

Transport Technical Notes and Case Studies

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Technical Notes

Note 1: The sustainable livelihoods approach framework

The sustainable livelihoods approach can be thought of as an organizing principle which draws on and combines existing development approaches such as participatory and community based development, sector-wide approaches, integrated rural development, public sector reform and decentralization. Central to this approach is the recognition of peoples diverse livelihoods goals or outcomes (e.g. more income, better health, reduced vulnerability) and the complex household strategies adopted to meet these goals. It recognizes that households activities are driven by priorities that arise in a context of vulnerability and that options are influenced by structures (e.g. the form and organization of government and the private sector) and processes (e.g. policies, laws and existing institutions). The framework focuses on people's strengths (assets) and how these can convert into positive outcomes. It identifies five types of assets which people can build on and/or draw upon—human, natural, physical, financial, and social capital.

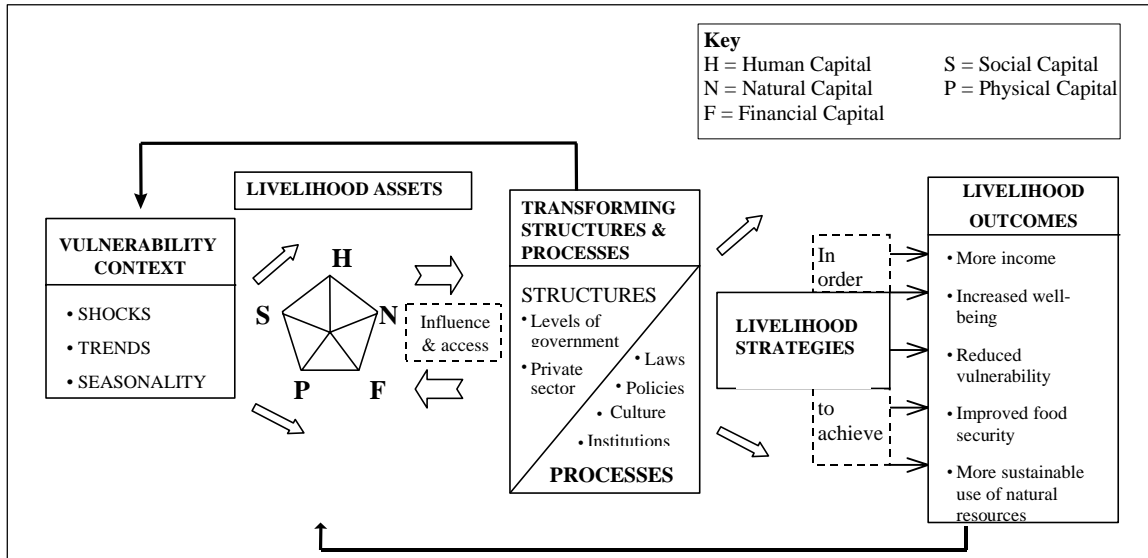
The sustainable livelihoods framework has three analytical components.²

- **Structural conditions**—these are fixed in the medium to long term and delineate the physical, economic, and political environment in which poor people live and work.
- **Capital assets**—the common property, for example roads, and individually owned resources poor people can draw on for their livelihoods.
- **Institutions and processes**—the institutions, government (local, regional, and national), private sector firms, NGOs, and the processes and social norms, legal, judicial, customary and gender relations, that provide opportunities and constraints for poor people to use a build assets.

How the three analytical components can be linked to transport is demonstrated in Tables 1, 2 and 3 below. Our aim here is to understand how transport figures in livelihood strategies and outcome. Figure 1 shows how assets (including transport infrastructure and services) lie at the heart of the sustainable livelihoods framework. The structural conditions and the institutional conditions govern how people use assets in their livelihood strategies. Livelihood outcomes feed into livelihood assets as they enable poor people to build up their assets (for example, through using more income to invest in physical or human capital). Alternatively livelihood outcomes may run down the asset base (e.g., through unsustainable use of natural resources).

² This summary of the Sustainable Livelihoods Approach derives from ODI (2000), prepared for the World Bank and DFID (UK).

Figure 1 Livelihoods framework



Source: DFID 1999

Table 1. Linkages between Structural Conditions and Transport

Structural Condition	Transport Link
1. Geography	Sets transports conditions (for example, access by road, rail, waterway, or sea). Determines choice transport infrastructure (e.g., bridges, tunnels, rails, roads, or paths). Influences cost of improving transport infrastructure.
2. Location	Distance of households from community center, towns, capital, coast, etc.; roads/ infrastructure.
3. Seasonality	Maintenance costs of infrastructure, need for all-weather access roads, seasonal demand for transport services.
4. Population density	Level of demand for transport services.
5. Shocks	Vulnerability to natural and manmade disasters— vulnerability, floods, famine, war, disease. Sufficiency of transport infrastructure for access in emergency. Potential of transport infrastructure to increase vulnerability by exposing communities to risk (for example, HIV/AIDS)

Table 2. Linkages between Livelihood Assets and Transport

Capital Asset	Transport Link
1. Natural capital (natural resource stocks from which resource flows useful for livelihoods are derived)	Developments may bring environmental degradation, ranging from air and noise pollution (urban) to slope instability and soil erosion (rural). Changes in land use, improved access increases exploitation of local resources. Increased competition for land and resources.
2. Social capital (social resources on which people draw in pursuit of livelihoods, i.e., relationships, membership of networks)	Increased contact with other social groups. Access to information, technology, new services. Lowers cost of social visits. Exposure to social problems (for example, alcohol and drugs).
3. Human capital (skills, knowledge, ability to work, good health, which enable people to pursue different livelihood strategies)	Increased risk of road accidents, incapacitation or death, loss of earnings. Formal and informal employment generation in construction, maintenance, and service industries. Improved access to health-care, education, and extension services.
4. Physical capital (basic infrastructure transport, shelter, water, energy and communications, production equipment)	Improved water, energy, and communications (telephone, radio, post office) service delivery. Seeds, fertilizer, machinery. Depends on quality of road versus benefits derived from improvements and affordability of transport services (esp. poorest).
5. Financial capital (financial resources available that provide livelihood options, for example, savings, credit, remittances, pensions)	Reduced transport costs, travel times, and vehicle maintenance and operating costs, all of which increase labor productivity and decrease farm input costs and produce prices. Improved income and improved access to markets, credit, and savings facilities, etc., bolster financial capital.

Table 3. Linkages between Institutions and Processes and Transport

Institution/Process	Transport Link
1. Local government	Responsible for transport infrastructure at district/local level. Linking communities to services, markets, and locations of political decisionmaking.
2. National government	Responsibility for national transport infrastructure network linking community to cities, ports, and regional centers.
3. Firms	Providers of transport services, often in partnership with government, supply of infrastructure.
4. NGOs	Interventions to improve transport at local level such as promotion of non-motorized transport, planning community-based initiatives to meet locally defined transport needs.
5. Laws	Regulate the provision of transport services including public health and safety.
6. Gender relations	Determine how transport assets and technologies are used (for example, whether it is acceptable for women to handle draught animals, use bicycles). Determine demand for mobility (for example, whether it is acceptable for women to travel outside household, move freely in public).

Case Studies

The case studies that follow have two main aims:

- to illustrate the outcome and impact of transport interventions that have a direct effect on the poor;
- to illustrate operational tools used in the intervention that are replicable and may be of use in other countries.

In addition, they provide a brief background and a contact person for more detailed information.

Case Study 1: Morocco From foodline to lifeline: Surveys find predictable but also unsuspected impacts of rural roads

This case illustrates how improving basic transport accessibility can have a wide range of positive impacts, on transport, agriculture, education and health. The case also highlights a well-designed impact assessment methodology.

Intervention. A rural roads component of a major highway project (financed by the World Bank). A detailed impact study covered four roads, located in different geographic and climatic areas of the country, that were improved from a deteriorated gravel or track condition to an asphalt surface.

Objectives. The rural road component aimed to alleviate rural poverty via improvements to the secondary and tertiary road network.

Rural Transport and Poverty. Morocco underwent a sustained urbanization process through the 1980s and 1990s. Nonetheless, about 50 percent of Morocco's population remains rural. About 70 percent of the country's poor live in rural areas.

Rural transport services are mostly provided by small trucks and by share-ride taxis.

Findings. The surveys found that by providing all-weather road access, and by substantially lowering the cost of operation for motorized vehicles, the improved roads helped farmers modernize agriculture inputs (more fertilizers, insecticides, mechanization) and outputs (higher value, perishable vegetables and fruits). These changes generated more on-farm as well as off-farm employment. The all-weather road access improved the quality of education and health, as it became easier to recruit and retain staff, and bring supplies. Women and girls benefited especially from the road improvements. The better roads made delivery of butane more affordable, reducing the need for women to collect firewood, and freeing this time (some two hours daily) for income earning or other activities or interests. Mechanization also provided women who previously helped in the wheat fields with more free time. This opened new opportunities for women, both work and nonwork. The new roads made walking or transport to schools more secure and encouraged parents to send daughters to school.

Impacts. The study found a wide range of impacts—only a sample are listed below. Figures shown are values comparing after/before the improvement. In all cases the figures are higher or much higher than changes taking place in the areas of control roads.

On transport: Road closures, which ranged from 30 to 90 days per year, were basically eliminated. Transport rates offered by commercial trucking services dropped, in some cases by as much as 50 percent. Traffic increased well beyond the national average—in one of the roads five times more as this road became a shortcut for long-distance traffic. The percentage of bigger, lower-operating-cost trucks on the project roads increased at least five times. Quality and quantity of commercial rural transport services improved; for example, high-frequency share-ride taxis at affordable rates were started and substituted for one single bus frequency.

On agriculture: Agricultural yields increased, more than 30 percent in the case of fruit orchards. The production mix changed drastically, as land devoted to vegetables and fruit plantation increased significantly (between 8 and 40 percent). Use of fertilizers increased substantially, up to 100 percent in one region. Use of extension services by small farms quadrupled.

On education and health: Primary school education enrollments reached 68 percent, compared with 28 percent prior to the improvements, despite the fact that among the poor forgoing children's labor or earnings is a key reason for not having children attend school. Girls' enrollment in primary education more than trebled. Visits to hospitals and primary health-care centers more than doubled.

On environment: Overall, no large impacts because the road improvements did not involve new construction. Negative changes were related to increased traffic and economic activity— noise and air pollution, and increased use of fertilizers and other chemicals. Positive impacts came from substituting butane for fuel wood (whose demand is larger than Morocco's sustainable forests) and from changes in the agricultural output mix that led to the curtailment of extensive goat and sheep herding that damage the soil cover.

Lessons learned. The survey identified a wide range of impacts, some of which were unexpected. Impact survey methodologies must be stringent to determine cause and effect. The methodology used consisted of:

- preparation of an extensive list of hypotheses of possible effects of road improvements, and of data required to test the hypotheses. The hypotheses were divided in four major categories:
 - i. direct impact on transport infrastructure and services;
 - ii. impacts on the agricultural economy;
 - iii. impact on education and health; and
 - iv. impact on the environment.
- for each road, the impact study utilized two types of analyses:
 - i. "before and after," comparing current conditions with those before the investments.
 - ii. "with and without," comparing conditions in the project road to a control road that did not benefit from improvements over the study period.

Extensive socioeconomic surveys were conducted at the farm, regional, and village levels. Focus groups were carried out at the regional/local levels to help interpret the data.

To learn more, e-mail hlevy@worldbank.org.

Case Study 2: Bangladesh Integrating rural markets and roads: Letting the local communities decide

This case illustrates how integrated rural infrastructure development can be designed to generate positive impacts in the transport system and in the rural economy, while making institutional improvements in the road agencies of direct relevance to the poor.

Intervention. Two projects, one closed and on-going, focusing on rural roads and rural markets. The World Bank, Switzerland, and Germany were involved in the financing.

Objectives. In Bangladesh, rural infrastructure investment projects form part of a rural development strategy focused on rural “growth centers,” selected on the basis of socioeconomic importance and potential. The project objectives supported this strategy through the reconstruction, upgrading, and maintenance of feeder roads and growth center markets; the strengthening of rural transport and market institutions; strong community and user participation in the planning, design, and implementation of road and market improvements; and the creation of employment and income-generating opportunities among the rural poor, particularly disadvantaged women.

Outcomes. By reducing constraints on rural mobility and marketing, the improvement of the rural roads and markets are contributing to rural economic development and poverty reduction. The projects encouraged the use of labor-intensive technologies and provided poor women and men with jobs. The improved roads provided the rural poor with much better access to market facilities, schools, health centers, and other social services. The road improvements also reduced transport costs, reduced travel time, and increased revenues for the traders using the improved markets.

The participatory approach used for the design, construction, and maintenance of rural roads created a deep sense of empowerment at all levels, since this process reached the smallest units of local and community governments. The economic opportunities opened by the projects reinforced the sense of empowerment. Women, in particular, benefited from this process. In the past, women sellers had not been allowed within the market and had to sell their products outside the market area, where prices were lower.

Impacts.

Transport System and Services: Traffic, motorized and nonmotorized, increased by 117 percent and 58 percent respectively after the roads were improved (two or three times the average increase in traffic over Bangladesh's road network). Cargo and passenger rickshaw pullers benefited financially as the higher traffic meant higher demand and income, and the smooth roads reduced the physical effort needed to pull the rickshaws. The number of buses and small trucks providing passenger and cargo services rose significantly in rural communities along the improved roads. The construction of culverts greatly improved accessibility by reducing the periods when roads were not passable.

Rural Economy: The clean environment in the improved growth center markets substantially reduced spoilage of produce and quality deterioration (economic return of market improvements investments is estimated at 22 percent). The number of sellers in 10 sample markets increased by an average of 26 percent after improvement of the markets—probably a part of this increase came from transfers from other markets to the more efficient, improved markets. The number of permanent shops around the improved markets has increased by an average of 13 percent per annum. Construction and maintenance of infrastructure created 18,600 jobs (Project 1). Women entered the road maintenance job market (including tree planting) where they made US\$ 0.80 per day, compared with salaries of US\$0.35 as maidservants.

Institutional building in the road agencies of direct relevance to poor groups: Creation of a socioeconomic monitoring and evaluation unit within the local government engineering department, which will monitor access to health and education and other important impacts. A national geographic information system was established for mapping purposes.

Key participatory features. In the on-going project, users participated in the selection, design, and implementation of all subprojects. The first step was an information dissemination and publicity campaign briefing the local government (Union Parishads) representatives on:

- the nature of the participatory approach;
- the roles of the UP in the process;
- procedures and conditions for subproject proposals;
- local financing contribution; and
- UP commitment for monitoring and maintenance.

The information campaign made special efforts to reach residents of different wards (subunion level comprising a few villages), village leaders, and organized groups. Ward meetings were organized to discuss subproject proposals. Decisions are made at a public meeting through a voting system where representatives of each ward can vote for up to three proposals. In the meantime the community contribution (10 percent of the cost of the works) required as a deposit is raised. During implementation, periodic meetings are held among the UP, monitoring committees, and public works staff to discuss progress, problems, and actions required. A special feature of the rural markets is a planning session at the proposed site (in one such session, about 100 stakeholders attended, including representatives of the UP, market management committee, sellers and buyers of produce, shopkeepers, vehicle operators, and women representing sellers and workers).

During implementation, the community monitored contractors. Contractors were required to post signs describing the works, the cost, and the delivery date. Human resources employed in the projects included 99 community organizers (2 female), 15 district sociologists, and two NGOs to provide training.

To learn more, e-mail mquazi@worldbank.org.

Case Study 3: India, Andhra Pradesh Appraising a rural access road program: Going beyond costs-benefits analysis

This case illustrates how a participatory approach and other practical tools can be used to supplement the conventional road project appraisal methodology in the design of a rural basic access road project.

Intervention. The project is a rural roads component of a larger project—Andhra Pradesh Economic Restructuring Project—funded by the World Bank. The component is a pilot program being implemented in three selected poor rural districts: Adilabad, Karimnagar, and Warangal. It finances the civil works that improve the rural access road network at least to the basic, all-weather motorable condition in the three districts.

Objectives. The project's development objectives are to improve the rural population's quality of life and to promote rural economic growth by improving the rural road network, particularly by providing basic, reliable, all-weather road access to villages that currently do not have such access.

Adopting a Participatory Approach. A participatory approach proved useful in addressing policy issues and in designing and appraising the project. The participatory process comprised several workshops. At the initial stage of project preparation, a two-day objectives-oriented consultation workshop was held with participation of state and district governments and transport operators. Through the workshop, rural road problems were identified and analyzed, project objectives discussed and prioritized, an overall description of the project established, and the rural road policy framework formulated. As the project preparation advanced, district-level workshops were held in each of three districts to discuss and formulate the district-level investment program. The detailed scope of the project was defined through additional workshops held with government officials and technical staff from both the state and the districts.

The rural road policy framework proposed through the participatory process emphasizes the importance of basic access and the need for economic justification for any road upgrading to blacktop standard. According to the current stage of rural transport development in Andhra Pradesh, the basic road accessibility is defined as basic all-weather motorable access to villages, with brief interruptions during heavy rains permitted. It is also decided that bringing the core network to all-weather standard would have priority over upgrading of individual links to blacktop standard. Road works related to the provision of basic access will be assigned priority according to cost per population served. Any investment beyond the basic accessibility, such as blacktopping and construction of new links, will be subject to cost-benefit analysis and must meet the minimum economic rate of return (ERR) of 12 percent. Moreover, the policy framework emphasizes the allocation of adequate funding for maintenance of the core network

through the state-level rural road maintenance budget³ and introduces district-based annual maintenance plans and a technical audit to verify the outcome of planned implementation. So far, the participatory process has been successful—the policy framework was passed as a state decree in December 1998 and has been adopted by the government of Andhra Pradesh throughout the state.

Selecting Road Works for Financing. A rural road master planning process was adopted to identify from a large number of rural roads in the project area a core network that would provide the basic minimum road connectivity between villages and market centers. This involved selecting one road connection from each village to a nearby main road or market center among the alternatives available for connecting that village, after carefully considering the existing road network, location of markets, topography, and local travel patterns. Through this process, a core network comprising 700 individual links and totaling 9,000 kilometers was selected in the three districts out of a total rural road network of 15,000 kilometers.

The next step was to determine the type of improvement required for each road on the core network to achieve the basic all-weather standard. Local engineers conducted a detailed road inventory and condition survey for the entire core network to establish a database containing the following data for each road: road name, jurisdiction, length, road type, number of bridges and cross-drainage facilities, overall conditions, passability during rainy season, population served, and current levels of traffic. With the road condition data and relevant engineering cost data, various works required to bring each road to basic all-weather standard were assessed and the least-cost solution was proposed for consideration of project financing. Paving works were also proposed for roads with traffic levels that met an economically justifiable threshold.

Most of the road works needed to bring a road up to the basic access standard involved spot improvements, such as graveling or placing one layer of WBM on sections of roads with poor surface condition and constructing missing cross-drainage structures at an average per-kilometer cost of US\$15,000 equivalent. They were ranked for cost-effectiveness according to the number of population served per unit amount of investment required to bring the road up to basic access standard. From the top of the ranked list, 3,000 kilometers road works were selected out of the core network (about 1,000 kilometers in each district) at district-level participatory stakeholder workshops. Based on the available funds, a maximum amount of US\$50 per person was identified as the threshold, above which road works would not be financed.

From the 3,000 kilometer of roads identified, the district workshops also produced a wish list for roads with substantial traffic to be upgraded to bituminous standard for economic reasons. These roads were evaluated by a simple cost-benefit analysis method and were screened using the estimated economic rate of return (ERR). Proposed paving on roads with low ERR would not be considered for financing under the project.

Eventually, about 1,700 kilometers of rural roads were selected for financing to basic accessibility standard, with cost-effectiveness ratio ranging from 14 to 50 U.S. dollar equivalent outlay per person served. An additional 1,300 kilometers of roads were

³ Funding for the maintenance of noncore roads is mostly from the central government and channeled directly to the community through various poverty alleviation and employment-generation programs. The policy framework encourages the creation of community road associations for the management of noncore community roads.

selected for blacktopping. Their ERR range from 12 to 90 percent with an overall ERR of 24 percent. A total of 2 million rural population are expected to benefit from the project.

Key Operational Tools:

- The participatory process for setting investment priority and developing a policy framework was crucial to achieve a systematic approach to the investment and management of rural roads.
- Comprehensive master plans for rural road network planning developed on local government level are an ideal tool to increase the effectiveness of rural road investment.
- A cost-effectiveness method combined with least-cost engineering solution is a useful tool for designing, assessing, and selecting basic accessibility road works.

To learn more, e-mail Dshelling@worldbank.org, or Zliu@worldbank.org.

Case Study 4: Kenya and Tanzania Sidewalks and bicycle paths benefit poor people

This case illustrates how low cost measures benefit pedestrians and cyclists by enhancing traffic safety and providing more access to opportunities.

Intervention. An experimental program implemented small scale pilot projects on urban mobility and non-motorized transport in four towns in Kenya (Eldoret and Nairobi) and Tanzania (Dar-es-Salaam and Morogoro) between 1995 and 1999. The projects were financed by a Dutch trust fund as part of the Sub Saharan Africa Transport Policy program.

Objectives. The aim was to test various engineering solutions in favor of pedestrians and cyclists in African cities, and to develop local capacity to plan and implement low cost mobility improvements.

Urban poor and low cost mobility. In Kenya and Tanzania the urban poor travel predominantly on foot. Bicycle usage is significant in small and medium size towns. Pedestrians and cyclists are particularly at risk of being victim of traffic accidents.

Findings. The low cost infrastructures proved efficient in increasing traffic safety for pedestrian and cyclists. The safe cycle paths favored both passenger and goods transport. Construction of pedestrian walkways also stimulated the creation of small informal retail activities favoring economic growth.

Local participation in the planning and implementation stages of the pilot projects allowed municipal executives and technical staff to get sensitized on the importance of sidewalks and bicycle paths for safety and low cost mobility for poor people.

Impacts.

Traffic safety improvement: In Temeke ward, a poor area of Dar es Salaam, a set of traffic calming measures (raised zebras, bus bays, street realignment, defense bollards protecting sidewalks) along a two kilometer long collector road, carefully crafted to suit

user needs, resulted in a tenfold reduction of traffic accidents. The main explanations are:

- traffic calming measure—high vehicle speeds (exceeding 50 km/h) have been virtually eliminated,
- frequent safe crossing spots (with vehicle speed below 25 km/h) that can be used by vulnerable pedestrians,
- Bus bays—informal bus traffic is significantly more disciplined, making predominantly predictable stops at bus bays.

Increased walking speed: The provision of flat, unobstructed, straight pedestrian walkways or tracks resulted in significantly increased walking speed.

Increased use of non-motorized transport: In Eldoret, infrastructure improvements between the town center and a peripheral poor residential area included both traffic calming measures on a collector road, and a pedestrian causeway on an alternative route. The combined improvements resulted in an increase of 3% of the pedestrian traffic and of 30% of the cyclists traffic.

Easier access to non motorized vehicles: In Eldoret, a micro financing pilot scheme successfully financed 300 bicycles purchased by employees of a fabric for a cost of \$22,000 (US\$ 73 per bicycle). The program subsidized about 10% of the purchase cost. Key to the success was the existence of a saving cooperative in the firm.

Increased retail activities: The improvement of pedestrian walkways in Eldoret resulted in a significant increase in informal retail activities.

User participation: User participation varied from highly successful involvement of users in Dar-es-Salaam, to complete failure in Nairobi. In Nairobi, the selection process lacked transparency, and users lost trust (in particular they got to believe that money had been set aside to pay them). In Dar-es-Salaam, two dynamic women led the participatory process and gained the trust of residents. The pilots resulted in the establishment of guidelines for user participation involvement.

Lessons learned. User participation, when properly organized, can help plan and implement efficient infrastructure for pedestrians or cyclists. Key features of the successful participatory programs were:

- Mutual trust between the initiating team and the participants,
- Actual implementation of at least some interventions that are prioritized,
- Not to let participants expect financial incentive for participating in “user groups”.
- Transparency by making all information, priorities and actions openly known to all stakeholders in the community.

Organization of national seminars helps the sensitization of stakeholders to the efficiency of low cost infrastructure interventions in favor of urban non motorized travelers.

To learn more, email hnovejossesand@worldbank.org

Case Study 5: India, Tamil Nadu Bicycles, women's literacy, and empowerment

This case study assesses the impacts on women's lives of the introduction of bicycles as part of a literacy campaign in the Pudukkottai region of Tamil Nadu State in India. The study shows that over a period of five years, women riding bicycles has now become widely accepted and bicycles are used to enhance economic activities, to reduce the burden of transporting water and fuel, for transporting the sick and to increase general mobility. Focus groups revealed that bicycles have contributed to their independence and empowerment but that in many cases the women do not own or control the bicycles so that their use is still dependent on male household members.

Intervention. The introduction of bicycles and bicycle riding skills as part of a women's literacy campaign (by the National Literacy Mission) in the early 1990s in, Tamil Nadu.

Objectives. Increase women's mobility (through cycling) so that they can take advantage of the literacy campaign.

The initial campaign enlisted the help of men to teach women how to cycle. Loans were made available for women to buy cycles and those with a regular income (such as NGO extension workers, childcare workers) were quick to take these up. As more women were seen regularly cycling, the opposition and male jokes died away. Cycling became acceptable through the sense of it being a widespread movement.

Impact assessment methodology. The impact study relied on key informant interviews, a focus group discussion and a village survey. Forty-nine women were interviewed in twelve villages. Out of these forty-nine, only three did not know how to ride a bicycle. Most of the women were Scheduled and Backward caste women, half of them barely literate and the others educated up to middle school. They earned their living through their labor. They were mostly in the 20 to 30 years age group and had a heavy workload—children and families to care for, in addition to income-earning activities.

Impacts.

Women's self-esteem: The women reported how taking a sick relative or child to hospital themselves on the bicycle gave them a feeling of independence of being a 'useful member of society'. The motivation to learn among the women who do not yet know how to cycle is high.

Control of bicycles and women's access in a male-dominated culture: Only four out of the sample of forty-nine women actually owned their own bicycle. While access to cycles for women now seems widespread, what is more problematic is the issue of control. Very few women still actually own cycles, hence they are dependent on the cycles of others, and have to adjust their work according to the needs of the owners. The men generally own the bicycles and so get priority in their use. The distance of the cycle hire shop was quoted as a problem for the women.

In addition, while the cycles greatly reduce the time and labor inputs for women in several drudgery-ridden tasks that are essential for household maintenance, men do not attach high priority to these unpaid tasks.

Economic impacts of women's increased use of bicycles: With the greater acceptance of cycling the profitability of cycle shops has increased. A cycle shop is now seen as a facility that should be available in a village.

Bicycles and gender relations: Cycling for women does not seem to have changed gender relations (for more than two thirds of the sample) in the household significantly. On the one hand, large numbers of girls are cycling to school every day in Pudukkottai; this is indicative of even higher bicycle use in the next generation. On the other hand, almost 40 percent of the women reported that their workloads had increased. Tasks that the men would do before, such as marketing, taking the children to school or running errands, have all now shifted to women. Cycles do, however, help them to complete their jobs faster and more easily. Despite their extra burdens, they report having more time for leisure.

Widening the activities for which bicycles are used: The study found that all women who had access to cycles, whether their own or that of a husband, father or brother, were using them for a range of tasks, related to all areas of their responsibilities. The most common uses were fetching water from the well or tank, taking paddy to the rice mill, collecting fuel and fodder, going to the hospital in an emergency, and going to school (younger girls). A few use the cycle for their productive work, such as selling flowers in the market, purchasing and selling gems to and from the contractor and maintenance of plants in a government nursery, and so on.

In the majority of rural homes of the District a cycle is now common property. In a door to door survey covering fifty households, it was found that two thirds owned a cycle. Almost all men asked knew how to cycle, and one third out of one-hundred women. Cycling is generally viewed as a cheap and efficient means of transport and definitely contributes to meeting the transport needs of women particularly those in 'low access' villages,(distant from essential services).

While between 30 to 50 percent of people hiring cycles in the District are women, ladies cycles can rarely be found in the shops. The women have got used to riding gent's cycles, and feel that it gives them better balance when carrying loads. Even riding a gent's bicycle in a sari doesn't bother the women any more.

Source: "Cycling Into The Future: The experience of Women in Pudukkottai, Tamil Nadu" By Nitya Rao. Case study presented at the International Forum for Rural Transport and Development (IFRTD) workshop in Sri Lanka. June 1999.

To learn more, see the case study section of the World Bank Gender and Transport Web site <http://www.worldbank.org/gender/transport>.

Case Study 6: Brazil Paving roads in poor urban areas: Participation lowers costs

This case highlights that focusing road investments to secure benefits to public transport on which poor people depend can be both economically and politically attractive, but requires both careful preparation and support and flexibility in implementation.

Intervention. The Third Brazil Urban Transport Project included a \$63 million component—PROPAV—to pave 500 kilometers of bus route in low income areas between 1981 and 1984. A central government agency, EBTU, would be responsible for selecting the roads and supervising the execution, and would embody its experience in a revision of the existing manual for low-cost paving. Local labor and local materials were extensively used.

Objectives. An extensive program of paving in low income areas was included in the First Brazil Urban Transport Project. Under this project, design agencies produced excessively elaborate designs for drainage and basic pavement structure. Cost and time overruns resulted. As a consequence, a comprehensive study of low cost paving was undertaken by the Empresa Metropolitana de Transportes Urbanos in Sao Paulo, which produced a low cost paving manual and an economic feasibility study. In parallel the national body EBTU commissioned a study of regional experiences in low cost paving, which concluded that the benefits from an extensive bus route paving program would be substantial, and established guidelines for the selection of roads in a paving program.

The importance of public transport to the urban poor. Bus transport (generally by private operators) is the dominant form of public transport in all Brazilian cities. Unpaved roads in low income areas in Brazilian cities, many of which were impassable in wet weather, was a serious impediment to the access of buses and emergency vehicles. In Sao Paulo alone there were 800 kilometers of unpaved bus route in the early eighties.

Findings. The economic rate of return on the individual projects exceeded 11% in 93% of cases and more than 40% in 27% of the schemes.

The costs were much lower than anticipated, only \$40,000 per kilometre compared with the estimate of \$150,000 . This was largely due to the reliance on local judgement on appropriate design and selection of projects and the use of local materials. As a consequence of the cost savings the program was so successful that it was extended to over 1,000 kilometres in 146 cities, not all Bank financed.

Impacts. Bus operating costs were substantially reduced by the program, and passenger comfort increased. It became possible to introduce or maintain bus services in poor areas which had hitherto been inaccessible to formal public transport. Similar problems existed in other Latin American countries and programs were launched in Chile, Jamaica, Peru and Mexico. In some cases, where impassability due to rain was not a problem, even simpler surfacing was used to permit coverage to be extended. The most recent developments include local community participation in the selection of segments for inclusion in a project in Lima, Peru

Lessons learned

- The successful implementation of the program in many small cities owed much to the strong central technical support provided in the form of a design and appraisal manual.
- While design guides are important, they should be flexible. Detailed local involvement in project selection and design, together with the use of local materials, can increase the cost effectiveness of relatively small scale local road investments.
- A programmatic approach, in which neither the physical schemes nor their locations were defined at the outset can contribute to effective project selection and design, so long as it is done in the context of some clear guidelines and evaluation criteria.
- Since eventually municipal administrations have to assume the debt liabilities for transport infrastructure and for maintenance expenditures from municipal revenues it is desirable that such projects attend to the financial health of the beneficiary municipalities. It may therefore be more cost effective to incorporate such projects in municipal development projects rather than as independent urban transport projects.

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Case Study 7: Kazakhstan Urban public transport reform serving poor user

This case illustrates how public transport deregulation and liberalization improved public transport service availability and affordability to poor groups, and how these reforms provided entrepreneurial and employment opportunities for poor people. It also shows how government was able to reallocate subsidies from public transport to other social services.

Intervention. The policy and institutional reforms component of a World Bank financed urban transport project to liberalize the urban public transport system in order to improve the efficiency of the system and provide adequate and affordable services.

Objectives. The objectives of the project were to restore and improve public transport capacity, performance, and services to the travelling public in Kazakhstan's major cities by, *inter alia*, designing and implementing institutional and policy reforms.

Urban Transport and Poverty. Public transport is an important economic and social service in Kazakhstan and other former Soviet Union countries. 90% of the population, many of whom are poor, rely on public transport services for their mobility needs to reach employment centers, and for access to educational and health facilities. Without an adequate and affordable public transport service, many poor would not be able to be gainfully employed, go to school, and visit health facilities.

The urban transport project was approved when Kazakhstan was undergoing a transition to a liberalized market economy underpinned by a system of private ownership. The rationale for the project was to mitigate the effect of the prevailing adverse macroeconomic conditions on the performance of public transport system. Before the reforms took place, inadequate services, long-waiting time at bus stops (often in severe

weather conditions), crowded buses, and large government subsidies characterized the public transport system in Kazakhstan.

Impacts. The deregulation and liberalization of the public transport system in Kazakhstan had three distinct benefits for the poor and the travelling public in general:

Adequate and affordable services for the poor: The main beneficiaries of the deregulation of the public transport system were the travelling public who enjoyed affordable services of acceptable quality. Overcrowding of buses and long delays at bus stops were virtually eliminated. Service became available throughout the cities within a short walking distance and with negligible waiting time for a vehicle to arrive. The stiff competition in the sector ensured that the fares remain affordable and services were of acceptable quality.

Reallocation of Government Subsidies for Social Services: The government of Kazakhstan was relieved of providing subsidies to provide public transport services, as the private sector proved capable of providing services without subsidies. This allowed the government to reallocate its scarce resources from public transport services to other social services that would benefit the poor.

Entrepreneurial and Employment Opportunities for the Poor: After decades of central planning and service provision by state-owned corporations, the public transport sector became an entry point for many aspiring, small entrepreneurs. Many people who became unemployed or underemployed because of the transition to a market democracy found employment and business opportunities in the liberalized public transport industry.

Lessons learned. Policy and institutional reforms capable of unleashing private entrepreneurship and competition can improve the quality and quantity of services available to poor people.

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