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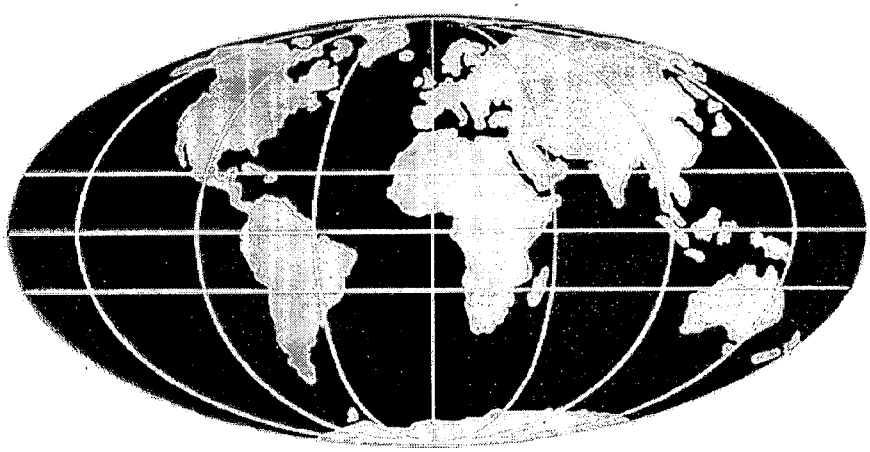
by: G D Jacobs, D A C Maunder and P R Fouracre



Transport Research Laboratory
Crowthorne
Berkshire RG45 6AU
United Kingdom

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Transport and Road Research Laboratory

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Dr G D Jacobs, D A C Maunder and P R Fouracre

Overseas Unit
Transport and Road Research Laboratory
Crowthorne, Berkshire
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G D Jacobs, D A C Maunder and P R Fouracre

Overseas Unit, Transport and Road Research Laboratory
Crowthorne, Berkshire

UNITED KINGDOM

Introduction

It has been estimated that by the end of the century the urban population of the world will reach some 3,000 million. Over two thirds of these will be living in cities of the Third World that (even now) are experiencing great difficulty in feeding, housing and transporting the millions who already live there. In many cities in developing countries, the rapid rise in population coupled with limited financial resources available for investment in urban infrastructure has produced severe transport problems. Many people live on the periphery of cities, particularly the newcomers or those of low income, and consequently have to travel large distances to work, places of higher education, hospitals and other amenities.

Most major cities of the Third World have been the subjects of comprehensive land-use transport studies. Future plans and policies have been formulated by studying existing travel and land-use patterns and making forecasts of future movements of people, vehicles and goods by varying modes of transport. In recent years considerable emphasis has been placed on short-term traffic management solutions which attempt, by relatively low-cost engineering techniques, to improve the capacity of the existing road networks.

Whilst these studies have been essential in improving the existing traffic situation and in effecting policies for the future, few, if any, have isolated the poorest sections of the community for specific study. This is perhaps not surprising since low-income groups are obviously not car users nor do they have high daily trip rates. However they do form a large proportion of the total population. In Kuala Lumpur, for example, a relatively wealthy city by Third World standards, almost one quarter of the total population lives in 'squatter' accommodation. Similarly in Delhi, almost 30 per cent of the total population fall into the lowest

income categories with average household incomes below 300 rupees (£17) per month. This paper looks at studies conducted in 5 cities, namely Delhi, Calcutta and Baroda in India, Kingston, Jamaica, and Kuala Lumpur in Malaysia where information on the travel patterns and problems of the poorer sections of the community has been gathered.

The urban poor

Evocative terms such as 'urban poor of the Third World', 'squatter accommodation', (even the mere mention of the city of Calcutta), bring to mind those unfortunate people with no permanent home, forced to live on pavements or under temporary cover. Such people were indeed the subject of one study carried out by the Overseas Unit in Delhi but most of the surveys conducted to date and included in this paper were at the permanent households of low-income groups.

In order to put the various groups studied into perspective, table 1 shows the household income levels per month (in pounds sterling at 1978-9 prices) of the various income groups. The national GNP/capita figures take into account both urban and rural populations.

As can be seen from table 1, income levels of the various groups studied varied considerably. In the Indian cities, for example, low income groups had montnly household incomes in the range £10-70 per month with which to feed, house, clothe an average of five people. The surveys in Calcutta were conducted at places of work so no households without an employed person were studied. Inevitably in Calcutta there will be many households with incomes lower than those indicated in table 1. Kingston Jamaica and Kuala Lumpur represent the more affluent cities of the Third World and incomes are high in comparison with those in India. Even in Kuala Lumpur, average monthly incomes are still low by Western standards and the relatively high monthly household incomes are a consequence of large household size (housing estates averaged almost 8 persons per household), with two or three wage earners per household.

Trip rates and journey purposes

Detailed home-interview surveys were conducted in Delhi and Kuala Lumpur as part of the research programme of the Overseas Unit, and have provided information on trip rates and journey purposes. Figure 1 illustrates how the household trip rate (all modes, all purposes) for squatters and occupants of City Hall flats in Kuala Lumpur, increased rapidly with increasing household income. Figure 2 shows that the trip rate per person increased but slightly with household income, most of the increase in household trip making being accounted for by increasing household size. For both squatters and occupants of City Hall flats, the

Table I

Average household income per month for Groups studied

City	National monthly GNP/cap (£) (1977 prices)	Type of groups studied and average household income levels (1978-9 prices)		
Baroda[1] India	£7	1 Person Household <£13	Household av. size 2 persons £13-33	Household av. size 3-5 persons £33-70
Calcutta[2] India	£7	Employed persons av. household income £10 (lower decile)	Employed persons av. household income £36 (mid decile)	Employed persons av. household income £75 (upper decile)
Delhi India	£7	Squatters £17	Low income housing estates £24	Middle income housing estates £90
Kuala Lumpur Malaysia	£40	Squatters £115	City hall flat dwellers £127	Housing estates £154
Kingston Jamaica[3]	£44	Low income groups <£50	Low-mid income groups £50-80	Mid-income groups £80-160

average daily trip rate per person by all modes was found to be 1.4. The survey showed that between 85 and 95 per cent of all trips were made for the 'essential' purposes of travel to work and school. Trip rates for households with incomes below £40 per month seemed particularly low and may have been due to fewer people in employment in these households, fewer children attending school and the fact that 'non-essential' trips (social and recreational for example) were rarely made at all.

In Delhi, household surveys were conducted at both low and middle-income housing areas. In the former, the average daily trip rate (all modes, all purposes) was 5.1 trips per household and 1.0 trip per person. The equivalent figures for middle-income areas were 6.8 and 1.4. The greater trip rate from middle-income areas was due mainly to the proportionately greater number of journeys made for educational purposes, the rates for work trips being the same at 3.0 trips per household. In middle income areas virtually all children between the ages of 5 and 17 attended school whilst in low-income areas just over 70 per cent did so. In many instances children supported the household budget by part-time employment. For both areas, 'essential' work and school trips accounted for almost 90 per cent of all journeys made.

Figure 2 shows the average daily trip rate per person in Kuala Lumpur, Delhi and an estimate derived for Kingston, Jamaica[4]. The trip rates per person in these three cities were, for varying family income levels, very similar indeed. For monthly incomes of approximately £15 to £50 per month, trip rates increased from 0.8 to 1.4 trips per person per day. Between £50 and £180 per month, the increase in trip rates was minimal. For households in the £50-£180 monthly income range the large majority of trips were for work and educational purposes with little money left, irrespective of income level, for social trips. For households with incomes below £50 per month, the large majority of trips made were to and from work, with relatively few educational journeys made and very few social trips indeed.

A similar study[5] was carried out by the Indian Central Road Research Institute in 1973 in Delhi. Relationships were established between income levels and journeys made for differing purposes as follows

$$y_1 = 81.2 - 0.0165x$$

$$y_2 = 6.66 + 0.008x$$

where y_1 = percentage of work trips of all trips made

y_2 = percentage of social and recreation trips of all trips made

x = income of individual in rupees/month (1973 prices)

Thus at an income of say £17 per month over 80 per cent of journeys made by individuals were for work purposes and under 10 per cent for social and recreational purposes. With income of about £200 equivalent figures were 40 and 30 per cent respectively. As might be expected, increased wealth provides greater mobility for people in Third World cities as it does in European and North American cities.

The travel patterns described above are in marked contrast to those which exist in the United Kingdom. For example, the National Travel Survey[6] 1975/76 suggests that almost 60 per cent of all journeys made in Great Britain were for social, shopping, entertainment and personal business purposes.

Modal Choice

Information was obtained on the journeys to work by different income groups and this is given in table 2. Emphasis has been placed on the journey to work since low-income groups make few daily journeys other than that to and from their place of work (see above).

Table 2

Mode of travel for journeys to work

City	Group or (journey type)	MODE %					
		Walk	Cycle	Bus	Para transit*	Private	Other
Baroda	1-2 kms) all 4 kms) incomes	32 3	61 60	1 25	1 1	5 8	- 3
Calcutta	Survey mean	7	-	84+	7	2	-
Delhi	squatters low-income mid-income	65 10 3	1 5 2	28 82 80	5 2 1	- - 12	1 1 2
Kingston[3]	low-income low-mid income mid-income	45 19 12	- - -	30 48 34	16 16 22	6 13 27	3 4 5
Kuala Lumpur	low-income mid-income	47 31	6 8	38 39	(inc minibus) (inc minibus)	8 22	- -

*minibus, cycle rickshaw, scooter rickshaw etc
+incl bus, tram and train

In Baroda, journey distance as well as income level were found to affect modal choice. For short trips of 1-2kms, journeys were mainly by cycle and foot, whilst for journeys of over 4kms, cycle and bus journeys predominated. Some employees in low-income groups in Baroda could afford neither a cycle or to use buses and consequently made very long walk and cycle trips, up to 90 minutes in duration.

Apart from in Baroda, the use of cycles appeared to be surprisingly low. This could well have been on account of journey distance, or the initial purchase price of a cycle. In Delhi, the low-income groups studied lived 15-20kms from the city centre and it is not perhaps surprising that few made this journey by cycle. Roadside surveys indicated that low-income groups (but not squatters) living much nearer to the city centre made about 15 per cent of their journeys to work by cycle. Squatters who often lived fairly close to places of employment seemed to make few journeys by cycle. In India the cost of a new cycle is approximately £20, which as can be seen from table 1 represents over a month's income for both squatters and low-income households.

In Delhi, almost two thirds of all work journeys by squatters were on foot. Some of these people walked over 10 kilometres to work and presumably could not afford even the very low fares charged by the Delhi Transport Corporation (DTC). Both low and middle-income workers in Delhi used buses for over 80 per cent of their journeys to work. There were differences however between the two groups; low income employees used the DTC service almost exclusively, whilst 30 per cent of middle income employees used the more expensive charter bus service. On charter buses, passengers are guaranteed a seat with a limited stop service whereas on DTC buses, passengers travel in extremely uncomfortable conditions with equivalent (door-to-door) journeys taking almost twice as long as charter bus services.

Not only do middle income areas have services provided by both DTC and charter buses - a choice denied to low income groups - but the level of service provided by the DTC itself to middle income areas is probably superior to that provided to low income areas. For example, the low income community is provided with 30 per cent fewer bus routes and 40 per cent fewer buses per head of population; average DTC bus journey times for similar distances are 12 per cent longer from low income areas; average passenger waiting times for services to low income areas are 40 per cent greater than those to middle income areas. Clearly, the level of service to low income areas is generally poorer, and it is these sections of the community which have greatest dependence on public transport.

In both Kuala Lumpur and Kingston there is still a heavy reliance on public transport for journeys to work. As might be expected, in these two

cities, private transport is used much more extensively than in those cities studied in India. In both cities, the percentage of journeys to work by private modes of transport for middle-income groups was found to be twice that of low income groups. Use of private modes of transport is still low by British standards; in this country for example, over 50 per cent of all work journeys are made by car or motor cycle[7].

Most cities of the Third World operate what are known as 'para-transit' forms of transport. The term 'paratransit' describes a whole range of public transport modes ranging between cycle rickshaw and mini-bus. As can be seen from table 2, low-income groups make little use of these forms of public transport apart from the minibuses of Kingston. A comparison of the cost of public transport by various modes in Delhi and Jaipur India, illustrates the relatively high cost of paratransit systems.

Table 3

Comparative cost of alternative forms of public transport in two Indian cities

Transport type	Average fare/km (pence)	Ratio (rel. to bus)
Bus	0.3	1
3-wheel minibus (tempo)	0.6	2
Horse-drawn (tonga)	1.0	3
Cycle rickshaw	1.7	6
Scooter rickshaw	4.6	15

It can be seen that a journey of equivalent distance by scooter rickshaw costs, on average, almost 15 times as much as a journey by bus. Detailed studies carried out by the Overseas Unit of the TRRL in Chieng Mai[8] (Thailand) and Surabaya[9] (Indonesia), two cities where paratransit systems are common, indicated the relatively low use made by lower-income groups of cycle rickshaws, minibuses etc. Not surprisingly, the reasons given for using buses was 'cheap fare' whilst middle-income users gave their main reasons for using minibuses etc as 'convenience'. In many cities, low-income groups do not use paratransit systems, mainly because they cannot afford the fares.

Expenditure on transport

With the exception of the Baroda survey, it has been possible to estimate the proportion of household income spent on transport. Results

are given in Figure 3. It can be seen that in all the cities there is a decrease in the proportion spent on transport with increasing monthly income. Low income families are obliged therefore to spend proportionately more on transport in order to make essential journeys.

The proportions spent on transport in Delhi and Kuala Lumpur were similar and ranged from 8 to 11 per cent depending on income level. The proportions in Kingston were significantly greater and ranged between 15 and 20 per cent. A study[10] of public transport operations in Third World cities by the authors showed that both operating costs and fares were particularly high in Kingston, and this is reflected in the high proportion of income spent on transport.

In Calcutta, surveys were conducted separately on work journeys and journeys to school. By combining results from the two surveys and making assumptions on the number of school children per household, it was estimated that some 16% of the total household budget of the lowest income group was spent on transport. Even this estimate assumed that virtually no children in the group travelled to school by bus.

In contrast, a study by Tulpule[11] of household expenditure in Great Britain in 1970 indicated that non-car-owning households in this country spent between 3 and 4 per cent of income on transport. Also the Department of Employment Family Expenditure Survey 1976[12] stated that households with (low) incomes of £15-20 per week spent 3.4 per cent of total expenditure on transport. It would appear therefore that people in Third World cities have to spend significantly more, proportionately, on transport than those from low-income groups in Britain.

If, for the purposes of this analysis the cost of housing, food and fuel are regarded as 'essential' items of expenditure, the sum remaining can be regarded as the 'disposable' income of the household. The proportion of disposable income spent on transport in the above three cities was estimated to be between 18 and 36 per cent in both Delhi and Kuala Lumpur, depending on income. In Kingston the range was a remarkable 54 to 74 per cent. Interviews in this city indicated in fact that some households (low income earners with several children living in rented accommodation, for example) were obliged to spend almost all of their disposable income on transport. Again, in contrast, Tulpule's study suggests that non-car-owning households in Great Britain in 1970 spent of the order of 8 percent of their disposable income on transport.

Discussion

From the preliminary studies carried out to date it is clear that low income groups in Third World cities make little use of motorised private transport with few trips made for purposes other than to and from work and, to a lesser extent, education. By developed country standards, their trips rates per person per day are low but more work needs to be done to determine whether or not this is a function of their 'lifestyle' or

whether they are unable, for financial reasons, to make important journeys. As shown, the money they spend on public transport is a key item of expenditure in the household budget and low-income groups spend proportionately more on transport than other users of public transport.

In many Third World cities, bus fares are maintained at an artifically low level for socio-political reasons. Whilst this benefits the low income groups, it does mean that middle-income groups are travelling at an artificially low rate. This policy of maintaining cheap fares for all users of public transport has a detrimental effect on the service provided by bus operators. A bus company which is impoverished by virtue of a low fare structure and at the same time is not in receipt of positive government support will always be short of investment capital, as a consequence of which the service will inevitably deteriorate. The decaying or stagnant service is further eroded as more expensive para-transit forms proliferate, their owners taking the opportunity to fill the gaps in transport supply. As seen from the studies reviewed in this paper, low income groups make relatively little use of paratransit systems and with a deteriorating conventional bus service, their problems are likely to increase.

There is a need for more extensive research on the transport problems of the urban poor and related problems of transport provision. Better criteria are needed to describe what constitutes basic transport needs for the urban poor. Research can also help in the problems of servicing these basic needs while at the same time neither impoverishing the low-cost conventional public transport or providing unnecessary subsidy to those who could well afford to pay higher fares. The urban areas of developing countries provide plenty of challenges to those transport researchers who see their work as an important part of social and economic progress.

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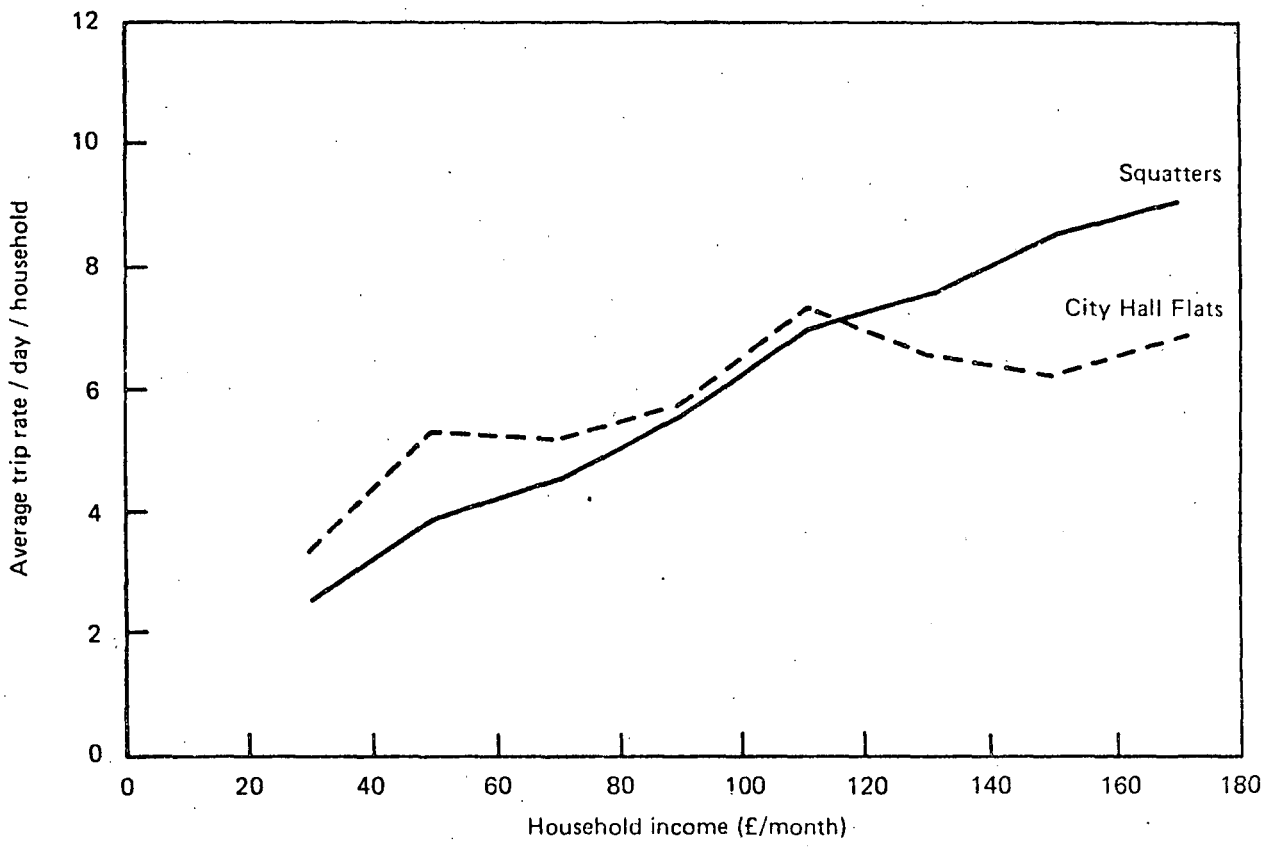

Fig.1 TRIP RATES PER HOUSEHOLD – KUALA LUMPUR

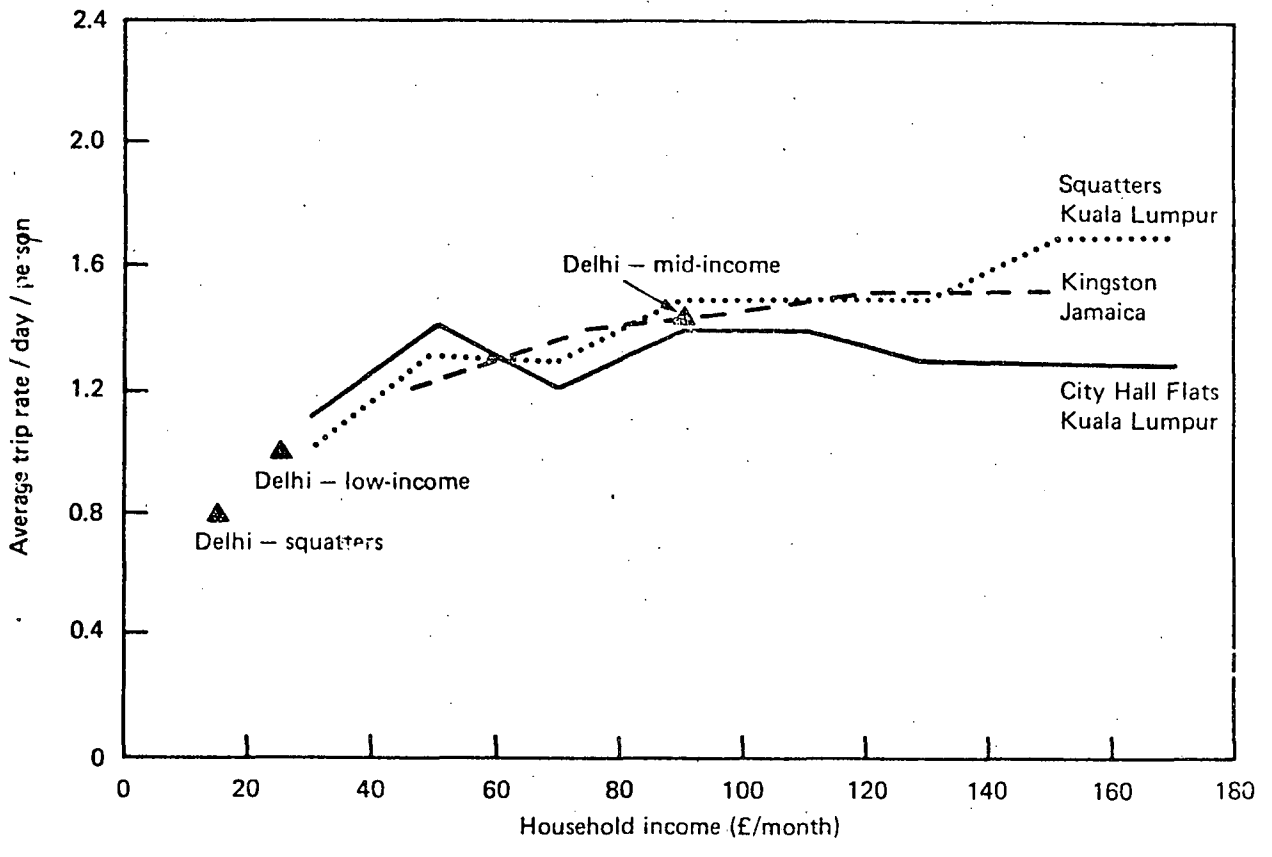

Fig.2 TRIP RATES PER PERSON IN THREE THIRD-WORLD CITIES

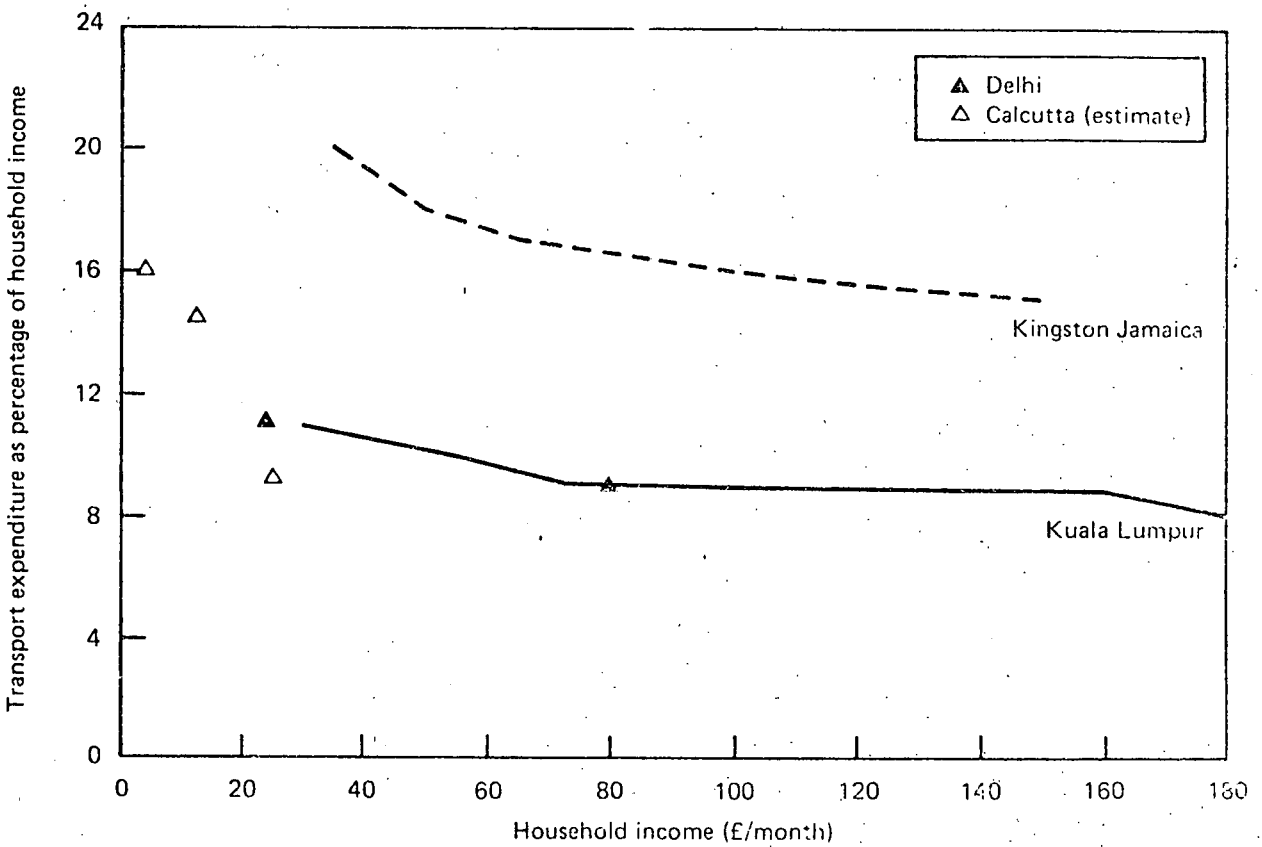

Fig.3 EXPENDITURE ON TRANSPORT AS PROPORTION OF HOUSEHOLD INCOME