Nonmotorized Urban Transport in India

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India had 12 cities with populations of more than 1 million in 1981 and will have 24 cities with populations of this size by the year 2000. Nonmotorized transport modes (walk, bicycle, cycle rickshaw, and tonga) are important components of the urban transport system. Travel by these modes ranged from 26 percent (Bombay) to 56 percent (Bangalore) in large cities and 56 percent (Vadodara) to 69 percent (Jaipur) in small cities. Urban poverty persists in India. Data from 9 cities indicate that nonmotorized transport is quite significant and particularly so to the urban poor. Although transport modernization is likely to take place gradually, urban planners must incorporate nonmotorized travel into their analysis and transport planning.

Despite various efforts to modernize urban transport systems in India, the nonmotorized modes persist. The primary reason for such survival is that these modes are cheap and often as efficient as motorized modes. The poor walk or bicycle, not for keeping fit, but primarily to save money. Modernizing urban transport systems and providing additional transport supply is quite costly. However, allocations for urban transport have met approximately 10–15 percent of the estimated needs during VII five year plan (1982–1987) and there is no reason to believe that allocations will expand during the 1987 to 1992 period (1). This means that the nonmotorized transport modes will remain for the time being.

Four large Asian countries—Bangladesh, India, Indonesia, and Pakistan—contain about two-thirds of the world's absolute poor (2). India displays economic vitality and dire poverty concurrently. Recent estimates of poverty based on the definition of a 2,100 daily caloric intake as suggested by the National Planning Commission of India indicate that 60 to 70 percent of urban residents are poor (3). For example, Bombay is a wealthy city whose total value of goods and services exceeds the GNP of several Asian countries. Yet, in 1981, 71 percent of Bombay households had a monthly income of less than (U.S.) $50, which is below the poverty line accepted by the government.

In 1981, India's population was 665 million, of which 24 percent was urban. The urban population is expected to increase to 28 percent (280 million) of a total of 1.0 billion by the year 2001. There were 12 cities with a population of one-half to one million in 1981. Their number is expected to increase to 24 by 2001.

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URBAN TRAVEL PATTERNS

Urban travel data for large and smaller cities are presented in Tables 1 and 2. Large cities have mature and diverse transport modes. These systems are generally overcrowded throughout the day. Among the large cities, Bombay alone has a good network of commuter trains. In other cities, public transport primarily means buses. Nonmotorized modes varied from a low of 26 percent in Bombay to 62 percent in Ahmadabad.

In smaller cities, the trip lengths are smaller. In these cities, nonmotorized trips are a higher proportion and varied from 56 percent in Vadodara to 69 percent in Jaipur. These trips decrease with the increase in the city size. Mode choice and city size relationships are shown in Figure 1.

Walking is the dominant mode: 15 percent in Bombay, 43 percent in Bangalore and Ahmadabad. The choice of walking trips is influenced by trip lengths, weather, alternative modes of transport and their cost, and the poverty levels. Bicycle trips amounted to 10 percent in Bombay and 26 percent in Jaipur. The bicycle is popular among the poor if they can afford to own one and also, in general, among the students.

Urban travel mode choices by the poor and very poor are presented in Tables 3 and 4, respectively. The relationship between income and mode choice is presented in Figure 2. Although mode choices are influenced by trip length, weather, and cost of other alternatives, income is the dominant determinant of mode choice. With increasing incomes, people shift to more comfortable and convenient motorized modes.

URBAN TRANSPORT POLICY

Urban transport systems in India function in an environment characterized by (a) large-scale poverty resulting in an inability to pay and (b) lack of adequate financial resources to create additional transport supply. These conditions are changing slowly but are not expected to change drastically over the next 20 years. On the other hand, urban transport policy goals and planning principles in India are heavily biased in favor of motorized vehicles, ignoring the nonmotorized modes used by a large segment of the population (4–6). It is as if these modes (walk, bicycle, and cycle rickshaw) do not exist and, if they do, they will somehow disappear during the next planning period. This situation is not unique to India. In many developing countries, the policy goals are to eliminate the nonmotorized modes and assume that they will fade of their own accord (7–10). Although transport modernization must take place, and

TABLE 1   URBAN TRAVEL—LARGE METRO AREAS, 1981

	Population (millions)	Transportation Mode (%)				
		Walk	Bicycle	Cycle Rickshaw	Tonga	Total Nonmotorized Trips
Bangalore	2.9	43.4	12.0	<0.1	0.3	55.7
Bombay	8.2	15.0	10.0	1.0	<0.1	26.0
Delhi	5.7	28.7	14.8	3.0	<0.1	46.5
Madras	4.3	20.0	20.0	<0.1	0.2	41.0
Ahmadabad	2.5	43.2	18.0	0.2	0.2	61.6

TABLE 2   URBAN TRAVEL—SMALL METRO AREAS, 1981

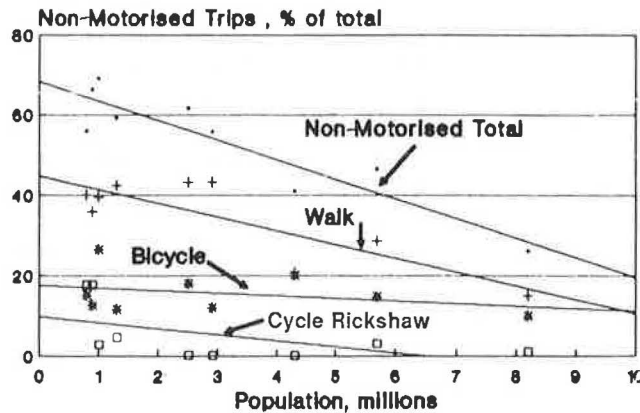|	Population (millions)	Transportation Mode (%)				
		Walk	Bicycle	Cycle Rickshaw	Tonga	Total Nonmotorized Trips
Visakhapatnam	1.3	42.4	11.6	4.6	0.5	59.1
Vadodara	0.8	40.1	15.1	0.5	0.2	55.9
Jaipur	1.0	39.5	26.5	2.7	0.3	69.0
Patna	0.9	35.8	12.5	17.6	0.4	66.3

FIGURE 1   Urban travel patterns: population and nonmotorized modes.

will take place with increasing income, it is important to plan for and appropriately accommodate these modes in the interim. The interim period is certainly longer than 20 yr, especially if the projected levels of poverty are considered (2, 3, 11).

Urban transport systems in India are characterized by high use of the walk and bicycle modes, practically overloaded public transport, and lack of financial resources to make quantum jump improvements. Furthermore, the majority of the urban dwellers are poor and they are the primary users of non-motorized transport. These differences require different approaches to transport analysis and development. For example, it should be mandatory to require assessment of impacts on the poor whenever new transport investments or regulations are proposed. Emphasis should be placed on nontransport solutions to transport problems.

Urban transport policy issues and conclusions are summarized in the following paragraphs:

• *Walking trips.* Fifteen to forty-three percent of all trips are made by walking. Therefore, adequate and continuous footpaths and safe and convenient crossings should be provided. Thirty-five to seventy-eight percent of all trips by the poor are made by walking. The poor walk primarily for economic reasons. Thus, short trips should be encouraged by providing adequate housing near employment centers and decentralizing work places, reducing the need for long trips.

• *Bicycle trips.* Ten to twenty-seven percent of all trips are made by bicycle. Therefore, adequate and continuous cycle paths should be provided, as well as safe and convenient interchange systems when the bicycle paths share the same roads with other traffic. Easy access to bicycles could be encouraged by increasing production of bicycles; promoting installment-purchase and bicycle-for-hire operations; encouraging short trips by providing adequate housing near employment centers; and decentralizing work places, reducing the need for long trips.

TABLE 3   URBAN TRAVEL BY THE POOR

	Monthly per Capita Income (Rs)	Distance to CBD (km)	Transportation Mode (%)			
			Walk	Bicycle	Cycle Rickshaw	Total Nonmotorized Trips
Dakshin puri	117	14	58	14	<1	72
Shakar pur	193	8	43	5	4	52
Poonna mallee	161	21	35	15	<1	50

TABLE 4 URBAN TRAVEL BY THE VERY POOR

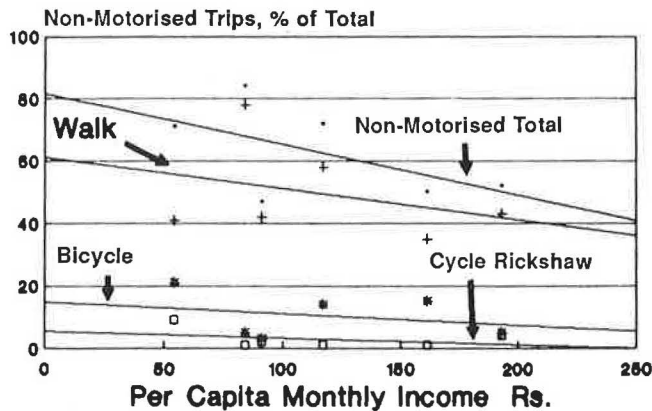|	Monthly per Capita Income (Rs)	Distance to CBD (km)	Transportation Mode (%)			
			Walk	Bicycle	Cycle Rickshaw	Total Nonmotorized Trips
Nand Nagri	91	25	42	3	2	47
Kesava Perumal	54	5	41	21	9	71
1,200 slums (avg)	84	NA	78	5	1	84

NOTE: NA = not applicable.

FIGURE 2 Urban travel patterns: income and mode choice.

• *Cycle rickshaw trips.* Cycle rickshaws are a significant part of the urban transportation system, particularly in smaller urban areas. One to eighteen percent of all trips are by cycle rickshaw. Modernization and motorization of rickshaws will take place eventually. Until then, nonmotorized rickshaws are required by the public. Regulatory barriers to new supply should be removed, new supply should be provided where there is a demand, and research should be undertaken on how the economic productivity of the rickshaw can be increased.

• *Nonmotorized urban transport as a whole.* The highest priority should be given to moving people using the most common transport modes, including walking and using bicycles and public transport. Design guidelines must be developed for safely and adequately handling mixed traffic. In addition, urban planning should incorporate the goal of reducing trip lengths, particularly to work places. Finally, urban transport studies must include data and analysis of walking and bicycle trips.

Some key areas needing further research are

• Applicability of the concept of equal and universal value of time: Do time-savings have equal monetary value or benefit to all persons? What increments of time-savings are significant to whom?

• Road user space and cost allocation: How are priorities established for vehicle mix and cost allocation?

• Modal efficiency: If bicycles are energy efficient and universally available even to poor households, should bicycle ownership and use be encouraged?

• Transport modernization: What are the most suitable strategies for transport modernization without increasing the cost of transport?

Although it is necessary to gradually modernize urban transport, it is important to include all nonmotorized modes within the system. It cannot be assumed that adequate financial resources will always be available or that the poor will pay for time-savings. It is important to protect the interests of the poor and at the same time provide adequate and efficient transport. Such goals can and should be complementary.

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