



14th WEDC Conference

Water and urban services  
In Asia and the Pacific

Kuala Lumpur 1988

## Squatter area upgrading in Malaysia

Dr R M Bradley and C D Ponniah

### EXISTING SITUATION

#### Socio-Economic Status

In the Federal Territory of Kuala Lumpur the 1985 squatter population was estimated at 200 000 persons, occupying 1189 ha. There were about 200 settlements, containing 29000 dwellings, generally dispersed along the banks and flood plains of watercourses and along highways and railways.

The squatter population increased at an average annual rate of 11% from 1967 to 1977. With an acceleration of resettlement schemes the population decreased at 3.2%/year from 1978 to 1985 and at 6.6%/year from 1982 to 1985. 60% of families were below the threshold poverty level of M\$500/month (December 1985 M\$2.5 to US\$1.0).

#### Water and Sanitation Facilities

In the Federal Territory in 1985 piped water supply was available to virtually the whole population. About 20% of the total population of 1.21 million were served by non-sewered sanitation systems.

Field surveys were carried out in six representative squatter settlements with a total population of 20516 and 2576 families. Families visited and facilities inspected ranged from 5 to 15% of the settlement total.

Water Supply was primarily from a public standpipe. Some shallow wells were still in use but not for drinking. On average, each standpipe served 10 to 12 dwellings, often by means of a plastic hose which was shared among families. There was little evidence of manual carrying of water over long distances. It was concluded that about 90% of dwellings were receiving a reasonably safe water supply, although improvements could still be made, particularly to reduce risks of contamination within the home.

Excreta disposal was generally to some type of latrine, either pour-flush (44% population), overhung (5%) or dry privy (44%). About 10 to 15% were communal. The standard of cleanliness of shared facilities was high, reflecting a high level of social awareness and good community organisation and leadership. The main inadequacy, which was prevalent in almost all areas, was that the latrine discharged to a shallow depression or marsh or

to a drain (ditch, pipe or corrugated sheet) which in turn discharged direct to a watercourse or to a seepage pit. The latter was often provided with insufficient seepage holes or constructed in soil with a low permeability. It was estimated that about 80% of all excreta reception facilities associated with pour-flush latrines and pit privies were unsatisfactory, although not all to the same degree. 2% of the population had piped water and flush toilets and 5% relied on indiscriminate defeacation or disposal with refuse.

Sullage disposal in all squatter areas was to drains and although it presented no major health risk the situation could be improved by upgrading site drainage and eliminating depressions under houses which tended to collect water and give rise to vector breeding.

Nightsoil buckets were still used by about 30000 people although they had been phased out in squatter settlements some years ago. In 1985 there were about 5400 buckets, serviced on alternate days by City Hall and a licensed private contractor, compared to about 30000 in 1970.

The house bucket contents were tipped into a separate bucket which was carried to the collection truck. Although the collection bucket was washed at the truck, house buckets were not washed by the collection crews. In general the buckets contained only excreta and, depending on user preference, water used for anal cleaning. In some areas anal cleaning was carried out in a separate washing area and the water discharged to the surface drainage system. Newspaper was the preferred cleansing material in some cases, and the buckets filled relatively quickly as a result. Site visits showed that the collection system was efficient and as hygienic as possible with little spillage. Inspections of bucket locations indicated a lack of attention to fly protection and cleanliness, particularly in some of the communal facilities. Access doors were invariably poorly fitting and few buckets were provided with lids. Fly larvae were present in the nightsoil.

All nightsoil was discharged to sludge digesters at the Pantai Sewage Treatment Works.

#### Public Health Status

The infant mortality rate in Peninsular Malaysia in 1983 was 20/1000 live births, having fallen from 50/1000 in 1965. The rate for the Federal Territory was even lower, at about 13/1000. Water related disease rates in the Federal Territory had also fallen with 1.48 notified cases/100 000 population of typhoid, cholera and dysentery in 1983 compared to 10.82 cases/100 000 population in 1972.

A 1978 survey (ref.1) of 4 to 6-year old children in Kuala Lumpur showed a significantly higher incidence of parasitic infestation in squatter settlements (ascaris 60%, trichuris 84%) compared to "upper middle class" areas (ascaris 2.5%, trichuris 8%). Survey data for children and adults in Kuala Lumpur in 1982 showed that communities in sewered areas exhibited an infestation rate about half of that in non-sewered areas, as summarised in Table 1 (ref.2).

Diarrhoea records for 1984 for children up to 7 years old were analysed for 11 clinics in squatter settlements and compared to data from 2 large clinics in urbanised sewered areas. Cases in the sewered areas represented 2.5% of the total attendance of 38710, compared to 2.6% of the total attendance of squatter clinics, suggesting that diarrhoea rates were not related to the type of excreta disposal system.

The major sanitation deficiency in the squatter areas was in the excreta reception system which could explain to some extent the relatively high prevalence of parasite levels in non-sewered communities. However, this did not imply that the absence of sewers, per se, was the cause of the higher incidence rates.

## UPGRADING STRATEGIES

### Government Policy

City Hall policy is to phase out all bucket nightsoil systems by 1990 and to accelerate the urban renewal and squatter relocation programme to achieve completion by about 2005. Emphasis is placed on privatisation of squatter area redevelopment including in-house water supply and sewerage. Any interim upgrading of water and sanitation facilities must, therefore, be prioritised in the context of the overall squatter settlement eradication policy.

### Upgrading Requirements

Perceived problems by squatters were evaluated from a sample survey to determine upgrading and improvement priorities. The main complaints were no electricity (41%) and no in-house water supply (40%). Only 5% considered excreta disposal facilities inadequate.

Public health risks were not quantifiable. With the exception of critical areas such as those without easy access to piped water, no formal means of excreta disposal, locations where excreta was deposited directly on the ground surface and in bucket nightsoil areas, upgrading could only be justified on the basis of enhancement of environmental quality.

### Recommended Upgrading Measures

Water supply upgrading was based on one standpipe/10 dwellings, each standpipe to comprise three 12 mm taps. The maximum distance would not exceed 50 m. The use of shared hoses connecting standpipes to dwellings was encouraged since it obviated the need for hand carrying and reduced the risk of contamination. Recommended improvements were lifting hoses above the ground and not submerging hoses in water storage vessels, thereby avoiding potentially contaminated water being drawn back into the mains supply during periods of low pressure.

TABLE 1. Parasitic Infestation Rates

| Area                      | Infestation Rate (% Positive) |           |             |         |
|---------------------------|-------------------------------|-----------|-------------|---------|
|                           | Ascaris                       | Trichuris | Ancylostoma | Overall |
| <b>Sewered Areas:</b>     |                               |           |             |         |
| New Villages              | 11                            | 28        | 4           | 33      |
| Flats                     | 5                             | 20        | 2           | 23      |
| Average                   | 8                             | 24        | 6           | 27      |
| <b>Non-Sewered Areas:</b> |                               |           |             |         |
| Squatter                  | 31                            | 50        | 8           | 58      |
| Estates                   | 46                            | 50        | 22          | 65      |
| Average                   | 38                            | 50        | 15          | 61      |

Sanitation upgrading in squatter areas was based on pour-flush latrines with relatively shallow gravel trenches or raised mounds for soakaways because of adverse drainage conditions. The total cost of a pour-flush latrine including a small septic tank of two 1m dia., 1m long concrete pipes was about M\$1000.

Bucket nightsoil upgrading was to provide sewer connections where street sewers were close by, or vacuum cartage. For vacuum cartage, the buckets would be replaced by a 1.5 cu m watertight vault costing M\$320, sufficient for three weeks use. The bucket lavatory would be upgraded, preferably to a trapped squat plate. Seven tankers would be required and it was recommended that existing tankers be modified by removing the internal dividing wall and installing a vacuum pump and 100m hose.

#### RATE OF IMPLEMENTATION OF UPGRADING STRATEGIES

##### Squatter Areas

The recommended programme was to provide 290 standpipes and 2860 pour-flush latrines to replace overhung latrines and to provide excreta disposal facilities for those families who had to rely on indiscriminate defecation or disposal with refuse. The total capital cost of such priority upgrading was estimated at M\$0.5 million for the standpipes and M\$2.8 million for the pour-flush latrines. The number of squatter families to benefit from the provision of standpipes would be about 2900 at a cost (excluding flexible hose) of M\$170/family. The cost of the pour-flush latrine would be about M\$1000/family, assuming no sharing. The upgrading work could be completed in three years, including one year for detailed site surveys.

##### Nightsoil Areas

To eliminate bucket nightsoil systems by end 1990 about 2500 buckets would be converted to sewerage at an average cost of M\$2500 and about 2900 buckets converted to vacuum cartage at an average cost of M\$740 (range M\$320 to M\$920). These costs allowed for 70% of the bucket toilet buildings having to be completely rebuilt and excluded the cost of tanker modification. The estimated operation and maintenance cost of a vacuum cartage system would be M\$7.4/vault per month, compared to M\$8.6/house per month of the bucket nightsoil system.

#### FINANCIAL VIABILITY

A pour-flush latrine would represent about 4.5% of a monthly income of M\$500 if it was to be financed over a 5-year period at 10% interest. Increasing the payment

period to 10 years would decrease the repayment to about 2.7% of the monthly income. The cost to the family could be reduced if materials were provided, either free or at a subsidised cost, and if the squatters were to provide their own labour. The material costs of a pour-flush latrine, averaged about 75% of the total cost. Experience showed that effective community organisation could be achieved in squatter areas, and the field survey showed that such organisation was capable of ensuring clean and hygienic communal latrine facilities.

It was recommended that the possibility of community participation in construction be explored, together with the provision of materials by Government. The concept of Government assistance in other sectors was already accepted, and since the Government's goal was to upgrade or redevelop squatter areas generally, the principle of financial assistance for facilities designed to safeguard public health in critical areas was sound; either through direct grant or cross subsidy from the more affluent sewerage areas. Such financial assistance would be essential for the lower income nightsoil areas where conversion to sewerage was to be carried out.

#### REFERENCES

1. YAN CW. and others. The problem of soil transmitted helminths in squatter areas around Kuala Lumpur, Malaysian Medical Journal, 1978, 33, 34-43.
2. OW YANG CK. Annual Report, Division of Parasitology, Institute for Medical Research, Malaysia, 1982.

#### ACKNOWLEDGEMENTS

The study was performed as part of the Reappraisal and Review of the Kuala Lumpur Master Plan for Sewerage and Sewage Disposal, carried out in 1985 by Engineering Science, Inc., in association with Malaysia International Consultants Sdn. Bhd. Dr. Bradley and Mr. Ponniah were associated with the project as Project Manager and Co-Project Manager respectively. The authors gratefully acknowledge the permission of the Director of the Sewerage and Drainage Department, City Hall, Kuala Lumpur, to publish the survey results and wish to point out that the opinions expressed in the paper are the authors.