FIG 5—View from the inner cone with Mawenzi in the distance and the northern glaciers in the foreground.

grandeur. The volcanic crater that surmounts Kibo has a fragmented outer rim breeched at intervals by glacial masses that spill over to form the icy tongues that give Kibo its local

name—the Piebald One. Within the rim there exists a desert of pumice, the aridity of which is emphasised by the ice cliff of the Furtwangler glacier with its curtain of 20 foot icicles, by the frozen terraces rising to the vaulted ice cathedral of the northern glaciers, and by the two storey knife edged slices that extend from the western Penck glaciers. Snowfields also dot the Saharan landscape, but no ordinary snow, for each field consists of serried ranks of frozen blades up to 18 inches high—the *nièves pénitantes*. It has been suggested that the angle of their tilt together with the direction of their parallel crests is dictated by the invariant arc of the equatorial sun. Towards the centre of the summit the volcanic scree slopes gradually upwards to form the rim of the inner cone, a secondary crater over 900 yards in diameter, the internal walls of which are decorated by yellow deposits of pure sulphur, each surrounding a gently smoking vent. Finally, within the inner cone, the pumice floor rises to a concentric smaller rim that surrounds the precipitous depths of the Ash Pit—and here at last you stand in awe above the ancient cataclysmic heart of Kibo.

After five weeks on the mountain we left our Chaga guides and porters and, having descended through the fertile belt of agriculture, drove out into the stifling dust and searing heat of the surrounding plains. There among the Masai and the plentiful big game, both dependent on sparse water holes, the importance of Kilimanjaro was underlined. In the words of the Masai, “it harvests the rains.”

My Student Elective

Effects of a water supply system on local health attitudes in Nepal*

RODERIC L CLARK

My sodden feet squelched miserably as I leant against the mud wall of the tea shop. The wooden bench was hard and unyielding and the tea tasted earthy; it was thick with sugar. Children played cheerfully beside the open fire at the other side of the room and I watched lazily, bleary eyed. The younger child had impetigo; there were honeyed crusty plaques across his face, decorated with flies which buzzed incessantly. Smoke drifted around the room, spiralling as it escaped through the single door to merge with the mist and drizzle.

Nepal. Several weeks earlier the word had only conjured visions of hippies and drugs. It is a delightful country, however, with stupendous scenery and a delightful variety of people. In the south there is the hot, humid Terai, then there are the Middle Hills, and in the north the bleak, cold, beautiful Himalayan slopes. The people may be broadly grouped as either Indian or Tibetan, but there are dozens of ethnic groups, and I was to live among the Brahmins and Thamangs in the Middle Hills south of Kathmandu.

At that moment, however, I was gently steaming in a tea shop. My brother, Alan Clark, and I were on our way to Karleswar,

walking the 15 km from Lele, which is the nearest road head. Karleswar, a political unit or panchayat, is 30 km south west of Kathmandu and consists of nine political subunits or wards and encompasses six villages. These villages are spread out over four ridges and three valleys. The terrain is exceedingly steep, dropping several hundred metres from one ridge to the next. The slopes are cultivated with an impressive array of terraces.

Water supply system

Alan Clark had been living in Karleswar for nearly two years, working with Volunteer Service Overseas and building piped water supply systems. The scheme was organised on the community self help approach and comprised two major systems. The first was built along one of the ridges during 1981-2 and the second on a parallel ridge during 1982-3.

The two water supply systems derive water from small dams built upstream. Pipes from these dams run downwards, away from the rivers, feeding water by gravity into large reservoir tanks on each ridge. Both water supply systems then have a single main pipe running down along the top of each ridge from which numerous side pipes branch off; these side pipes supply between one and three tapstands. Tanks functioning as sedimentation and break pressure units are interposed along the main pipe to prevent blockage of the pipe by silt and excessive hydrostatic pressure. The system built during 1982-3 is more than twice the size of the first

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and is supplied by two dams along the same river. The other system is supplied by only one dam on a different river.

There are four ridges in Karleswar, and on two of them there is no water supply system. Most of the villagers living here rely on water running along open contour channels (kola) dug in the ground, which conduct water from the river to a bamboo water spout reasonably close to the home. These kola are obviously more

FIG 1—Washed at the tapstand.

susceptible to faecal contamination than water conducted in pipes. A few households benefit from a nearby supply of water conducted through plastic pipes that they have suspended from the trees.

Diarrhoea is a common problem in Karleswar, especially in children, and the village is isolated from effective Western medical services. The nearest health post to Karleswar is 10 km away, but as there is often no doctor there most parents would prefer to take their child to Kathmandu; treatment there may cost a villager his life savings.

Other problems were introduced by the water supply scheme itself. In Karleswar, because of the self help nature of the scheme, villagers were willing to work only if there was to be a tapstand located near their home. This had a direct effect on the design of the system. The houses were spread out, so in order to get enough villagers to work many more tapstands had to be built for each pipe line than the pipe could supply. Consequently, there was not always water at each tapstand. This created social unrest. Social disturbance was also precipitated in deciding the exact location of tapstands and by the absence of a water supply system on two of the ridges.

Our project

Studies investigating the various effects of water supply systems on a village community have consistently shown a major benefit to be a reduction of the amount of time spent carrying water.¹ Other potential advantages, such as a reduction of diarrhoeal morbidity, are not usually important. This is despite an adequate supply of clean water nearby.

In Karleswar the water supply system was built with intensive local participation. Attitudes may have been affected by this active participation in the self help scheme. By appreciating the potential health benefits villagers may have been motivated to try to improve their personal hygiene and sanitary arrangements. Actions that parents would like to have taken for a child who had diarrhoea—if they had the money or were nearer to a health post—may have been altered. We investigated the effects of the water supply system on health attitudes—in particular, the assessment and

management of children with diarrhoea—by comparing those areas with a water supply system and those without. We thought that this would help to indicate the potential, or otherwise, of self help schemes in local development.

Method

Over a two month period Hari, the headman's son, had interviewed almost all of the villagers in Karleswar. This had been organised by AC. Because of language difficulties I was unable to take part. We assessed how well Hari conducted his interviews by carrying out a 10% random sample of the households that Hari had interviewed previously.

My first day in Karleswar was typical. The household was up at dawn collecting shrubbery for the goats and buffalo and firewood for cooking a meal of rice, potatoes, and lentils—my staple diet in Nepal. AC and I staggered up rather later, washed at the tapstand, and with Hari planned which houses we would visit that day. We left in a haze of drizzle and mist. Leeches, which parachuted like black demons, filled my consciousness until buildings loomed ahead. A refuge. Tripping over chickens we entered. We were usually offered the local alcoholic brew. Drinking as little as possible, I looked at anyone aspiring to be ill. Hari, using the questionnaire, conducted his interview of as many household members—men, women, and children—who were at home. AC, who speaks fluent Nepali, listened and together we tried to assess Hari's technique. Then once more we were off.

Results

Over two months Hari interviewed 173 (82%) of the households in Karleswar. We found that half (55%) of them used tapstands; only a few, however, used tapstands as their only water source (18%). The rest used water from an open contour channel (kola). All of the households with a functioning tapstand nearby used it.

We confirmed the high level of diarrhoea in children (persons aged under 7 years): 46% (93 children) had had "frequent and troublesome loose

FIG 2—While Hari conducted his interview using the questionnaire.

stools" in the previous week. The availability of tapstands was not associated with a change in diarrhoeal morbidity in children or with a change in any of the other prevalent health problems—for example, stomach ache (17%), accidents (12%), and skin problems (6%). Only two of the 93 children with diarrhoea in the previous week had been taken to a health post; no specific dietary changes were made for any of the children.

The water supply system did have a social effect. When the areas that had tapstands were compared with those without, more households near to tapstands regarded them as being prestigious (77% compared with 46%) and causes of social disruption (34% compared with 14%). Households with tapstands available were also more likely to agree that maintenance was a problem (11% compared with 4%).

Health attitudes

There was an association between the availability of tapstands and various health attitudes. Nearly all of the households interviewed thought that tapstand water was cleaner than alternative sources (89%), and "bad" water was the agreed cause of diarrhoea in 60% of households. Households near to tapstands, however, were more likely to think that "bad" water caused diarrhoea (77% of households compared with 51%). By "bad" water was meant murky water, which was likely to contain keela (literally, little animals—the macroscopic animal life that can be seen in water). Bad food was also thought by many (37%) to cause diarrhoea; again, households near to tapstands were more likely to think that bad food caused diarrhoea (58% as opposed to 24%). Other causes of diarrhoea were rarely given.

The agreed indicators of severe diarrhoea were fever (62% of households), vomiting (44%), and blood in the stool (43%). The availability of tapstands was not associated with any difference in the method of assessment.

Most parents said that they would do nothing if their child got diarrhoea (67%); few would consult anyone or make any dietary changes. Most would let their child eat solid foods (dhaal bhat) if he wanted and would let him drink water and milk if available. Nearness to a tapstand was not associated with any particular action.

Conclusions

The major advantages of the water supply system were to reduce the time spent carrying water and the possible effect on sanitary attitudes. The availability of tapstands was associated with the attitude that bad water and bad food were causes of diarrhoea. There was no effect on assessing and managing children with diarrhoea and no change in morbidity. In contrast, the water supply system caused severe social disruption during the construction (in deciding the location of tapstands) and afterwards (as only half of the households in Karleswar have tapstands nearby).

Back in Kathmandu I was shown around Patan Hospital by the medical superintendent. The new "flashy" building, bedded wards, and superb pathology department were impressive and obviously expensive. I could not help comparing this type of development with the water supply system in Karleswar. The hospital was imposing, efficient, and effective; it obviously benefited a few. The water supply system was cheaper, built by local labour on a self help principle, and saved about 200 women a lot of labour. There was a possible effect on sanitary attitudes, and

if complementary inputs, including better water storage facilities in the home and latrines, had been available there might have been a reduction in diarrhoeal morbidity. Social unrest, however, was, and is, an important consequence.

Most would agree that the appropriate technology for helping the majority was the water supply system. This was supposedly democratic and built by motivated villagers. An inherent problem with this democracy, however, is that it depends on the motivations of all concerned. These include government officials, political leaders, and the villagers. Their reasons for helping are likely to be different from ours, and consideration must be given to what advantages there are for them.

An intrinsic problem with the water supply system in Karleswar was that more labour was needed at any particular time than could be supplied by the number of people who would benefit from that particular piece of work. This was despite the fact that in the end, on completion of the system, there would be a large number of villagers who would have a tapstand nearby. Consequently, the influence of the headman was important in ensuring cooperation among all the villagers who would ultimately benefit. The scheme also depended on the headman's motivations. He would expect a nearby tapstand at least.

Despite the extra complications of a self help scheme, if it is successful the villagers may be better able to maintain it. There is also more likely to be a beneficial effect on sanitary attitudes. For this to be effective complementary inputs must be made available. For example, the construction of a school with washing facilities would reinforce a change in sanitary attitudes and allow these to be put into practice. Health education should be directed at specific unhygienic practices. Latrines and the provision of better storage arrangements in the home would also help to decrease food and water contamination.

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What are the hazards to the fetus when the mother passes through the screening gate at airports?

The "screening gate" at airports works by detecting the disturbances in a magnetic field induced by metallic objects being carried through it by passengers. There is no ionising radiation such as x and gamma rays. There is no evidence that exposure to magnetic fields in this way is harmful to the fetus. Baggage may be examined by equipment using x rays. The exposure used is very short and the image obtained is maintained on the screen by electronic means so as to permit detailed inspection. The radiation doses to the staff using the apparatus and to passengers in the immediate vicinity have been monitored and found to be tiny and insignificant (National Radiological Protection Board, unpublished data).—S RAE, medical adviser to NRPB, Didcot.

Is there any possibility that a "copper" coil in situ in an early pregnancy could produce a congenital defect of, say, the heart or other internal organs?

This possibility has been investigated in various ways. The incidence of congenital abnormalities has been studied among babies conceived with a copper containing intrauterine contraceptive device in situ and has been found to be normal.^{1,2} These studies included several hundred babies, but because of concern that these numbers were too small to show slight changes in incidence investigations have been carried out in animals. In one such study small coils of copper wire were inserted in one uterine horn of pregnant rats³; congenital abnormalities were no more frequent among fetuses from the horn containing copper than among those from the opposite side.

Although there have been reports of raised cord blood caeruloplasmin concentrations in human fetuses exposed to copper containing intrauterine contraceptive devices, a study of abortion material showed no evidence of raised copper concentration in fetal tissues.⁴ The possibility remains that copper may affect implantation of very early embryonic development, but there is no sign of an increased risk of abnormalities in pregnancies continuing to term.—JAMES OWEN DRIFE, senior lecturer in obstetrics and gynaecology, Leicester.

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What sensible precautions should be taken by a woman in her mid 50s who has bilateral renal calculi? She had calcium phosphate stones removed from one kidney last year.

The precautions indicated depend on the cause of the calculi. In many patients there is no detectable cause. In the presence of recurrent or bilateral calculi there is an increased likelihood of an underlying metabolic disorder. This woman should first be investigated for causes of hypercalcaemia or hypercalciuria. Meanwhile she should be advised to drink sufficient fluid to cause nocturia and to avoid large quantities of dairy products or absorbable alkalis. Urinary tract infection should be excluded.—D B WEBB, lecturer in medicine, Cardiff.