Public Health Practice

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Combating drought: food for all

Although Botswana entered its sixth year of drought in 1987, there have been no reports of deaths due to starvation. This is attributed to the country's drought early warning system and to the comprehensive relief measures that have been devised.

Botswana is a landlocked country in southern Africa. More than two-thirds of its area is covered by gently undulating sand. Most of the rivers dry up each year and there are vast regions without surface water. The annual rainfall, which varies widely around an average of 475 mm, is unevenly distributed. It usually comes in heavy bursts of short duration, causing rapid run-off and considerable soil erosion.

The country is self-sufficient in beef but in no other food product. In years of favourable rainfall, only half the food requirement can be produced, the rest being imported. In 1982 the President declared the country drought-stricken. The production of the four main crops, sorghum, maize, millet and beans, fell from 15 500 tonnes in 1982 to 6030 tonnes in 1984, and the condition of cattle in all areas except two has deteriorated because of the poor quality of grazing.

There is evidence of drought throughout the country. Rain clouds sometimes appear but only sandstorms develop. It is not uncommon to find cattle with the outlines of all their ribs clearly visible. Undernourished children are a common sight in health facilities. Even so, the worst has not happened—there has been no report of anyone dying of starvation. This is primarily attributed to the drought early warning system and to the nationwide measures taken in response to the situation.

Early warning

The early warning system came into being in 1984 with the establishment of an Early Warning Technical Committee, which reports to the Interministerial Drought

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Committee. The aims of the Early Warning Technical Committee are to improve drought-monitoring activities, maintain the country in a state of readiness to confront drought, and facilitate the response to drought situations. This Committee monitors:

- the incidence and severity of drought conditions throughout the country;
- the effects of such conditions on human and livestock populations;
- the supply situation and outlook for basic foodstuffs.

Situation reports are submitted nine times a year to the Interministerial Drought Committee, together with recommendations for action if necessary.

The Early Warning Technical Committee comprises members from government units and agencies supplying data that are used in two phases:

- a predictive phase, mainly using data on rainfall and on ploughed and planted areas to estimate possible crop yields;
- a monitoring phase relying more on data on nutritional surveillance, food availability, and changes in prices of basic commodities to indicate the trend at any particular time.

The first phase assists in the planning of intervention strategies while the second allows for adjustments in programme implementation.

Rural Development Unit

This agency, which is attached to the Ministry of Finance and Development Planning, is responsible for coordinating drought monitoring and implementing relief and recovery measures. It also coordinates the work of the Early Warning Technical Committee.

Department of Meteorological Services

This Department of the Ministry of Works and Communication reports on seasonal rainfall, compares current figures with the average, and assesses the effects of prevailing weather on agricultural conditions.

Department of Planning and Statistics

This Department of the Ministry of Agriculture is the main source of information on crop conditions. It has an extensive information network that gathers data on areas ploughed, expected yields, livestock and grazing conditions, and water supplies for cattle. The analysed data are submitted to the Early Warning Technical Committee. The Department conducts annual surveys of livestock and arable farming.

Nutrition Unit

Since 1978 the Nutrition Unit of the Ministry of Health has been operating the National Nutrition Surveillance System,

Several supplementary feeding programmes are implemented during periods of drought.

covering most health facilities. This is an important element in monitoring the nutritional status of the under-five population and identifies vulnerable groups. The Harvard standard is used in measuring

the growth of children aged under five years. All children below the 80% line of this standard are classified as underweight and all those below the 60% line are considered to be severely so. The data from the health facilities are processed by the Central Statistics Office, and the Nutrition Unit interprets them for both the Early Warning Technical Committee and the Interministerial Drought Committee. On the basis of these data an estimate is made of the nutritional status of the nation. This information assists in determining how much food aid will be needed. The data are also used to determine the nutritional status at district level.

Food Resources Department

The Food Resources Department of the Ministry of Local Government and Lands is responsible for implementing relief and recovery measures for the human population. This includes regular food distribution to all supplementary feeding programmes for the various vulnerable groups and the implementation of the Labour-based Relief Projects, which give supplementary income-earning opportunities to the rural population. The Department makes estimates of the resources required to meet the needs of planned relief and recovery projects. It informs the Early Warning Technical Committee about the number of beneficiaries in the supplementary feeding programme on a monthly basis, and also about the extent to which donated food covers requirements. It provides estimates of financial needs for the purchase of food locally. The Department thus provides the government with the capacity to respond to emergencies by acting as a planning and implementation agency dealing with disasters affecting food supplies or rural incomes.

Direct support for households affected by drought is provided through temporary income-earning opportunities.

Agricultural Marketing Board

This body was established in 1974 to provide farmers with a reliable outlet for their crops. It has no monopoly on produce purchase and sales, but acts as a residual buyer. Private traders are allowed to buy foodstuffs from farmers and sell them to the public. In addition, since Botswana belongs to a customs union with South Africa, traders can buy grain in that country for distribution in Botswana. The Board also manages the strategic grain reserve, 6000 tonnes of sorghum donated by the World Food Programme. The purpose of the reserve is to cover shortages in time of drought or other emergencies, including the sudden interruption of imports. It is intended to increase this reserve to 30 000 tonnes of maize and sorghum, equivalent to three months' consumption.

Relief measures

In order to contribute towards meeting the immediate nutritional needs of the most vulnerable groups in the population, direct dietary supplements are provided. In addition, income-earning opportunities are provided for people affected by drought. Both of these approaches have proved to be very effective in getting food and money into households that are considered

vulnerable. In 1985 the government spent more than US$ 20 million in these areas.

Food supplements

Food aid plays an important role in combating the effects of drought. Of the external food aid that Botswana receives, 83% is donated by the World Food Programme. The commodities supplied include corn soya meal, vegetable oil, dried skimmed milk, and corn soya milk. Sometimes shortages of corn soya meal occur, and the government provides maize milk consisting of nine parts of maize and one part of milk.

Several supplementary feeding programmes are implemented during periods of drought. In 1985 over 650 000 people, amounting to more than 60% of the population, received some form of food aid. Of these, 370 000 came under the feeding programme for vulnerable groups—children under 5 years of age, pregnant and lactating women, tuberculosis patients, children aged 6–10 years not attending school, and destitutes, the latter being people unable to provide for themselves but having homes. They may be disabled or, if they have lost their means of livelihood as a result of drought, classified as temporarily destitute.

Each vulnerable individual is entitled to a daily take-home ration of 200 g of corn soya meal and 25 ml of vegetable oil, providing approximately 1000 kcal (4.18 MJ) and 26 g of proteins. This food is obtained monthly from more than 600 distribution centres. Except in the case of small children, the ration is not enough to meet most people's daily nutritional needs. Unfortunately, although meant as a supplement, it is often the only sustenance available. A problem that has been encountered with take-home rations is that they are not consumed by the targeted individuals alone, but shared by whole families.

If a child is malnourished, it is eligible for a daily feeding programme at the local health facility. Children below the 80% weight-for-age line are fed for five days at the facility and given a weekend ration. In order to vary the diet, the government has made money available to the feeding programme for the purchase of locally available foods. The purpose of this direct feeding programme is to combine nutritional rehabilitation with nutrition education and health education.

Self-sufficiency is the overall goal of the national food strategy.

In addition, children below the 60% weight-for-age level are eligible for a high-protein drink made from skimmed milk, vegetable oil, sugar and boiled water. These severely malnourished children take this drink at their local health facility on a daily basis.

The school feeding programme reaches approximately 230 000 primary school children and provides 800 kcal (3.35 MJ) and 30 g protein to each child daily. The school meal is composed of sorghum, beans, dried skimmed milk, and vegetable oil. During periods of drought, children are given a take-home weekend ration and a school holiday ration. The problem of the whole family sharing the ration is again encountered.

People living in remote areas who are beyond the reach of most government

services are given a full ration that meets their daily energy and protein needs; approximately 20 000 people are assisted in this manner.

Income-earning schemes

Direct support for households affected by drought is provided through temporary income-earning opportunities in rural areas. The largest schemes of this kind, the Labour-based Relief Projects, pay people in cash to work on labour-intensive public works projects. The intention is to keep money circulating in rural economies by replacing some of the income lost due to drought. Participation in one of these projects is on an interim and rotational basis so that as many households as possible can benefit. Recently, over 70 000 people have participated in this programme, and it is estimated that almost 50% of the income lost due to crop failures has thus been replaced.

In another scheme, women are paid to stamp the sorghum used in the school feeding programme. There is a scheme in which low-grade cattle are bought from poor farmers so that the meat can be fed to primary school children. The draught-power hiring scheme is a form of state assistance for farmers, as is the destumping project, which helps them to clear their land. In addition to income generation, these last two projects provide subsidized agricultural inputs into drought-affected households.

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Each of these programmes, while making a useful contribution, also has limitations and potential drawbacks. The main concern is the danger of creating long-term dependence on the government to provide for the needs of some households. Self-sufficiency is the overall goal of the national food strategy, and the avoidance of dependence has been an underlying aim. Each relief measure has a built-in termination point, and depending on the environmental, economic and agricultural conditions, various measures of relief and recovery have been and will continue to be tailored to meet specific situations in different parts of the country.

Botswana relies greatly on the National Nutrition Surveillance System to monitor the effects of drought on the human population. The data it provides can be linked to information on food aid distribution supplied by the Food Resources Department. This is possible since most of the supplementary feeding programmes are carried out at health facilities, and the foodstuffs are supplied according to the number of beneficiaries reporting. The food needs for direct feeding of malnourished children are determined by the numbers recorded in the surveillance system. Close monitoring is necessary in order that adjustments can be made in accordance with the fluctuations that occur.

Even though the population is increasing at 3.4% per annum, Botswana has managed to keep the drought problem under control. It is intended that malnourished children will continue to receive special attention and that improved services will meet the needs of healthy children in the years ahead, whatever trends develop in the drought situation. □

The World Health Organization is very grateful to the French cartoonist Plantu for permission to reproduce the above cartoon.

A. Prost

When the rains fail...

The degree to which abnormally low rainfall adversely affects people's health depends in large measure on the viability of their socioeconomic structures. High levels of self-sufficiency and social collaboration allow communities to cope much better with hostile climatic conditions than would otherwise be possible.

Drought occurs when there is a decline in the quantity and/or regularity of rainfall of sufficient magnitude to bring about ecological changes that outstrip a society's ability to adapt to or keep pace with them. The amount of rainfall corresponding to drought conditions varies widely. For instance, during the recent severe drought in southern Ghana, the 864 mm of rainfall at Kumasi in 1983 were over 500 mm below the region's annual average, yet would have been considered normal or even higher than normal in more northerly parts of the country.

A crisis may arise suddenly if, for example, a monsoon fails to materialize. However, it is more usual for drought to be associated with the exacerbation of permanent structural deficiency. This is true in north-east Brazil, north-west China, and the Sahel. Drought is a sign that the ecological balance between man and his environment has collapsed in the face of a combination of factors, among which climatic variation is not necessarily the major determinant. It is desirable, but difficult, to separate the direct effects of drought on health from the effects of associated factors, such as migration, the breakdown of social frameworks, economic structural constraints, wars, and insecurity. The recent famines in East Africa were triggered by drought but there was an underlying refugee problem. The hungry in Brazil may be suffering more from the system of land tenure than from recurrent drought.

The absence of reference data makes it far from easy to assess the extent to which drought is responsible for ill health. A study of the situation in the extreme northern areas of Upper Volta (now Burkina Faso) during the drought of 1973 suggested that, although the population was on a low plane of nutrition, the general situation was not unusual for rural Africans living in similar environments and that there was no reason to suppose that the spectrum of disease observed was other than that normally present in the region *(1)*.

Mortality

Little has been done to quantify excess mortality associated with recent episodes of

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drought. In the absence of precise data, authors resort to indirect or empirical measurements and make comparisons between supposedly similar populations. Seldom is it explained that excess mortality attributable to drought is an insignificant fraction of that attributable to under-development. Large-scale mortality occurs when there is an accumulation of causes additional to drought, especially civil unrest and epidemics, which may continue for several years after a drought has ended, as was the case in Bengal several decades ago *(2)*.

Communicable diseases

Drought has often been blamed for diseases observed during crisis situations, including malaria, respiratory disease, skin infections, and meningitis. However, a distinction has to be made between real increases in the incidence of disease and increased reports of cases as attention becomes focused on populations in drought-affected areas. With regard to malaria, the vectors of which require surface water in which to breed, it is clearly unlikely for transmission to increase during a drought. Diseases such as tuberculosis should not come into the reckoning, because in respect of them excess numbers result solely from the fact that relief operations bring case-finding to hitherto unexamined populations. Contagious diseases, whose incidence increases every time there are migrations or concentrations of people, should also be set aside.

The incidences of skin infections, streptococcal infections, conjunctivitis, and external ear infections almost certainly increase as water becomes scarcer, for below a certain threshold of consumption they are closely related to the quantity of water used. The drought of 1976–77 in Haiti left the areas of Port-au-Prince which were normally supplied by pumping without water for ten weeks, whereas the areas supplied by gravity systems received more or less normal supplies. A survey failed to demonstrate any significant health differences between the two areas. However, taking the two populations together, increased frequencies of diarrhoea, scabies, conjunctivitis, and febrile episodes were noted among children under the age of six years in families of more than four persons with a consumption of less than 20 litres of water per day. The fact that the frequency of diarrhoea, which depends on the quality as well as the quantity of water, showed the same variation as conjunctivitis and scabies, which depend only on quantity, seemed to demonstrate that the scarcity of water was indeed the cause of the increased number of cases observed.

There is little reason to think that drought has a direct effect on water quality. However, dwindling water supplies may lead to the use of polluted water, and when users crowd around the remaining water points there is obviously an increased risk of pollution. On the other hand, as polluted surface sources dry up it becomes necessary to look for deeper reserves, and these ought to be much safer.

If drought is accompanied by political instability the system may collapse and large sectors of the population may find themselves without institutional support.

Cerebrospinal meningitis occurs across the Sudan and the Sahel in dry-season epidemics every five to ten years. It has been suggested

that prolonged drought has been responsible for a renewed outbreak of the disease in western Africa and for its extension southwards. Although the theory is attractive, there is as yet no corroboration. Indeed, epidemic peaks since 1957 have occurred outside periods of drought. Furthermore, the southward extension of the endemic area has not been confirmed. The regional distribution of notified cases in Côte d'Ivoire and Ghana over the last ten years shows that meningitis has remained sporadic outside the most northerly areas of these countries and is showing no clear tendency to spread beyond the area in which it traditionally occurs. However, the ecological conditions found in the meningitis belt are extending southwards and it would be logical to expect the next epidemic surge to do the same.

In Chad, in May 1971, about 5000 cases of cholera were notified in ten days during the dry season, when the ground temperatures, between 50° C and 80° C, were above the limit at which vibrios can survive, and when it seemed reasonable to suppose that the lack of water would make propagation impossible. In the Sahel, the two epidemic peaks that followed the initial outbreak in 1971 coincided with the height of the 1973 and 1984 droughts. After remaining confined to the coastal areas of Ghana for 11 years, cholera struck the northern region for the first time in 1982, then again in 1983, which were the years of severest drought. The epidemics in South Africa and Mozambique coincided with the severe drought of 1982–83. It seems that drought is likely to trigger cholera epidemics based on direct interpersonal transmission.

A limit to the beneficiary state's capacity to absorb aid will rapidly be reached.

With regard to vectorborne diseases, droughts may have a beneficial effect. In Burkina Faso (previously Upper Volta), the 1972–73 drought pushed back the northern limit of the tsetse fly, the vector of sleeping sickness, by more than 100 km *(3)*. For onchocerciasis, the annual transmission potential by blackflies was reduced to a tenth of its mean value, or even to nil, in the White Volta Basin during the drought years of 1973–75. Observation of the prevalence and intensity of the disease showed that the drought represented a gain equivalent to two years of effective vector control.

Nutrition

Malnutrition is probably the most widespread disease in the world, yet virtually nowhere is it reflected in medical morbidity statistics. With or without drought, the food intake of a quarter of the population of the developing countries is below the critical threshold. The problem is structural and persistent, shifting from one region to another over the years. It does not depend solely on the vagaries of the climate or on prices. There is a direct relationship between drought and loss of food production but the extent to which populations affected are vulnerable depends on the structure of their socioeconomic systems. People died in Ethiopia in 1973 not because of an extreme shortage of food, but because of an extreme shortage of money; the country's overall agricultural production was practically normal *(4)*. It is impossible to draw general conclusions from the multiplicity of surveys of nutritional status in drought-afflicted populations. The only common factor is that drought triggers or reveals a crisis. Data on the underfed say

nothing about the severity of drought; they are indicators of social adjustment to adverse situations.

A good example of the impact of drought on quantitative malnutrition at the country level is to be found in birthweight curves for children in Ghana. In the drought years of 1982 and 1983 there was a drop in mean birthweight, pointing to maternal malnutrition during pregnancy. It should be recalled that low birthweight is associated with increased neonatal and infant mortality and with a high prevalence of physical and mental handicaps.

Iron deficiency anaemia and folate deficiency are delayed effects of nutritional inadequacy and should not be considered to be related to recent or temporary shortages caused by drought. Nor is vitamin B deficiency an acute problem in times of famine, for requirements vary with calorie intake. Vitamin A deficiency, however, may occur at an early stage in drought-affected areas because of an insufficiency of green vegetables and fruit.

Poisoning from substitute foods is common and is most often the result of eating bad meat or chemically treated seeds. In 1961 the inhabitants of two Chinese villages suffered selenium poisoning after planting maize in dried-up rice fields; this crop concentrated five times as much selenium from the soil as rice would have done. In Afghanistan there was a deadly epidemic of veno-occlusive hepatic necrosis during 1974, caused by the rapid proliferation of a toxic desert plant in corn fields during two years of drought.

In Mozambique, spastic paraparesis struck more than 1000 people in five districts of the province of Nampula during 1981. An investigation concluded that the cause was cyanide intoxication resulting from the consumption of cassava. In 1980–81 this region received its lowest rainfall ever recorded and drought destroyed all food crops with the exception of bitter cassava; it also intensified the toxicity of all other varieties of cassava. Detoxification by drying may take up to a year. The people were forced to adopt to a diet consisting exclusively of cassava, and because of the food shortage it was sometimes eaten after a period of drying that was far too short to achieve detoxification. The absence of protein intake reduced their ability to metabolize the toxin.

Food aid weighs on agricultural prices and they become too low to encourage production.

Management of health services

A drought-stricken country will simultaneously experience an economic crisis, a loss of export earnings from cash crops, the need to buy food, the drifting of the rural unemployed to the cities, and a drop in industrial output as a result of electric power rationing. Loss of revenue and unforeseen expenditure disrupt budget implementation and result in the reallocation of operational credits. The health service, which is heavily dependent on the state, loses the means to carry out its activities. It is very difficult to obtain illustrations of this phenomenon because it is not revealed in published documents.

If a crisis worsens and famine or mass migration begins, the health service will be required to redirect its activities towards

priority groups or areas. This will be done to the detriment of the rest of the population, since there will be no increase in the resources available. Thus the crisis leads to the disorganization of the system and the

National solidarity and international aid tend to bring about long-term dependence on outside assistance.

disruption of most of the regular activities that cover already underserved populations. The impact of drought on health may be felt well beyond the areas where the rains have failed. If drought is accompanied by political instability the system may collapse and large sectors of the population may find themselves without institutional support.

International support

International aid may then arrive, its primary objective being to complement national efforts. However, a limit to the beneficiary state's capacity to absorb aid will rapidly be reached. Furthermore, a process of substitution may rapidly develop, tending to be competitive. The destabilizing effects of competition should not be overlooked: food aid weighs everywhere on agricultural prices and they become too low to encourage production. In Mali the establishment during the drought of 1983–84 of special shops that sold drugs at token prices ruined the efforts of cooperative drug stores run by village associations. In Niger the aid brought to refugees in the camps opened in 1973 raised their nutritional status to a considerably higher level than that of the villagers among whom they were settled; a similar result was produced in Somalia in 1981.

National solidarity and international aid thus generate further inequalities. Above all, they tend to bring about long-term dependence on outside assistance, destroying the ability of communities to adapt to environmental change. The vulnerability of the affected societies increases as their dependence deepens. Sudden and temporary disasters give way to a permanent structural crisis. The mechanisms by which people have learnt to survive in given environments break down. Unless the social and economic conditions in which these mechanisms can function are restored, it is to be feared that the people will remain at the mercy of climatic fluctuations and that international aid will have to be provided from time to time.

Community support

It may be possible to diminish the social effects of drought through better organization of society so as to satisfy the basic needs of all its members and through the promotion of social collaboration, community participation, and self-sufficiency. The best recommendation often seems to be that affected societies should be radically restructured although the political feasibility of this may be doubtful.

The establishment of pilot areas offers no solution. They usually require a vast infusion of resources and a high level of external support and technical assistance. This type of showcase project benefits only a very small proportion of the population in need; it cannot be expanded or replicated, and gradually disappears when external support comes to an end.

It would also be wrong to believe in the possibility of a quantitative solution of all problems: increased food production,

fertilizer consumption, numbers of physicians, and so on. The most urgent requirements are for a reorientation of the activities of health services, a better distribution of resources, including manpower, and a restructuring of production and marketing networks.

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Drought takes many people from chronic to acute malnutrition and introduces malnutrition to new population groups. It is important to prevent the failure of conventional health statistics systems to deliver early warning signals. There is an urgent need to monitor the extent of malnutrition in risk groups and in populations at large, to reduce the underregistration of vital events, and to reduce the bias of existing reporting networks towards urban areas. The data collected should be evaluated in relation to food production, distribution, stocks and prices, and to employment and income in different segments of the population. This allows provision to be made for relief operations before the social effects of drought have become excessive. The monitoring of chronic pre-catastrophe situations makes possible a useful diagnosis of developing processes. When a catastrophe has struck, all observed effects may be attributed to it, and the officers in charge may absolve themselves from the responsibility of taking action.

Once the worst has happened, the community is already destabilized and nothing can prevent further disruption associated with international assistance. External aid organizations should limit their support to the alleviation of the most dreadful, life-threatening consequences and shift their attention as soon as possible to the rehabilitation of drought-stricken populations in a viable environment. Any improvement beyond the average level of pre-crisis conditions, whether in housing, nutrition, or health service delivery, will perpetuate the demand for external assistance and may make a return to self-sufficiency impossible. □

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Peter Jordan

Schistosomiasis can be prevented

Schistosomiasis is acquired by exposure to water containing infected snails. If safe drinking-water supply systems are supplemented with simple laundry and shower facilities the risk of contracting the disease is greatly diminished.

The main aim of the International Drinking Water Supply and Sanitation Decade is to prevent gastroenteritis among infants in developing countries. A project in Saint Lucia has shown that, as well as producing this result, improved water supplies lead to a reduction in the transmission of schistosomiasis *(1, 2)*. Furthermore, after the widespread use of antischistosomal drugs, no increase in the prevalence of infection was observed over four years in villages with a standpipe water supply, laundries and showers.

The Saint Lucia project

This project was designed to evaluate three methods of combating schistosomiasis — snail control, chemotherapy, and reducing the risk of infection by providing safe water.

Initially a comprehensive water delivery system, consisting of a water outlet to each house, communal laundries, shower facilities, and play pools for children, was used. Health education induced women to refrain from washing clothes in rivers, and, as a consequence, children accompanying their mothers were less exposed to infected river water; over a four-year study period the incidence of new *Schistosoma mansoni* infections among children aged 2–5 years fell from 19.3% to 4.5%. Over the same period in villages served by a standpipe system the incidence fell only very slightly, from 16.5% to 14%.

The comprehensive system, costing US$ 22 per capita at 1970 prices, is too expensive for developing countries. When the standpipe system in some of the comparison villages was made more reliable and supplemented by laundry and shower units, however, the observed frequency of exposure to infected river water was reduced by 50% within 12 months. Failure of the rains subsequently reduced water supplies and, as a result, contacts with infected water increased. When normal rainfall resumed, the system became operative again. Treatment was then offered to all people found to be infected and the value of the water supplies as a means of preventing a resurgence of transmission was assessed. Over a four-year period the incidence

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among children up to the age of 11 remained between 4% and 7%.

In the villages with the comprehensive water supply system, treatment was given and the incidence gradually fell to 1%. In one valley where chemotherapy and a comprehensive but less regular water supply system were provided, there was a fall in incidence but transmission appeared to reach a steady low level, again between 4% and 7%.

These results suggest that, after chemotherapy has been given, a water supply system including laundry and shower units keeps transmission at a low level.

Chemotherapy

Chemotherapy is now the main tool in schistosomiasis control programmes. It rapidly reduces the prevalence and intensity of infection but there is, inevitably, a reservoir of infection, and transmission continues at a low level. In the absence of other control measures an increase can be expected, the rate depending on the reservoir of infection and local ecological conditions. Further treatment will then be necessary to prevent the development of schistosomiasis. In Saint Lucia, community standpipes and household water supplies supplemented by laundry and shower units appeared to prevent this from happening for four years.

Education

To obtain the greatest possible benefit from safe water, health education is necessary for all sections of the community, but it should be aimed particularly at children and women. The message that the proper use of water can contribute to the prevention of schistosomiasis and other diseases should be part of a long-term health education programme. Although improved sanitation has not been shown to be effective in schistosomiasis control, its value should not be underestimated.

Quantity of water

Water must be adequate in quantity. Before piped water was available in Saint Lucia it was estimated that about 15 litres per head of population were carried home from the rivers each day *(3)*. With an unlimited piped supply, the metred consumption of water, including that used in laundry and shower units, was 45 litres per person per day; this remained unchanged over an eight-year period *(4)*.

Siting

Water supplies should be conveniently located and, if possible, houses should be nearer to them than to infected surface water. The siting of a water outlet should be discussed with the women who will use it, and if a washing facility is to be built on land donated by a villager, it should be established that this will not deter any women, for whatever reason, from using it. Women should also be consulted on the height of washing tubs or slabs. In some cultures it may be preferred to have them at

After chemotherapy has been given, a water supply system including laundry and shower units keeps transmission of schistosomiasis at a low level.

waist height, in others there may be a preference for them to be nearer the ground. Concrete laundry tubs were used in Saint Lucia, but, if these are not available, washing slabs can be used. Tubs have the advantage that they are ideal for washing babies and young children.

Showers can be installed if there is a piped water supply. Where pump or well water is used, a simple screen can provide the privacy needed for personal washing. A floor with effective drainage is always necessary.

Maintenance

The maintenance of water supply systems is essential. When these are dependent on local surface water, as with the government supply in Saint Lucia, seasonal variation in supply may be inevitable, but mechanical breakdown should be attended to promptly. It has been postulated that an effective water supply would mean that people would not go to rivers for water and therefore that faecal and urinary contamination would be reduced *(5)*. In Saint Lucia, however, there was evidence to the contrary — where the river was not the public water supply, its contamination increased. Thus, if a supply breaks down and maintenance of the system is poor, a return of the population to the river could lead to many cases of schistosomiasis (though this would be less likely after chemotherapy). Maintenance should include the repair of dripping taps, which not only waste thousands of gallons of water but can lead to the formation of pools that may become snail-infested. Infected snails were found in Saint Lucia under such circumstances, probably due to the washing of faeces-contaminated hands under taps. These pools can also serve as breeding sites for mosquitos. It is vital, therefore, that the areas around pumps or pipes be adequately drained. Pump maintenance has been a major problem in the past, but serious efforts are now being made to test pumps thoroughly in both the laboratory and the field before they are put into service *(6–9)*. In Kenya, pumps are produced locally and spare parts are plentiful; local personnel are trained in maintenance, which is the responsibility of the local health committees — a small charge is therefore made for the water.

Prevention

The prevention of schistosomiasis is now possible thanks to the new control strategy based primarily on chemotherapy. More ministries of health are embarking on preventive programmes. Because water development programmes are frequently under the control of different ministries, interministerial coordination in this area is clearly desirable. □

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Vijay Kumar & Neena Datta

Home-based mothers' health records

The value of mothers' health cards that are kept at home discussed, with particular reference to a pictorial card developed for use by illiterate traditional birth attendants in India. The existence of records in this form contributes towards the early detection of women at risk and encourages self-care.

Mothers' health cards have been developed and used to facilitate the administration of good quality care during the prenatal, intranatal, postnatal and interpregnancy periods. They can also serve in the evaluation of the effectiveness with which services are delivered to mothers. They can be considered a useful intervention tool because they:

- facilitate the early recognition of women at risk;
- encourage self-care;
- generate service statistics;
- help the teaching process;
- improve referral linkages.

Although these records for women have existed for a long time, confidence in their value and the need to develop aids suitable for use in primary care have emerged only recently. Elaborate hospital records are used in the diagnosis and treatment of diseases. They necessitate the application of technical skills of the highest order and include information on sophisticated measurements and evaluation. These records are of value in the institutional setting but serve little educational purpose and do not contribute towards self-care. Hospital records do not link up referral institutions and are of little use in computing epidemiological information, although they are used extensively for research. To deal with the problems of busy outpatient clinics, antenatal cards have been developed, some of them covering identifiable risk factors *(1)*. In some instances the complexity of the cards has restricted their use.

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Community settings

In India, a simple, action-orientated card for retention in the home was devised *(2)*. Printed in the vernacular, it was intended to be filled in by primary health care workers. Among other things it provided for the recording of risk factors and of body weight during pregnancy. It was revised after having been used for several years in rural communities.

Another home-based antenatal card has been field-tested in five villages with a population of 10 880 in Vellore, India *(3)*. It carries various illustrations for the benefit of health workers. In addition it carries guidelines for pregnant mothers in the local language.

In Indonesia a pictorial record card has been devised for illiterate traditional birth attendants so that they can identify high-risk factors *(4)*. It covers the weight and sex of babies, skin colour, activity, presentation, perinatal complications and maternal condition. A comparison of observations made by traditional birth attendants and midwives showed good agreement.

Another pictorial card for use by illiterate traditional birth attendants has been developed in India *(5)*. This card provides for recording prominent risk factors, vital events and important aspects of care related to pregnancy and neonatal outcome. Its use necessitates the ability to recognize illustrations and symbols and to make a tick or a cross. Following a feasibility trial, the card was evaluated in 2024 cases by 61 traditional birth attendants in 54 villages, over a three-year period.

The cards showed that two or more doses of tetanus toxoid were given to 1735 pregnant women, nutrition advice was provided in 1820 cases, and iron/folic acid supplements were advised in 1902 cases. Oedema, severe anaemia, bleeding during pregnancy, and abnormal presentation were identified in 98, 84, 69 and 100 cases respectively. The mother's height was below 150 cm in 168 cases and below 145 cm in 13 cases, and 307 babies weighed under 2200 g.

For the successful introduction of record cards where female literacy is poor and birth attendants lack technical skills, training is needed so that the cards can be completed, and skills have to be learned.

Breast-feeding was discontinued or supplemented within one month in 103 cases and difficulty in breathing was reported in 13 babies. Half of the women at risk were referred and half of these used the proper referral facility. The use of referral was inhibited by a failure to understand the severity of disease, the expense and time involved, a lack of faith in the facilities and a fear of surgical and other procedures.

The card also serves as an effective health education tool. At monthly meetings of traditional birth attendants it was used as a starting point for discussing and describing experiences and the management of problems. The traditional birth attendants used it to promote self-care among pregnant women and their families. The cards made it possible to calculate that the stillbirth, perinatal mortality, and neonatal mortality rates were 33.1, 48.4 and 37.8 per 1000 respectively; these values conformed to the overall pattern in the area.

This card has been successfully used by the traditional birth attendants. Its simplification and adaptation for other primary care settings are being studied. A new prototype card has three panels for pregnancy and one each for obstetric history, referral, and the interpregnancy period. It is meant to promote self-care, the early identification of risk factors during pregnancy and the perinatal and postnatal periods, the collection of vital data, and the facilitation of referral linkages. The card has been introduced for feasibility and acceptability studies in several developing countries.

Operational considerations

The usefulness of mothers' health cards has already been established in several settings. However, the cards have yet to become an integral part of health delivery systems.

Benefits and problems of pictorial cards

	Client	Provider	Supervisor
Benefits	Better understanding	Improved care	Better reporting of vital events
	Improved concept of self-care	Constant reminder	
		Record of vital events	Training tool
	Better antenatal care	Favourable outcome	Promotion of family planning efforts
	Early risk identification	Functional linkages among primary care workers established	Better rapport with health workers and families
	Timely action in cases at risk	Status symbol	
		Enhances credibility	
		Is starting point for discussion	
		Promotes learning through problem-solving	
Problems	Not home-based	Problems related to old age	Repetitive training
	Does not reinforce messages	Difficulty in relating to illustrations	Heterogeneous group in terms of literacy skills and previous training
	Photographs of live situations are better understood than illustrations	Reluctance to write and fill the card	
	Problem in interpreting illustrations correctly	Incorrect interpretation of some illustrations	
		Failure to fill in at the time of event	
		Complete newborn follow-up lacking	
		Interaction needed with a literate person for identification data	
		Smallness of illustrations	

Their widespread acceptance and utilization requires the elimination of various operational constraints (see Table). For the successful introduction of record cards where female literacy is poor and birth attendants lack technical skills, training is needed so that the cards can be completed, and skills have to be learned. To be effective, training needs to be adjusted to the local culture, and it should be repetitive and combined with health education of the mothers. These activities have to be backed up by supportive supervision. This may be a slow process since, in many countries, the number of birth attendants needing to be trained is very large.

Retention of the cards in the home is generally excellent but the information on them may be incomplete: in Vellore, India, 21% of the cards did not have data on fundal height, systemic examinations, and final outcome *(3)*, and in Chandigarh the columns on breathing difficulty, abortion and parity were not correctly filled in *(5)*. Furthermore, the accuracy of entries is hard to establish.

Consideration has to be given to the cost, size, colour and format of the card and to linkages with child growth care. Additionally, the following issues need to be addressed before introducing the cards in national programmes.

- The items to be included should be decided in the light of local problems, the training background of birth attendants, and the felt needs of the community.
- Methods should be devised to maintain continuity of care. The incorporation of child growth cards may mean losing subsequent information on pregnancy or periods between pregnancies.
- The cards should generate basic service statistics and be linked up with existing information systems.

Home-based mothers' cards hold the promise of being an invaluable entry point for primary care. □

References

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Said at the First World Health Assembly

Educational role of WHO

The essential educational role of WHO in stimulating advanced training in the field of public health and its allied specialized fields would appear to be an important phase in any programme adopted by this Assembly. It will take many years to produce a sufficient number of trained personnel to staff the basic and most important link in public health today—the local health department. In addition, there will be required numbers of highly qualified specialized public health personnel to give supervisory and advisory assistance and guidance to the basic health services.

—Dr G. F. Amyot, Canada
Eighth Plenary Meeting, 29 June 1948.