more vulnerable people.

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I THE ARGUMENT

This paper¹ argues that in many tropical rural environments the wet season is the most difficult and critical time of year, especially for the poorer people, women, and children. The 'wet season' here refers to the period from the onset of rains until the harvest. This wet season is often the time when morbidity and mortality are highest, when people are most incapacitated by sickness, when rural health services are least likely to be effective, and when urban-based officials are least likely to observe what is happening in rural areas. The seasonal dimension is important in determining medical research priorities, and in planning and administering preventive and curative health programmes. Seasonal analysis presents an opportunity for improving health care at the times when it is most needed.

The main argument is presented in the form of seven propositions:

- most of the very poor people in the world live in rural tropical environments of marked wet-dry seasonality;
- malnutrition, morbidity and mortality have seasonal patterns and often peak during the wet season;
- the poorer people, women and children are especially vulnerable to hardship, malnutrition, sickness and death in the wet season;
- the economic costs of sickness and weakness are concentrated in the wet season;
- it is during the wet season that sickness is most liable to make people permanently poorer;
- rural health services are likely to be at their least effective in the wet season;
- urban-based professionals underperceive seasonal deprivation and underestimate morbidity in the wet season.

The seven statements will be discussed in turn. They are not generalisations with universal validity. The critical reader will recognise that there are exceptions to most, if not all,

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of them. Environments vary and each should be examined separately. Nevertheless, the evidence so far assembled (see Chambers, Longhurst, Bradley and Feachem 1979) suggests a seasonal scenario in which many factors are adverse during and just after the rains.

In this scenario,

for agriculturalists in the tropics, the worst times of year are the wet seasons, typically marked by a concurrence of food shortages, high demands for agricultural work, high exposure to infection especially diarrhoeas, malaria and skin diseases, loss of body weight, low birth weights, high neo-natal mortality, poor child care, malnutrition, sickness and indebtedness. In this season, poor and weak people, especially women, are vulnerable to deprivation and to becoming poorer and weaker (Chambers et al 1979, abstract, and see pp 3-6 for an extended version of the scenario).

1. Most of the very poor people in the world live in rural tropical environments of marked wet-dry seasonality

Climatic seasonality in the tropics has been defined and measured in several different ways (Walsh 1978). One distinction is between unimodal (single peak) and bimodal (double peak) patterns of rainfall, with their associated patterns of agriculture. Another approach, developed by Walsh (*ibid*) distinguishes relative seasonality (degree of contrast between the rainfall of different times of the year) and absolute seasonality (length of the dry period). Using Walsh's classification system to eliminate areas like Kerala and the Congo basin which have low relative and absolute seasonalities, the rural populations subject to marked climatic seasonality in Africa south of the Sahara have been estimated at about 220 mn, and in the Indian subcontinent at about 600 mn (Chambers 1978:12). With the addition of other areas, including parts of Central America, South America and Southeast Asia, it seems likely that the total rural population living in tropical environments of marked climatic seasonality will be over one bn. This represents a high proportion of the very poor people in the world.

2. Malnutrition, morbidity and mortality have seasonal patterns and often peak during the wet season

Patterns of seasonal stress vary. In pastoral areas of very low rainfall, the most critical times of the year are usually towards the end of the dry season (see for example Swift 1978). In North India the very hot dry season, the hot wet season, and the cold dry season are all associated with different forms of stress and morbidity. Elsewhere in the tropics the most difficult time of year appears very generally to be the wet season. For cultivators and labourers the rains are often a

'lean' or 'hungry' period of physical stress when shortages of food combine with high energy demand for agricultural activities (Bayliss-Smith 1978, Longhurst and Payne 1979). Food is at its scarcest, most expensive, least varied, and least well prepared at these times of year (Schofield 1974). Resistance to disease is lowered.

But it is precisely at this time that exposure to infection is often most pronounced and morbidity highest. While there are local variations and exceptions, it is common during tropical rains for there to be a rise in the incidence of diarrhoeas (Chowdhury et al 1978, Cutting 1978, Drasar et al 1978, Rowland et al 1978), malaria (Bray 1978), skin infections (Porter 1978), guinea worm disease (Belcher et al 1975, Muller 1978), Dengue fever (Halstead 1966), and snake bites (Warrell and Arnett 1976).¹ Other diseases may also be most prevalent at these times, as with cholera in parts of Bangladesh (Chowdhury et al 1978: table 2). Not only is morbidity high at these times, but death rates in tropical countries typically peak during or just after the rains (Dyson and Crook 1978: 19). The wet season is not just the hungry season; it is also often the sick season.

3. The poorer people, women and children are especially vulnerable to hardship, malnutrition, sickness and death in the wet season

Seasonal malnutrition and poverty go together and for many of the poorer people, seasonal shortages of food coincide with a demand for high energy output in agricultural activities. This is reflected in substantial changes in body weight in areas of seasonality and poverty (Hunter 1967, Longhurst and Payne 1979). Body weight data has, however, rarely been analysed by socio-economic category. In the one case that is known, Chowdhury and others (1978:12-13 and table 4) found in one part of Bangladesh that landless mothers had lower average body weights, and greater variance seasonally around the mean, than did mothers in families with two acres of land or more.² On the basis of extensive comparative analysis, Schofield has

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1. Warrell and Arnett consider that 'Although snake bite is recognised locally as an important medical problem in many rural areas of the tropics, its incidence has been grossly under-reported'. High incidence is associated with farming activities and with rains which drive snakes to drier land (pp 320 and 326).
 2. The mean for mothers in families with two acres or more was 41.8 kg, and for landless mothers 40.2 kg. Both groups weighed most in March and least in September, with percentages of their respective means of 103 and 104 for March, and 97 and 95 for September.

written (1974:25) that '... the very poor do more physical work and get less food, and the short- and long-term effects of seasonal variations around an already low level are thus worse for poor families.'

Mortality is also, as might be expected, higher among poorer people. This is notoriously so during famine, and is illustrated by McCord's much quoted evidence from Companiganj in Bangladesh in 1975 in the sequel to the floods of 1974. He found that the crude death rate was three times higher among landless families than among those with three or more acres of land, while the differential increased to five times for deaths of children aged 1-4 years - 86.5 per 1000 among landless families, compared with 17.5 per 1000 among families with three acres or more (McCord 1976, cited in Chowdhury and Chen 1977:417). Perhaps more remarkable is the finding of Durham (personal communication) that in a rural area in El Salvador the child mortality rate of children of females born between 1915 and 1945 was about 38 per cent among landless families compared with about 11 per cent for families with two hectares or more. As we have noted (Dyson and Crook 1978:19), mortality is also seasonal. The question then arises whether seasonal peaks in mortality disproportionately represent poorer people, women, and/or children.

The evidence available is suggestive. McGregor and others, for example, found that half the infant deaths in a Gambian village occurred during the three months of the rains (McGregor 1976 and McGregor et al 1961, cited in Rowland et al 1978:1). Becker and Sardar, analysing data from Matlab Thana in Bangladesh, found that the age groups with the most marked seasonality of death were those in which the overall risk of death was high. They reported that these were children in the first month and first year of life, and people aged 44 and above. Within these age groups families which are landless seem to be the most vulnerable to sharp fluctuations in deaths, perhaps reflecting their very precarious financial position in slack months prior to harvest (Becker and Sardar 1978:20). Given the interactions between poverty, malnutrition, morbidity and seasonality, it would indeed be surprising if this were not the case.

Part of the difficulty in writing about seasonal privation is the multiple linkages which operate at the worst times. This can be illustrated by some aspects which especially concern women and children (see Schofield 1974, PAG of the UN 1977, Chowdhury et al 1978, Palmer 1978, Rowland et al 1978, Whitehead et al 1978, Schofield 1979). It is possible that some lactating women stop breastfeeding with the onset of the rains, anticipating hard work, but increasing the risks for their weaned children at the time of peak exposure (see, eg, Barrell and Rowland 1979) to bacterial overgrowth of foods. Within the family, women may also be discriminated against in the allocations of food. In the Gambia, Whitehead and others found (1978:5-7) a sharply reduced capacity for lactation during

the rains when mothers' average energy intakes fell to less than 50 per cent of the recommended value. In the month of August they found that women in the last trimester of pregnancy lost an average of 1.4 kg, and that a similar weight loss occurred during lactation at that time. During the rains, women often have exceptionally heavy work loads, which leads to stress and to the neglect of children and of domestic activities generally. Schofield has listed some effects of reallocating female labour time during this period of crisis:

Cooking practices change, especially where quick easy-to-prepare meals (usually of the nutritionally poorer staples such as cassava) are produced once a day or in bulk, and vitamins are destroyed by food kept simmering in the pot. Intra-family distribution of food is affected, where the children are asleep before the daily meal has been prepared and women have no time to either prepare special infant foods or effect the proper distribution of available foods. Food gathering may be inhibited so that some types of foods (eg green leafy vegetables) are suddenly excluded from the diet. House-cleaning, essential in overcrowded and insanitary conditions, may be inhibited. Fuel and water collection is constrained by lack of time. Finally mothers devote less time to the care of their children who are often left in the charge of other siblings or elderly grandparents (Schofield 1974:27, italics in original).

A further condition which appears adverse for mothers and children is the tendency for births to peak in the late rains and around the time of harvest. There is evidence for this from widely scattered environments including Bangladesh (Becker and Sardar 1978), Guatemala (Mata 1978:34), most states in India (Dyson and Crook 1978:36-39), Nigeria (personal communication, Richard Longhurst), and Senegal (Lericollais 1972:14). The questions here are complex and birth at any time of the year has its particular disadvantages. A careful analysis by Schofield (1979:102-9) finds no simple conclusion about a best time for births. Each environment is likely to deserve separate examination. But a concurrence of late pregnancy with heavy work, food shortages, poor nutrition, and high exposure to infections during the rains and around harvest, is hard for both mothers and babies. Rowland and others (1978: table 2) found in the Gambia that birth weights during the six months which included the rains were significantly lower than for the other six months of the year. The prognosis for those children born during the rains was also worse (Rowland et al:1). Rowland and his collaborators have written, in summary, that 'many adverse factors operate mainly during one period of the year, the rainy season. The mother who produces her child at this time will have suffered more weight loss herself during pregnancy, producing a smaller child who then gets less breast milk and cannot "catch up"' (1978:9). To the extent that late pregnancy and birth peak at a time of

year which is difficult for the mother and which offers a poor prognosis for the child, this is yet another way in which tropical seasonality accentuates the stress and risks of the vulnerable.

4. The economic costs of sickness and weakness are concentrated in the wet season

The economic costs of sickness and weakness can be analysed both in terms of agricultural production foregone in the economy, and in terms of losses for small-farming and landless families.

These costs are linked with the seasonal labour demands of tropical agriculture. These are often sharply peaked, especially for the activities of land preparation, transplanting, weeding and harvesting. For small-farming families, the area they can cultivate and the yield they can obtain depend on adequate and timely labour inputs. As Hugh Bunting has written, 'In many traditional farming systems, particularly in the seasonally arid tropics, there are pronounced seasonal peaks in the demand for labour, notably in the early part of the season when land must be broken and crops sown and weeded. The peak is accentuated by the risks of losing the initial flush of nitrogen to leaching on the one hand and to weeds on the other' (1970:737). Inability to carry out an operation promptly can, then, mean loss of a crop. In the words of a Gambia village woman to Margaret Haswell, 'sometimes you are overcome by weeds through illness or accidents' (Haswell 1975: 44). With small farmers who have to rely on family labour, and for whom that labour limits area or yield, incapacity through illness is likely to mean a smaller crop or no crop at all.

Such incapacity is most obvious in those diseases which are epidemic during and just after the rains, as with malaria and guinea worm disease. The effects of malaria have long been recognised. Thus B.H. Farmer, in his classic study of the Dry Zone of Ceylon, wrote:

In addition to its effect on the death-rate and on the ability of the Dry Zone population to maintain itself, malaria induced mental and physical inefficiency in its victims. The incidence of fever was unfortunately highest during the rainy season ... just when the stricken cultivators should have been busy with their ... main paddy crop and with their chenas [dryland cultivation]. It is not surprising that general debility and seasonal fever helped, with other factors, to produce low crop yields (Farmer 1957:20).

The major reduction in malaria in the Dry Zone was, he considered, 'a true revolution' (p 223).

Guinea worm disease presents another dramatic example of loss of production through incapacity. Belcher and others (1975) considered, on the basis of a study in rural Ghana, that this

was the major preventable cause of agricultural work loss. They reported that

The highest attack rate was in adult male farmers, with three out of four affected in some villages. Disease which occurs at a slack period would have little impact on agricultural output, but guinea worm disease coincides with the two peak agricultural periods. Untreated farmers were completely disabled for over five weeks, and few households succeeded in finding alternative labor sources so that a major crop was lost (Belcher et al 1975:248).

They concluded that

Because guinea worm disease is seasonal, coinciding with peak agricultural activities, and few alternative labor sources are available for the incapacitated farmer, a marked reduction in agricultural output occurs (p 243).

The diarrhoeas may be somewhat more varied in their seasonalities than either malaria or guinea worm disease, and their effects are less visible. But they are so widespread, with an estimated 3 to 5 bn infections per annum in the world (Walsh and Warren 1979:appendix A), that it is difficult to imagine that they do not contribute substantially to losses in production. Infections of the skin also tend to be less spectacular, but bacterial and fungal infections are most prevalent during the rains and skin diseases are a frequent reason for people visiting health facilities. They affect how time is utilised in the family and they too have direct and indirect economic costs (Porter 1978). Indeed, production is liable to be affected not just by those diseases which have pronounced peaks during the agricultural season, but by all diseases, whether they peak or not, which weaken or incapacitate at this time. Moreover, it may often be the interaction of several adverse factors, of which a specific disease is but one, which reduce work. Margaret Haswell has observed of a village in the Gambia: 'persistently poor feeding and lowered resistance to disease adversely affected the quality of work of some farmers' (1975:45). The cost in production and income foregone is often the outcome of interactions of malnutrition, high energy demand, low immune response, and combinations and sequences of morbidity.

If the economic costs of incapacity to work, and therefore the benefits of prevention of incapacity, are highly seasonal, the estimation of these costs and benefits is far from simple, and subject to many local variations and subtleties. Prescott, after reviewing ten attempts to evaluate the social costs of malaria and the social benefits of its control in particular communities, concluded that 'no cost-benefit analysis of malaria control has yet provided a plausible estimate of the net aggregate income benefit which might result' (1979:39).

Prescott argues that the benefits of malaria control may have been exaggerated through high values for the duration of disability and debility per case, and through ignoring the seasonal distribution of cases in relation to seasonal labour surpluses (1979:66). Responses to malaria at peak periods include: working in spite of it (though with diminished efficiency); pressing into service other family members; and employing non-family labour. He also argues that 'cases prevented in periods of labour surplus will probably contribute a zero marginal product' (1979:66), repeating a point made earlier by Elliott that if acute sickness strikes during a period of excess family labour capacity, its economic cost is zero (1970:655).

The reality may often be more complex. First, any analysis of social costs and benefits of labour inputs foregone must be in terms of farming calendars and the benefits of timeliness. A farming family suffering sickness during a critical week, even if other labour is eventually recruited or pressed into service, may suffer a major loss of production which is easily underestimated. Second, sickness in a slack period may not be costless: it may have a lingering or permanent effect on physical capacity, or it may require payments for treatment which impoverish and which reduce the ability to cope with subsequent seasonal peaks. For both these reasons, the benefits of incapacity averted will be higher rather than lower.

For families, the costs and benefits to small farmers may sometimes differ from those to landless labourers. Higher wages at times of peak labour demand, especially harvest, suggest high costs to labourers from being sick at those times. This may be generally true, and supports the case for seasonal preventive interventions. However, two possible twists may be noted. The first is that less sickness among small farmers at times of peak labour demand may reduce employment for the landless, since farm families will be better able to meet their requirements from their own resources: for example, Bhombore and others (1952, cited in Prescott 1979:24) found in one village in a malarious area in Mysore that after an anti-malarial programme, annual expenditure on hired labour fell by 76 per cent in one sprayed village for which data were available. The second possible twist is that for very poor people in zones of marked labour surplus - as in parts of Indonesia (Bejamin White, personal communication) - it may take more hours of work in the slack season to earn enough to survive than it takes in the busy season. For a very poor family with one or more members sick, it may then be harder to obtain enough for survival in the slack season than it is in the busy season, so that slack season sickness brings greater privation. While these two twists may be exceptional, the possibility of their occurrence deserves to be on the agenda of rural planning where there are landless labourers.

In general, however, the evidence is strong that the costs of sickness and weakness for rural agricultural populations, are

usually concentrated in the wet season. The implications for rural health planning are both immediate and future. One objective of rural planning in areas of labour surplus is to create labour scarcities which will drive up real wages and differentially benefit the landless and near-landless. As scarcities are created, the costs in production foregone of sickness at peak periods will rise sharply. One example is the watershed technology being developed by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) at Hyderabad. Although there are seasonal health problems in ICRISAT survey villages, they have not been presented as a major problem limiting agricultural production. But the new watershed technology would shift labour demand from a position where on average all demands can be met from family labour throughout the year, to one in which there would be acutely peaked deficits (Ghodake et al 1978). One may speculate whether with such a technology villagers might not come to perceive illness at those times as a new serious problem; certainly the economic returns to effective preventive health programmes at those times would rise with the change in farming system. In such a case, as generally, costs to society and to families of incapacity through sickness will be higher wherever there is a labour deficit at times of seasonal demand, so often precisely when vulnerability to sickness is greatest.

5. It is during the wet season that sickness is most liable to make people permanently poorer

Rural poverty has many causes, and discussion of seasonality should not distract attention from those which are political and social, or from political and social solutions. At the same time, in seeking to slow, arrest or reverse processes of impoverishment, it is relevant to analyse the contingencies which trigger loss of assets or the incurring of debts. These are very obvious to the people concerned, but few recent studies are known which have analysed the proximate events which provoke the sale or mortgaging of land, livestock, jewelry, utensils, or tools, or the negotiation of loans. These contingencies can be classified as social and ceremonial (bride-wealth, dowry, weddings, funerals etc); legal (litigation, compensation and fines); consumption (alcoholism, etc); failures of enterprises; famine; and sickness.

A distinction can be made here between ways in which tropical seasons help to keep people poor, screwing them down cyclically in their poverty; and ways in which tropical seasons may help to make people poorer, forcing them down against a ratchet which may be irreversible. Mild or brief sickness may merely reinforce the cyclical screw, though the poorer people are, the more serious it is likely to be; but acute or prolonged sickness is more likely to force a ratchet, to be a contingency which impoverishes permanently.

The relative significance of health ratchets in processes of impoverishment can be expected to vary according to the levels

of other contingencies, the degrees of poverty, the incidence and seriousness of disease, the availability and efficacy of curative facilities, and the direct and indirect costs of treatment. The severe and irreversible effects of even quite a short illness can be illustrated by the example of a landless family in the Philippines, the Sumagaysays. Tiyo Oyo, the head of the family, was stricken by a mild form of cholera for a month, and had to be taken to hospital. Tiya Teria, his wife, handled the crisis. Antonio Ledesma reports:

The week's stay in the hospital cost the family ₱120, with food not yet included. Another ₱130 had to be provided to buy dextrose when Tiyo Oyo was in a critical condition. Fortunately, one of the drugstores in Pototan agreed to provide a guarantee for the Sumagaysays in the hospital. To cover the expenses, Tiya Teria had to sell their carabao [buffalo] for ₱330 to another small farmer ... The carabao was already in full working condition, and under normal circumstances could have been sold for more than twice the amount received by the Sumagaysays. Moreover, with the carabao, Tiyo Oyo would still have been able to plow other farm parcels for ₱10 a day instead of working as a pure manual laborer for the current wage rate of ₱6 a day ... In that sense, parting with the carabao meant parting with their last capital investment in farming. Buying a new carabao today would be unthinkable with the current market value of a working carabao estimated at ₱1,000-1,500 (Ledesma 1977:27).

One may note, in this example, what may be common: the high cost of treatment, the need for cash at short notice to meet it, the distress sale of an asset at less than its normal market value, the reduced family earning capacity as a result of the sale, and the impossibility of ever regaining the asset. A short illness can make a family permanently poorer, as it did with the Sumagaysays.

The incidence of such health ratchets is difficult to assess. An illustration can be drawn from a micro-study by David Parkin in a coastal area of Kenya. He has written:

Natural or man-made misfortunes, of which the greatest is sickness, strike into the lives of men and their families with a suddenness which defies resistance or delay. Cures must be sought, sometimes at great expense, from a range of traditional doctors, whose various techniques are applied until success, or death, ensues (Parkin 1972:59-60).

Parkin found that sickness was a common reason for selling land, being given or implied as a factor in 14 out of 58 transactions (pp 60-61). He concluded that 'Bridewealth

demands, sickness, and death ... are the main factors prompting men to dispose permanently of their palms and land' (p 61). Similarly, in Bangladesh, sickness appears to be a common factor leading to the impoverishment of families, and especially of women whose husbands have died after an illness during which the family's assets have been sold seeking treatment and cure.¹ One may speculate about how many millions of families, each year, are made permanently poorer by the costs of sickness and treatment; and how preventable this may be.

These examples do not indicate the seasons when the sicknesses occurred. They might have been at any time of the year. But there are reasons for supposing that ratchets from sickness are most common and are most commonly precipitated, during the lean and vulnerable season of the rains. It is not just that the incidence of disease is often greater then. Perhaps more, it is that other factors interact to make sickness more damaging at that time. During the agricultural slack season, after harvest, families have more resources to meet the costs of treatment and transport, travel is relatively easy, the labour of the sick person and of those who take the person for treatment has low opportunity cost, the climate is usually more favourable for recovery, food is adequate and more varied, and time can be spared to care for the sick person. In contrast, during the busy and lean agricultural season, families have fewer resources to meet costs of treatment and transport, travel is more difficult, the labour of the sick person and of those who take the person for treatment has high opportunity cost, the climate is less favourable for recovery, food is often scarce and less varied, and time is harder to spare to care for the sick person. In the lean season of the rains, then, it is likely that there will be longer delays before treatment (if any), that sickness will last longer, and that the costs, direct and indirect, will be much higher. Sickness during the rains and before harvest is thus more likely to lead to irreversible impoverishment. Not only is the incidence of sickness higher; it is also more damaging. More than at other times sickness in the wet season is liable to make poor people permanently poorer.

6. Rural health services are likely to be at their least effective in the wet season

In order to prevent and treat sickness, to reduce mortality, to help the poorer people, women and children, to reduce the economic costs of sickness, and to prevent people being made permanently poorer by sickness, rural health services should be at their most effective during the time of greatest need, typically in the wet season.

1. Personal communications, Martin Greeley, Saleha Begum, and members of the field team of the Institute of Development Studies Project on Post-Harvest Losses in Bangladesh.

This is, however, when they are likely to be least effective. There is an agenda of possible factors to be addressed in any particular situation:

- (a) the demand for medicaments may be high, but supplies are often on a flat rate monthly basis. At these times, then, if there is any shortage, more people will go without treatment. (If there is an unofficial inducement paid for treatment, this may seasonally rise to reflect the excess of demand over supply, discriminating against those who find it hard to pay);
- (b) the supply of medicaments may be interrupted by problems of transport during the rains. Supplies to meet emergencies will be harder to get through than at other times of the year;
- (c) standards may fall because supervisors visit less because of transport problems;
- (d) there will be less specialist treatment of serious cases either on the spot or through referral because of transport and other communication problems;
- (e) mobile services may not be able to operate, or be able to operate only on good roads;
- (f) health staff may take leave, or devote less of their time to health work, in order to fulfill the competing demands of their own agricultural activities. This will apply especially with village primary health care workers;
- (g) health staff (especially primary health care workers who may be subject to many of the seasonal stresses) may themselves be sick at these times of year;
- (h) inelastic services will deal with a lower proportion of those in need at times of high demand than in slack periods;
- (i) (as we have seen) rural people may be less able to reach or afford to take up health services during the rains;
- (j) there may be a problem with the phasing of the financial year. Funds are typically short in the second half of any financial year, and especially so towards the end of it. In countries in East Africa, for example, where the long rains begin in March or April, a financial year which starts in July may mean that drugs and transport are in short supply at precisely the time when they are most needed.

7. Urban-based professionals underperceive seasonal deprivation and underestimate morbidity in the wet season

To the extent that the six preceding propositions apply, one would expect rural health services, both preventive and curative, to anticipate the demands of coming wet seasons and to pay special attention to those diseases most prevalent and incapacitating at those times and to those who are most vulnerable. Informal evidence suggests that this is rare. It seems odd, given the strong influence of economists on planning, that health services should not be concentrated on the period when they are most cost-effective in preventing the loss of agricultural production. In its section on health as a productive investment, the World Bank's (1975) Health Sector Policy paper shows no awareness of this but is, rather, preoccupied with the costs of 'absenteeism' (World Bank 1975:25-29), suggesting an urban, plantation and large farm bias. It also seems odd, given the fieldwork of sociologists and social anthropologists which extends through several seasons, that more attention should not have been directed towards the need for health services at those times when sickness is most likely to impoverish. There is something to explain. Either the propositions are false or exaggerated, or there must be reasons why their implications are not perceived or pursued. If such reasons exist, the propositions are all the more credible.

Four biases operate so that professionals underperceive seasonal deprivation and underestimate morbidity during the wet season:

(a) professional and personal biases

Medical practitioners are pointed away from rural poverty and seasonality by their professional training and by their life experiences.

Professional training has been influenced by needs in highly industrialised rich countries in temperate climates, where urban living provides little contact with rural seasonality, food shortages are rare, and harvest, the main agricultural labour peak, comes at a healthy time of the year. Professional training for specialised expertise tends to concentrate and narrow vision, so that if professionals (whether medical or other) do note adverse seasonal effects, these tend to be limited to their restricted preoccupations. A doctor may observe seasonal patterns of morbidity but not of indebtedness. An economist may analyse seasonal changes in wages but not in the incidence of malaria. For rural people, unblinkered by disciplinary specialisation, multiple adverse seasonal interactions may be more obvious. But professionals have been trained away from being able to see them, and have been so 'educated' that they are often neither able nor willing to learn from rural people.¹ Professional insight into the

1. For discussion of learning from rural people, see IDS(1979).

multiple interactions of adverse seasonality is one of the casualties. This is reinforced by the well known urban bias of professionals generally and of doctors in particular. For many, urban work is most professionally satisfying, most remunerative, and most convenient. Professionally and personally, and except for a small but distinguished minority, doctors are not exposed to rural seasonality and so do not appreciate its significance.

(b) biases of access and contact

Areas visited by urban-based professionals tend to be those that are more accessible - urban, peri-urban, and regions near large cities (which tend to be the more prosperous). This has been described as 'tarmac bias'. Ssenyonga has observed in Kenya how services are concentrated along good roads, how the better-off people buy up plots there and build good houses, and how the poorer people move back out of sight (Ssenyonga 1976:9-10, and personal communication). Those contacted on rural visits by urban-based professionals are likely to be those who are less adversely affected by seasonality - those who are accessible and visible, the better off rather than the poorer, people on regular salaries rather than people depending on agriculture, farmers rather than labourers, people with access to off-farm employment rather than those dependent solely on cultivation, men more than women, those in project areas rather than those outside, users of services rather than non-users, those who go to meetings rather than those who stay at home, those who go to market (who have something to sell, or something with which to buy) rather than those who do not go because they have nothing, those who are alive not those who are dead. Those most affected by adverse seasonality are precisely those least likely to be encountered.

(c) dry season bias

Rural visits by urban-based professionals have their own seasonality. Epidemiologists may visit during the rains. But for urban people generally, the rains are a bad time for rural travel because of floods, mud, broken bridges, getting stuck, damaging vehicles, losing time, and enduring discomfort. In some places, roads are officially closed. In the South Sudan, there is a period of about two months after the onset of the rains when roads are impassable but when there is not yet enough water in the rivers for travel by boat. Many rural areas are quite simply inaccessible by vehicle during the rains. The worst times of year are then not seen. But once the rains are over urban-based professionals travel more freely. The dry season, when disease is diminishing, food stocks are adequate, body weights are rising, ceremonies are in full swing, and people are at their least deprived, is the peak

period for rural visits, forming impressions, and gathering data.¹ Even nutrition surveys are sometimes carried out after the harvest (Jim Pines, personal communication).

(d) statistical biases

Two sets of statistical biases understate the incidence of sickness during rains. First, even where surveys are carried out all round the year, analysis of the data tends to be aggregate. Only if time, patience, money and interest are adequate (which they often are not), will the more time-consuming analysis which shows seasonal variations be carried out.

Second, and more seriously, there are many reasons why sickness in the wet season is under-reported in official statistics. An example of under-reporting of a seasonally crippling disease is presented by Belcher and others. In their study of guinea worm disease in Ghana they observed that attendance at modern health facilities was low because of distances involved, increased pain with motion, and greater reliance upon traditional medicines (1975:248). They found that 'few infected persons attend medical clinics (less than 1 per cent in this study) so that its incidence is greatly underestimated' (p 243). The question here, as more generally, is why there is under-reporting and what seasonal factors affect it. Many factors, alone or combined, can be expected to reduce the proportion of the sick who get to health posts or clinics or hospitals during the rains, and who therefore appear in the statistics: difficulties and discomforts of travel (impassable roads, mud, flood, rains, etc.); shortages of cash; the high cost of loans during the lean season; the high cost of time and energy required to get sick people to treatment during food shortages and agricultural activities;² the high cost of waiting for treatment;³ longer waiting times for

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1. For example, a manual for assessing rural needs warns about the unexpected in rural surveys and says: 'once, the jeeps needed for transporting the interviewers were recalled for a month during the few precious months of the dry season' (my underlining) (Ashe 1979:26).
 2. Consider, for example, the social and economic cost to a poor family of persuading the able-bodied at a time of peak activity to carry a sick person to a clinic for treatment, if indeed they could so persuade anyone.
 3. See for example Cole-King (1979:8). 'Patients frequently have to wait long hours at out-patient facilities: if they have to travel any distance, and a visit to a health centre may take a whole day, the loss of a day's work may be a significant cost to patients'.

treatment; inelastic services;¹ multiple undernutrition and sickness in the same family; delays in treatment leading to greater incapacity, greater pain, and greater difficulty in movement; and sheer physical weakness and exhaustion in both the sick and their helpers. These factors interact, and the distortion is accentuated by the operation of their opposites during a dry season following harvest.² Not only do these statistical warps understate wet season sickness but they reinforce other biases, making it even more difficult for professionals who are trained to use statistics to appreciate the extent and seriousness of seasonal morbidity.³

When these biases - personal and professional, access and contact, dry season, and statistical - are seen to be interacting with and reinforcing one another, it is less difficult to understand why seasonal dimensions of health and poverty are not more prominent in health programmes.

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1. If services are inelastic, those seeking treatment have to wait longer at peak periods, fewer will come for treatment, and those operating the services will underestimate morbidity in the population as a whole. Alastair White (personal communication) reports '... in El Salvador where treatment is rationed on a queuing basis (the doctor will be able to see say 30 patients in the day, so it is only the first 30 to arrive who are seen), high seasonal demand is translated into a need to arrive earlier, which will mean setting out from home before dawn if you live in a village a couple of miles away, even though the doctor does not arrive till 9 a.m.'
 2. The 1978 Report of the Gono Unnayan Prochesta (People's Development Effort), Bangladesh (GUP 1979), is illuminating. Patients at the Outdoor Clinic, Khalia, reached a peak of 9830 in June, and dropped to 1227 in December. The high figure in June was partly associated with high morbidity, but also with less work to do in the fields, ease of travel, and cash from paddy and jute harvests; while December was a busy month with harvesting and post-harvest processing for the main paddy crop.
 3. A question raised here is whether traditional medical practitioners receive a disproportion of patients during the rains, with a compensating seasonality in attendances between traditional (rains) and allopathic (dry season) services and practitioners. Any such tendency might be reinforced by financing arrangements, with debts easier to arrange in the traditional than in the allopathic system.

II PRACTICAL IMPLICATIONS

This analysis has its own biases. It has been influenced especially by three sets and sequences of studies in three rural environments of marked seasonality in respectively, the Gambia,¹ Northern Nigeria,² and Bangladesh.³ Other environments are less seasonal, or more seasonal, or seasonal in different combinations of ways. In particular, the cold dry - hot dry - hot wet seasonality of much of Northern India presents a pattern of stress in the hot dry season which qualifies the scenario. It cannot be emphasised too strongly that each rural situation should be appraised separately to identify what interventions are appropriate. The practical implications which follow are not a blueprint. They are, rather, a check-list of ideas and a repertoire of options to consider, environment by environment.

Practical implications can be suggested under the headings of research, health services, and rural planning and action.

1. Research

Enough is known already, or enough is easily knowable through local-level analysis, for many seasonal problems to be tackled. Moreover, research can be a distraction, an excuse for postponement, and a means of reinforcing vertical and technological approaches to health problems which may distract from the priority of horizontal emphasis on primary health care. All the same, much remains to be known and done. Four suggestions can be made for research:

- (a) sickness and impoverishment: This research could be cheap, simple and widespread. It would rely heavily on the knowledge of rural people. The objective would be to identify the relative importance of seasonal sickness among other proximate factors in processes of impoverishment. It would involve both counting, as carried out by Parkin (1972) in Kenya, and case studies, like that written up by Ledesma (1977) from the Philippines. Besides its value as a contribution to knowledge, this approach should also be a useful part of local-level seasonal analysis in rural planning.

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1. The work of Margaret Haswell (1975; 1978) in Genieri village and of the Dunn Nutrition Unit at Cambridge University (see Rowland et al 1978 for references) in Keneba village.
 2. The work of Richard Longhurst (1979), David Norman, Emmy Simmons (1978), Andrew Tomkins (1978), Michael Watts (1978) and others based on Ahmadu Bello University, Zaria.
 3. The work of the Cholera Research Laboratory, Dacca (see Chowdhury et al 1978 for references) in Matlab Thana, Comilla District.

- (b) micro-level seasonal linkages: This would be more complex, involving analysis across disciplines to identify seasonal interactions, especially between bio-medical, socio-economic, and agricultural factors. It would rely on adding socio-economic and agricultural dimensions to existing bio-medical research (for example in the Gambia and Bangladesh), or in adding bio-medical dimensions to existing socio-economic and agricultural research (as with the villages studied by ICRISAT). Since there is already a strong data base in these studies, the marginal additions to knowledge might be high indeed, illuminating relationships between morbidity, mortality, age groups, socio-economic categories, seasons, and agriculture, and leading towards insights which might permit simpler diagnosis and prevention for rural planning and action elsewhere.
- (c) seasonal mapping: At an early stage in planning counter-seasonal strategies, it would be useful to map the spatial distribution of adverse seasonal factors and their linkages. In Sri Lanka, for example, the seasonality of malaria differs between ecological zones. Elsewhere, there may be acute combinations of adverse factors which are simultaneous in their impact only in certain definable regions. A preliminary mapping of seasonal interactions within a region or country should indicate those zones where attention should initially be directed.
- (d) research on tropical diseases: Whatever the reservations that a vertical approach may divert attention from primary health care, the present global figure of about \$60 million (Walsh and Warren 1979:20) for research on tropical diseases looks low. The UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (covering malaria, schistosomiasis, filariasis, trypanosomiasis, leishmaniasis, and leprosy) and the international centre for research on the diarrhoeas being set up in Bangladesh are, though belated, major new thrusts. The priorities accorded to malaria and the diarrhoeas fit the seasonal priorities which follow from the arguments in this paper. The question remains, however, to what extent the needs and wishes of rural people weigh as against professional considerations in determining research priorities, and whether the high costs, both social and private, of incapacity at periods of agricultural activity are taken into account. The rarity with which a seasonal link between health and agriculture is noted in medical writing about rural health suggests that the weight may be less than it should be. In selecting future priorities, seasonal analysis argues for priority for those diseases and complaints which weaken and incapacitate most at times of food shortage and high labour demand.

2. Health Services

Seasonal analysis of health, agriculture and poverty has implications for the planning and operation of rural health services,

and especially for the priority (WHO 1978) of effective primary health care. The seasonal dimension is, of course, only one of several. It may be argued that there are sometimes, or often, other priorities; that if, as found in a part of rural Ghana (IDS Health Group 1978), a third to a half of the population of districts live out of effective reach of health units providing primary care, it may be more important first to extend coverage before refining it to take account of seasonality. On the other hand, if a programme meets felt needs, as seasonal preventive and curative measures may often do, it will be popular, there will be a demand for it, staff morale and better staff performance may result, and there may be many benefits, notably for the poor.

Some of the more obvious suggestions arising from the analysis in this paper are:

- (a) stocking rural clinics and health posts with medicaments on a seasonal basis to meet seasonal needs, especially in preparation for the rains. This is a particular priority for primary health care in areas which are cut off in the wet season.
- (b) priority for seasonal preventive measures against diseases which incapacitate during the wet season. Malaria is a notable case where much can be achieved for relatively low cost and with enthusiastic public support. An example is seasonal anti-malarial chemoprophylaxis combined with other preventive measures in Raigarh District, Madhya Pradesh, where in two years an incidence believed to have been about 95 per cent was brought down to almost nil, with poor people prepared to pay for their pills (Sister Lorraine Ryan, personal communication). The cost-effectiveness of chemoprophylactic anti-malarial programmes can also be increased by shifting from year-round to seasonal implementation, as in some parts of Mozambique where action is being concentrated on the seasons of highest incidence (Malcolm Segall, personal communication).
- (c) priority for seasonal curative facilities for those sicknesses, especially diarrhoeas, malaria, skin infections, guinea worm disease, and dengue fever, which tend to be most prevalent during the wet season.
- (d) caution in introducing mobile clinics. Mobile clinics have been questioned on other grounds. The additional seasonal argument is that they may be unable to reach the more remote people who are often poorer and more vulnerable to adverse seasonality;¹ and that during the rains, when

1. This is partly an inference from Dasgupta's (1975) comparative analysis of 126 Indian villages.

health services are most needed in less accessible places, mobile clinics will be at their least mobile, often confined to tarmac roads, if not to garages.

- (e) concentrating preventive and curative health services in areas where the costs (in production foregone, in suffering, in impoverishment) of sickness in the sick and hungry season are highest.
- (f) encouragement of child day-care facilities especially at times of stress when mothers have to work in the fields. This has been done successfully in several, perhaps many, places. For example, harvest-season day-care centres were an effective addition to the Narangwal Project child health programme in the Indian Punjab (Robert L. Parker, personal communication).
- (g) in family welfare programmes, discussing the best and worst times of the year to give birth. Rural women may often be much more aware of the advantages or disadvantages of different seasons for birth than urban-based professionals realise. Discussing desirable times may provide one focus among others for enabling rural women to see advantages in being able to control fertility.
- (h) concentrating health education and preventive programmes such as immunization in the dry season. This is when rural people usually have more time, when their time has a low opportunity cost, and when they are in better health and have higher immune response. Health staff may also have a lower work load at that time, and travelling conditions are better.
- (i) staffing on a seasonal basis (in timing leave, in shifting staff from one area to another) in order to meet local seasonal needs. This may, however, be a difficult refinement to implement. It has been tried in Matlab Thana in Bangladesh, where Chowdhury and others (1978:17) report:

The seasonal nature of diarrhoeal diseases in Matlab has prompted the CRL [Cholera Research Laboratory] hospital to shift staff between periods of strong and weak service demand. Preventive work and non-seasonal curative services, such as family planning, may be undertaken during non-epidemic periods. It should be stressed however that this increase of staff efficiency may be achieved only at the cost of increased program complexity. Shifting of staff work requires more training, supervision and other program support services (Chowdhury et al 1978:17).
- (j) selecting community health workers for primary health care who are less, rather than more, dependent on agricultural activities, so that they will be less distracted from

health work at the times of greatest need. Seasonal analysis leans here against that conventional wisdom which holds that community health workers should be part-time farmers, typical members of the community, and unpaid. If a community faces a seasonal crisis simultaneously in cultivation and in health, a community health worker in a farming family will be torn between conflicting obligations, and those of cultivation for the family may prevail over those of health for the community. In planning primary health care, and in selecting community health workers, this is a factor to be borne in mind.

3. Rural Planning and Action

As noted (pp.13-16 above), the perceptions of urban-based professionals are distorted by biases (personal, professional, access, contact, dry season, and statistical) so that they either fail to recognise or underestimate seasonal linkages and seasonal deprivation. Rural planning, notably in health, has anyway a tendency to emphasise location and buildings rather than implementation and timing. But past neglect is present opportunity. Precisely because seasonality has been missed as a link between health, agriculture and poverty, it now presents potential for seasonal programmes to counter poverty and deprivation.

Such programmes have to be tailored to particular rural environments. This implies decentralisation. One approach is a required procedure for local-level staff to carry out seasonal analysis.¹ Health and agricultural staff might be required jointly with each other and with rural people to identify seasonal linkages between health, nutrition, agriculture and poverty in the areas in which they work. Particular attention might be paid to the views and experience of those poorer rural people most adversely affected. The incentives to staff might be enhanced by workshops with their colleagues from other areas to which their findings were reported, and then by together working out and agreeing proposals for action. Such joint analysis and action can be suggested for the district and subdistrict level. This procedure should heighten awareness of seasonal problems, leading to health programmes and other interventions better geared to the seasonal needs of agriculture and of the poorer people.

Implementation is the crux. Good ideas which are not implementable are bad ideas. The best way forward may be to develop methods of seasonal analysis and a repertoire of interventions which are simple, manageable, replicable and effective, and which involve rural people as partners. Analysis is the easier part; the greater challenge is action. Ways forward may be sought through combinations of decentralised seasonal analysis,

1. For an elaboration of this sort of approach, see Chambers (1974).

action programmes, evaluation, and then training and replication. In such ways, if this paper is correct, much might be done to restrain processes of impoverishment, to increase agricultural production, and to benefit those who are poorer and weaker. This could be achieved, moreover, without significant loss, and often with gains, to those rural people who are less poor and more powerful. The local political obstacles which so often impede and subvert programmes intended to benefit the rural poor should therefore be less serious than usual, and may not appear at all. Seasonal analysis and action should, then, benefit those most in need, making things better for them at the times they find worst.

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