

# RESEARCH DESIGN

The objective of the literature and project review described in the preceding chapters was to identify the hypotheses they contain about poverty impacts, implicit or explicit, and to evaluate the evidence produced to support or disprove these hypotheses. The study group formulated hypotheses in transport or energy interventions (independent variables), poverty reduction outcomes (dependent variables), exogenous factors (contextual variables), and endogenous factors (situational variables) likely to affect these outcomes. The purpose of this exercise was to establish a propositional inventory with associated research findings to identify key gaps in current knowledge. Based on this information, the study group developed the broad outlines of a proposed research program and identified suitable sites for the field research. Domestic research institutions (DRIs) in the selected countries were then invited to make specific proposals for research that would be policy relevant in their countries and would contribute to filling some of the gaps in current knowledge.

## Definition of Variables

The definition of key variables varied widely among the studies and projects reviewed (Figure 4.1).

### Independent Variables

In most cases, the independent variable is the transport or energy “project.” This usually means an infrastructure improvement, but it may also consist of, or include, sector policy interventions, institutional capacity building, and/or service improvements. For rural transport, poverty impact studies have almost exclusively concerned rural roads. They have distinguished between the construction of new roads (providing basic access), raising road standards (reducing transport costs), and investment in road maintenance (averting future costs). Some studies have looked at changes in transport services and/or in the means of transport used by the poor. The transport sector policy issues of concern in the context of rural roads have been the public expendi-

ture priority given to road maintenance, acceptance of appropriate design standards in relation to traffic levels, use of labor-based technology, removal of barriers to entry into rural transport services, and fiscal adjustments to promote the use of intermediate means of transport.<sup>5</sup> For urban transport, the issues are mainly in the realm of sector policy and transport services. Some consideration is also given to externalities imposed on the poor by urban transport infrastructure projects. To date, with the exception of resettlement studies, few poverty impact studies have been concerned with rail, port, or air projects.

In energy, the main subject of study has been rural electrification programs, with the aim of providing as many poor people as possible with access to modern energy. Thus, the number of new connections or villages served has been the main independent variable, with some attention to whether the source of power is the national or regional grid or an off-grid system, and whether the technology used is extractive or renewable. Studies focused on the impact of privatization on the poor have tended to stress service reliability as a key independent variable. A different literature concerns the improvement of traditional energy systems using biomass. Little work has been done on the effects of intermediate fuels used by the poor, such as LPG or kerosene. Sector policy issues include the efficient operation of power utilities, privatization, pricing and subsidies, and regulatory and fiscal policy changes to improve the supply and reliability of services and to create a “level playing field” for investors to serve the poor.

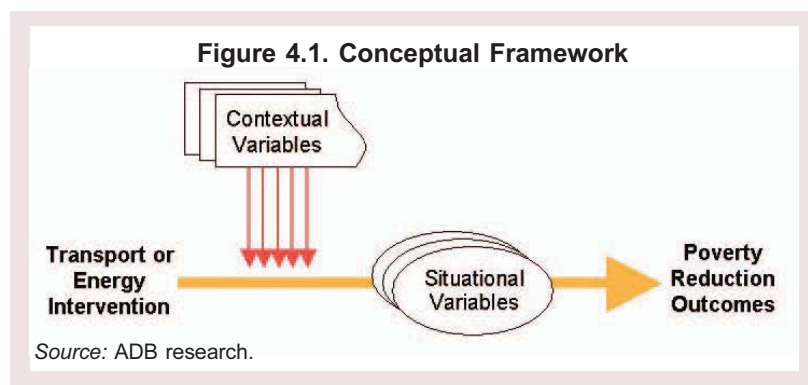
Studies that look at transport and energy impacts together (usually in association with other forms of infrastructure and/or other public programs) tend to take public expenditure in each sector as independent variables. This has the effect of ignoring the private investment that is also necessary for services to be provided, in particular to the poor. In the context of multisector projects with transport and/or energy components, no attempt is usually made to

<sup>5</sup> Relevant policy issues in sectors other than transport are addressed under contextual variables.

distinguish the effects of activities in the different sectors. Rather, studies evaluate the effects of the whole package or “bundle” of services on poverty reduction in the target area.

## Dependent Variables

Surprisingly few of the existing studies actually use an explicit measure of poverty. Those that do rely heavily on measures of “income poverty.” In much of the literature,



small farmers and/or landless laborers, or households without roads or electricity, are simply assumed to be poor. Some studies use income distribution data to define higher and lower income groups, without necessarily relating these to poverty levels. Other studies take inequity, or the shape of the income distribution, as their dependent variable.

Looking beyond income effects, numerous studies propose to evaluate impacts on the welfare of poor people, generally through improved access to health care and education services. Recently, some studies have added the effects of knowledge and information, with corresponding improvements in the functioning of product and labor markets. Some ongoing studies are investigating infrastructure impacts on other dimensions of poverty, such as insecurity, exposure to risk, and powerlessness. Recent studies also pay greater attention to gender dimensions of poverty.

## Contextual Variables

The impact of transport and energy interventions on poverty reduction is strongly conditioned by the context in which these interventions take place. A distinction is made here between contextual factors, which are exogenous

to each case study and are therefore treated as constants, and situational factors, which are endogenous to the country case studies and may partially explain observed variations. The values of contextual variables do vary across regions or countries and, with appropriately defined data, may be used to explain differences in cross-regional or cross-national comparisons of case studies.

Major contextual variables include the income level, income distribution, and poverty level of the region or country concerned; population size and density; level of urbanization; natural resource endowments; macroeconomic policies, including trade, investment, and fiscal policies; patterns of public expenditure; role of the private sector; and sector policies in related sectors such as health care, education, agriculture, industry, and finance. Contextual factors also include broad sociocultural characteristics of a region or country, such as caste- or gender-based norms of behavior, the quality of governance, and the degree of public participation in political processes.

## Situational Variables

Within a given context or case study, poverty reduction outcomes associated with a transport or energy sector investment may vary, depending on other factors present in the situation. For example, the effect of improved road access on agricultural incomes may depend on factors such as the availability of extension services communicating useful research results; availability and quality of land; availability and prices of inputs; availability and cost of credit; availability of associated technological requirements, such as irrigation; distance to markets and perishability of crops. To take a more qualitative example, the effect of improved access on personal security of the poor depends on the attitudes and behavior of the police, social and cultural controls on criminal behavior, and the effective functioning of the justice system.

A multitude of situational factors may be relevant to the different types of anticipated impacts on the poor. The general categories of relevant situational factors include urban vs. rural setting, land availability and quality, available technologies for production (farm and non-farm), efficiency and effectiveness of service delivery for

various public services, availability of information, and local social and cultural factors such as land tenure or community organizations. For the field research, it is necessary to define the situational factors that seem relevant for poverty reduction in each case study setting.

## Propositional Inventory

A propositional inventory derived from the review of literature and project experience is presented in Boxes 4.1 to 4.3. It should be noted that this list represents only those hypotheses that are explicit or implicit in the literature and project reports reviewed. It does not include all the hypotheses that could be formulated, nor does it imply that these hypotheses have been validated by empirical research. Some of them *have* been the subject of empirical research in numerous studies, often with conflicting findings. Others have been proposed (or assumed) on theoretical grounds, but have never been empirically tested. Generally, few statements about the impact of transport or energy interventions on poverty are sufficiently well documented to be taken as proven facts. The field seems wide open for future research.

## Knowledge Gap Analysis

On the basis of this review, it appeared that the major gaps in current knowledge about transport and energy impacts on poverty reduction have to do with

- the impacts of sector policy change,
- the impacts of changes in service provision,
- the impacts of transport modes other than roads,
- the impacts of energy sources other than electricity, and
- the impacts of transport and energy projects on the urban poor.

Other gaps that have been identified by reviewers of this study include

- constraints on access by the poor to improved transport and energy services,
- gender differences in impacts of transport and energy investments,
- environmental consequences of transport and energy investments, and
- governance and institutional issues.

### Box 4.1. Propositional Inventory (Transport)

#### Rural transport improvements (road construction, improvement, maintenance)

- decrease costs to the poor for personal travel and goods transport;
- generate farm income that disproportionately accrues to the poor;
- promote the development of nonfarm activities in rural areas that generate income disproportionately accruing to the poor;
- increase the range of opportunities for wage employment and thereby raise the price of labor in rural areas, generating income that disproportionately accrues to the poor;
- increase the availability and accessibility of education and health care services in rural areas, resulting in greater participation in these programs by the poor;
- increase the access of the poor to natural capital, especially common property resources (land, water, vegetation, wildlife);
- increase the personal security of poor people in rural areas;
- facilitate the delivery of emergency relief to the poor in case of natural disasters; and
- have a positive effect on participation of the poor (i) in local organizations (bonding social capital), (ii) in activities outside the rural community (bridging social capital), and (iii) in local political processes and management structures.

#### Urban transport improvements

- reduce transport costs for the poor;
- facilitate the delivery of health care and education services to the urban poor;
- reduce health and safety risks for the poor;
- increase opportunities for employment for the poor in transport services, commerce and industry, and the informal sector;
- increase the personal security of the poor in urban areas; and
- positively affect the participation of the urban poor in community organizations (bonding social capital), in activities outside their own neighborhood (bridging social capital), and in political processes.

Source: Authors' research.

#### Box 4.2. Propositional Inventory (Energy)

##### Rural energy projects

- reduce energy costs for the rural poor;
- increase farm productivity, generating income increases that disproportionately accrue to the poor;
- promote the development of nonfarm activities in rural areas, which generate income disproportionately accruing to the poor;
- improve the quality of education and health care services in rural areas, resulting in greater benefits of these programs for the poor;
- increase the flow of information to the poor;
- protect the access of the poor to natural capital by decreasing pressure on woodlands that are being exploited for fuelwood;
- increase the personal security of poor people in rural areas; and
- have a positive effect on participation of the poor (i) in local organizations (bonding social capital), (ii) in activities outside the rural community (bridging social capital), and (iii) in local political processes and management of community resources.

##### Urban energy reforms

- reduce energy costs for the urban poor;
- increase the access of the urban poor to modern energy services;
- improve the quality of health care and education services, resulting in greater benefits of these services to the urban poor;
- reduce health and safety risks for the urban poor;
- increase opportunities for employment of the urban poor in energy services, commerce and industry, and the informal sector;
- increase the personal security of the urban poor; and
- positively affect the participation of the urban poor in community organizations (bonding social capital), in activities outside their own neighborhood (bridging social capital), and in political processes.

*Source:* Authors' research.

#### Box 4.3. Propositional Inventory (Aggregate Impacts)

- All other things being equal, transport improvements have a significant effect on poverty at the community or district level.
- All other things being equal, energy improvements have a significant effect on poverty at the community or district level.
- Transport and energy improvements, taken together, have a significant effect on poverty at the community or district level that is greater than the sum of their individual effects.

*Source:* Authors' research.

However, the results in the better-researched areas still leave a large degree of uncertainty and ambiguity. In particular, few field studies disaggregate their samples into poor and nonpoor groups in internationally comparable poverty measures. This makes it difficult to assess transport or energy contributions to poverty reduction on a world scale or even, in many cases, on a national scale. Such deficiencies give rise to suspicions (as has been shown, for example, in studies on the real incidence of subsidies) that the poorest of the poor gain less than others from conventional transport and energy projects. In addition, the poor may bear disproportionate costs, especially in relation to large infrastructure projects. The dominant position of roads in the transport sector, and of electricity in the energy sector, suggests that further refinement in the body of knowledge concerning these investments is also warranted.

## Conceptual Framework

The broad conceptual framework proposed for the field research posits transport or energy investments as the independent variables, macroeconomic and sociocultural factors as contextual variables, sector policies and situational characteristics as intervening variables, and poverty reduction outcomes as dependent variables. Linking transport or energy investments to poverty reduction in a robust way requires research designs that can hold all other potential contributing factors constant. In reality, of course, poverty reduction is an outcome of a complex of macro, sector, and situational factors all acting at the same time on a target population that is itself constantly changing. It is for this reason that poverty analysis needs to be conducted and poverty reduction strategies determined at the country (and even global) level before being decomposed

into their sector components. Only with overall poverty reduction targets well defined, and with strategic options well identified at the country level, will it be possible to modify the design of infrastructure sector interventions and investments so as to maximize their contribution to poverty reduction.

This interaction of multiple factors has been best articulated in the work sponsored by IFPRI in India and the PRC and earlier, in Bangladesh (the IFPRI program is discussed in Chapter 2; for more on Bangladesh, see Ahmed and Hossain 1990).

For the present research, the IFPRI model has three main limitations. One problem is its failure to address rural-urban linkages and capital flows, particularly the importance of remittances from urban family workers in rural household investment and survival strategies. Transport and energy investments bring rural and urban areas closer together, in time if not in space, and facilitate information flows that contribute to increasing productivity in the rural economy as well as the efficiency of the national labor market. Second, with its focus on public expenditures, the model fails to capture the significant contribution of the private sector to investment, especially in infrastructure service provision. Third, it is an econometric model that explains poverty reduction only in the narrow sense of reducing the share of the population living below the poverty line. Multiple dimensions of poverty may be affected by transport and energy investments, as the country case studies will show.

To place the three RETA country studies on a comparable footing in this conceptual framework, however, a special study was carried out in Thailand with assistance from IFPRI. The study was designed to build a model of public expenditures and impacts on rural poverty that explicitly addresses the effect of transport and energy investments, similar to the work that has been completed for India and the PRC. The results of this study are reported in the Thailand country study (Chapter 6).

## Crosscutting Themes

The central theme of the proposed research program is the impact of transport and energy interventions on poverty reduction in the selected study areas. However, certain crosscutting themes emerged from the review of the literature that could also be addressed in the field research. These include

- gender differences in poverty impacts;
- environmental and social consequences of infrastructure projects and their implications for the natural assets and social capital of the poor;
- the changing role of government in policy setting and regulation, and of the private sector in infrastructure investment and service delivery; and
- the importance of institutional capacity, good governance, and public participation in determining whether the theoretical benefits of transport and energy projects actually reach the poor for whom they are intended.

## Gender

Research has shown that the responsibility for meeting the transport and energy needs of poor households differs substantially by gender, in ways that are both universal and culturally specific. Typically, women bear the main responsibility for doing the “reproductive” work of the household, which means providing water and fuel, as well as, in many cases, producing field crops and/or garden produce for domestic consumption. Men typically dominate the production and marketing of cash crops and control household cash income and expenditures. The respective roles of men and women in undertaking wage labor, investing in and operating local businesses and small-scale industries, and traveling for employment elsewhere are very much culturally patterned, as is the distribution of cash income within the household and the effective ownership and operation of assets such as bicycles, farm machinery, and other kinds of equipment (sewing machines, grain grinding mills, etc.). The participation of men and women (and boys and girls) in education and health care programs, as well as in politics, is likewise subject to sociocultural as well as access constraints.

The culturally defined responsibilities of men and women may change significantly as poor households move from a subsistence to a cash-based economy and come to depend more on commodity and labor markets. Changes in the intrahousehold distribution of income can make a difference in household dynamics, empowering some members and disempowering others, opening up new possibilities but also aggravating tensions that may sometimes lead to violence. Changing from a rural to an urban setting also has important implications for household and community dynamics, for patterns of social organization and social control. Thus, it was important for the field research to be designed and carried out in a way that would permit disaggregating impacts by gender.



Owning a sewing machine helps women like this one in Nakhon Ratchasima, Northeast Thailand, to earn cash income.

## Environment

The construction and operation of infrastructure projects often involves significant impacts on the physical environment that should be taken into account explicitly in project design. It is often alleged that such negative consequences affect the poor disproportionately. This argument is more often made in urban areas, where the poor tend to be concentrated in parts of the city that are particularly prone to flooding, have poor sanitation and solid waste management, and are vulnerable to noise and air pollution. As pedestrians and users of nonmotorized transport (NMT), the poor are often said to be more exposed than others to death and injury in traffic accidents. However, real research on this topic is notably lacking. A similar case can be made in rural areas, where poor design and/or construction can leave homes, fields, and water sources exposed to pollution and erosion, as well as creating health and safety hazards. It is worth noting that the environmental costs of projects, especially energy projects, are often borne by people who are *not* the same as the project beneficiaries.

A more subtle argument is that the development induced by transport and energy projects may have negative effects on the poor by consuming or alienating natural capital to the benefit of the wealthy. This problem is particularly acute with respect to common property resources such as forests, water, and wildlife, which may be important assets for the poor. Development that aims at fixing farmers on small plots and distributing land to migrants, or setting it aside for conservation purposes, will only suc-

ceed in benefiting the poor in remote areas if they can acquire the necessary skills to meet their needs in new ways. This transformation is likely to bring profound sociocultural changes that the people concerned may or may not desire. It was important, therefore, for the field research to identify the potential environmental impacts of projects, direct and indirect, and evaluate whether the poor bear a disproportionate share of such costs.

The construction and operation of infrastructure projects may also have direct and indirect consequences for the social environment of the poor. At the most basic level, changes in the mobility of different members of the household, access to new markets for information as well as for goods and services, and exposure to national media such as radio and television can dramatically alter intrahousehold relations among men and women, young and old. At the community level, infrastructure projects can introduce physical barriers to internal communication while facilitating relationships with the outside world. While some types of risk are reduced, others are introduced. A particular concern is the potential spread of waterborne and sexually transmitted diseases as a result of the exposure of a remote community to construction workers and nonlocal transport operators. At another level, a poor community may be invaded by outsiders with conflicting cultural values and greater economic and political power, who find ways to capture the greater part of the benefits that should accrue to the community.

Increased mobility and exchange between urban and rural areas may become an important aspect of the income generation and risk management strategies of poor households. Improvements in human and social capital may come about as a result of improved access to information, as well as community organization and participation in the planning and management of infrastructure projects. However, the extent to which these changes benefit the poor remains an empirical question. Finally, the economic growth induced by transport and energy investments may tend, at least initially, to increase inequity within a community and exacerbate political tensions.

These potential effects may be summed up in the hypothesis that infrastructure projects are likely to have negative effects on “bonding” social capital in a community, but positive effects on “bridging” social capital linking community residents to the outside world. It was important for the field research to anticipate and measure these effects and to evaluate their consequences for the poor in both urban and rural areas.

## Private Sector Participation

The literature and project experience both show that in modernizing and globalizing economies, the respective roles of government and the private sector are changing rapidly. From the standpoint of the field research, these changes are part of the country or regional context in which community-specific interventions occur. It was to be hoped that at least one case study in each country could look at the impacts of a change from public to private sector provision of services, and/or at a case of the private sector coming in to fill a gap left by the public sector. It would be somewhat more difficult, though not impossible, to investigate the impacts of a change in public policy, for example, regarding tariffs or barriers to entry, on the access and affordability of services to the poor.

Such case studies could be carried out in relation to either transport or energy interventions. In transport, for example, one might look at the effects of privatizing an urban transit system or removing barriers to private provision of transport services. In energy, one could consider the effects of a community investment in minigrid electricity services based on local energy sources, or the effect on access and employment of privatizing a public utility. In any case, the contextual changes over time should be noted in each case for the purpose of later comparison across cases and countries.

## Governance

The theoretical models of infrastructure impacts will only work if people behave according to the expectations of the model. In particular, it is often assumed that civil servants will behave as though they have the interests of the public at heart, while private entrepreneurs will act to maximize personal utility. Such models do better at describing the outcomes of private sector interventions than of government programs. Institutions may fail to play their expected roles in generating benefits for the poor for many reasons: among them are issues of capacity, political will, program design, and resource constraints. The field research therefore needed to pay particular attention to the effectiveness of the institutional links in the causal chain. For instance, the provision of access to health care services will only result in improved health for the poor if (i) the health care programs offered meet their needs; (ii) they are available and affordable to those who need them; and (iii) staff understand their needs, can communicate with them, and do not discriminate against the poor

in delivering services. The possibility of findings regarding this governance dimension had to be considered in the design of every case study.

Participation of the poor, together with other stakeholders, in the design and implementation of transport and energy projects is another important aspect of the governance issue. The field research therefore had to evaluate the extent to which poor people participated in the design of the interventions under study and helped shape the ways in which they respond to their needs. Participation may also occur at the implementation stage, both through employment in project activities (construction, operation, and maintenance) and through provisions for beneficiary oversight and feedback, such as users' committees. The case studies would evaluate the extent to which the poor participate as equal partners and gain "voice" through such activities, as opposed to simply bearing costs on behalf of the community (e.g., through unpaid labor contributions).

## Site Selection

To maximize the possibilities of the case studies' yielding insightful findings about how transport and energy infrastructure affect poverty reduction, it was agreed that field work should focus on countries with relative macroeconomic and political stability over the last 10–15 years, providing reasonable prospects that infrastructure investments could realize their potential impacts. Three of ADB's DMCs—the PRC, Thailand, and India—were identified for the field research and agreed to participate. The following criteria established by the Steering Committee guided their selection:

- each had a track record of having improved transport and energy infrastructure over time;
- poverty data were available for time series and geographically disaggregated comparisons;
- capable DRIs existed in all three; and
- they were a representative mix of countries, including both economic and cultural diversity, and a balance between subregions.<sup>6</sup>

In vast and diverse countries, such as the PRC and India, field work would need to concentrate on one geographical or administrative area (state or province)

<sup>6</sup> ADB divides its 24 DMCs into five subregions: PRC and the Central Asian Republics, South Asia, the Greater Mekong Subregion, Southeast Asia, and the Pacific Islands.

chosen according to similar criteria. On this basis, and given the other criteria, the PRC (Shaanxi Province), Thailand, and India (Gujarat State) were chosen as sites for the field research.<sup>7</sup>

The selected DRIs were the Chinese Academy of Social Sciences (CASS), India's National Council for Applied Economic Research (NCAER), and the Thailand Development Research Institute (TDRI). Each institution was asked to set up a team including an economist/team leader, transport and energy specialists, and specialists in poverty and participatory research. The teams were invited to make proposals regarding the transport and energy interventions they would like to study and the research hypotheses they would investigate. Each team was also asked to form a national steering committee and to hold a national seminar on its study findings.

## Research Design

The focus of the field research was to trace out the causal chain of effects that, in a given context, leads from a transport or energy intervention to a poverty reduction outcome. Thus, particular attention was to be paid to identifying the links in that chain and the situational factors likely to affect the strength of those linkages. According to classical economic theory, the most direct effect of transport and energy interventions should be cost savings to users. These could be direct cost savings or implicit savings relative to the costs of current alternatives, such as time savings or service quality improvements. The impact of these cost savings on the poor depend on the extent to which the poor are users of the service provided. However, benefits to nonpoor users may also contribute indirectly to the welfare of the poor.

Any number of situational variables may affect the magnitude of these linkages. For example, the extent to which vehicle operating cost savings are passed through to passengers and freight transporters depends upon the competitiveness of the local market for transport services. The ability of the poor to capture such benefits directly (as owner-operators) depends on their ability to purchase means of transport, which in turn depends on cash income and credit availability. The extent of passenger benefits accruing to the poor depends on their personal travel patterns and their use of road trans-

port services. Indirect benefits, such as those deriving from the travel of traders, teachers, health care workers, etc., depend on the quality of services offered and other factors affecting the participation of the poor (user fees, sociocultural barriers). The extent to which poor farmers benefit from increased crop prices and lower input costs may depend on their access to land, water, extension services, and/or credit. Landless farm laborers may benefit only from increasing employment. The ability of the rural poor to take advantage of opportunities to increase nonfarm production depends again on their access to resources, technology, and credit, while income benefits from industrial employment depend on the conditions for outside investment in income-generating enterprises. Benefits from the reduction in the prices of consumer goods go to the poor only to the extent that the poor are in the market to purchase these goods.

A similar analysis could be made for the participation of the poor in the benefits generated by energy projects. To the extent that these benefits are reflected in direct cost reductions, they accrue to the poor in relation to the use made by the poor of modern energy services. Nonpoor consumers of energy services, in particular community services such as schools and health centers, may pass some benefits along to the poor users of these services. Under the right conditions, energy services may help improve agricultural productivity (e.g., through irrigation) and stimulate investment in industries. However, the extent to which the poor will share in these benefits depends on the degree to which they own or have access to natural resources and financial capital, as well as on the amount and nature (skilled/unskilled) of employment generated.

After looking at direct cost savings and the ways in which they are reflected through the economy, the field research considered other effects that projects may have on the poor. One of the most important attributes mentioned in the literature is the provision of "access" to meet "basic needs" of the poor. In fact, studies have shown, the poor do find ways to meet their basic needs for transport and energy. These ways are often very costly in time and human energy, however, even if no monetary cost is involved. The time and human energy available to the poor have practical limits, especially given the multiple demands of meeting all their basic needs. Consequently, when these systems are designed with the real needs of the poor in mind, gaining access to modern transport and energy systems offers the potential to increase their productivity and improve their welfare.

The "access" benefit is sometimes measured by comparing modern transport or energy costs with the costs of achieving the same objective using traditional systems. Often, how-

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<sup>7</sup> After this selection was made and approved by the Government, civil disorder broke out in the state of Gujarat, which considerably delayed the India field work. However, it is believed that these conflicts did not materially affect the views of respondents in the rural areas where the case studies were conducted.



*One way of increasing the poverty reduction impact of road construction is to employ the poor as laborers, as in this project near Mundra, Gujarat State, India.*

ever, the financial costs of using the modern system are greater than those of the traditional system. To assume that the poor will switch to the modern system amounts to assuming that the value to them of savings in time and effort is greater than the discrepancy in financial costs. This assumption can be tested in various ways: through willingness-to-pay studies, through evaluating opportunity costs in relation to alternative uses of time, or through observing behavior and inferring from this the value that the poor place on overcoming access barriers.<sup>8</sup>

A secondary benefit of an economic nature is the income generated by direct employment in the construction, operation, and maintenance of transport or energy systems. Typically, this is more important for transport than for energy, as massive amounts of employment for the poor (or at least intended for the poor) have been generated by rural road construction projects. Because these activities are sometimes seen as welfare programs rather than as investments in building a nation's infrastructure, less attention has been paid to generating continuing employment through labor-based maintenance and enabling the poor to participate in providing transport services. In urban areas, road investments have been directly inimical to the poor engaged in providing NMT services. In energy, the possibilities for direct employment benefits are more limited and often depend on the acquisition of new skills.

<sup>8</sup> In studies of this kind it is important to consider the gender dimension, because much of the time and effort involved in the use of traditional systems is provided by women, and may be differently valued by men and women.

Linking welfare outcomes such as improved health or education status to investments in transport or energy is more problematic than evaluating income effects. Even if infrastructure investments provide access to services and help improve the quality of services, many other factors affect the propensity of the poor to use such services and the outcomes they experience. It is probably safest to stay in the realm of "opportunity" and note (when it is the case) that transport and energy investments will remove barriers to the provision of services and facilitate their use by the poor. The interaction of transport, energy, and other infrastructure investments with investments in the productive and social sectors to reduce poverty is probably best analyzed through the use of computable general equilibrium models, giving rise to specific linkages

that can then be further tested through field research.

The impacts of transport and energy interventions on noneconomic dimensions of poverty (security, social capital, political participation) have been the subject of some speculation, but little empirical research to date. This is a new area for research, as an understanding of these noneconomic dimensions of poverty has only begun to penetrate the world development community. This subject proved to be one of particular interest to the field study teams, and some of the most significant findings of the field research are in this area. Another issue is the possibility of extra costs being imposed on the poor as a result of infrastructure projects. Ideally, projects should be designed to avoid such costs as much as possible, to minimize them when avoidance is not possible, and to compensate the affected people fully (especially the poor) for any losses they sustain, thus bringing the net loss to zero.

The impacts of transport and energy interventions on poverty reduction are strongly conditioned by the context in which these interventions take place. Major contextual factors were not expected to vary within the country case studies. Rather, their influence is examined in the comparative analysis of the findings (Chapter 8). However, within a given context, poverty reduction outcomes associated with a transport or energy sector investment could also vary depending on situational factors. For the field research, each team was asked to define and assess the situational factors that they thought would be relevant for poverty reduction in each case study setting.

## Research Methods

The World Bank's "Handbook for Practitioners" on evaluating poverty impacts recommends that a representative sample of people likely to be affected by the project and a matched comparator or control group be identified, and that baseline data on relevant impact indicators be collected, prior to project implementation; follow-up surveys should come at project completion and at some later time, when a new equilibrium has been established. Sample and control groups should be stratified by poverty level (measured by income and/or expenditure data) and gender. This "double difference" design allows for before-and-after, with-and-without, poor-and-nonpoor, and gender-based comparisons, and maximizes the chance of obtaining valid and reliable research results. In the field research conducted for this RETA, attempts were made to approximate this design as closely as possible. Given the time frame for the study, however, it was not possible to collect preproject baseline data, and it was also very difficult to find true control groups. Therefore, the study teams generally had to rely on the perceptions of people who had experienced project effects to a greater or lesser degree.

In a first stage of the field research, secondary data concerning the area under study were used to construct a sample frame. The time frame of the study was defined as the previous 10 years (1991–2000). Based on the site selection criteria, information was expected to be available about poverty, at least at the district (county) level, at the beginning and at the end of the case study time frame. Within each study area, four sample districts (counties) were selected in which significant change had taken place in transport and/or energy service provision over the past 10 years, and in which significant poverty reduction had also been accomplished. While the sample districts would not necessarily be representative of the study region, they were selected to provide a range of variation on some key situational variables. Within each sample district, four to eight communities were selected for intensive study. Within each sample community, 50–100 households were interviewed. The sample was stratified and designed to ensure adequate representation of poor and nonpoor households.

Field research involved a combination of methods, including collection and analysis of secondary data, quantitative surveys, key informant interviews, and work with focus groups. Special techniques such as transport or energy user surveys, travel diaries, time studies, and participant observation could also be used to enrich the database. Although quantitative analysis may provide more

conclusive evidence, qualitative data in the form of participatory meetings and focus group discussions were also sought to add depth and richness to the study findings.

Based on the TDRI proposals, a methodology workshop was held in January 2002 in Bangkok, Thailand, to coordinate the work of the three country teams. Field research was carried out from January 2002 through June 2003. A second workshop took place in Vadodara, Gujarat State, India, in July 2003. In this workshop, the three research teams shared their preliminary findings and conclusions with one another and with the ADB task man-

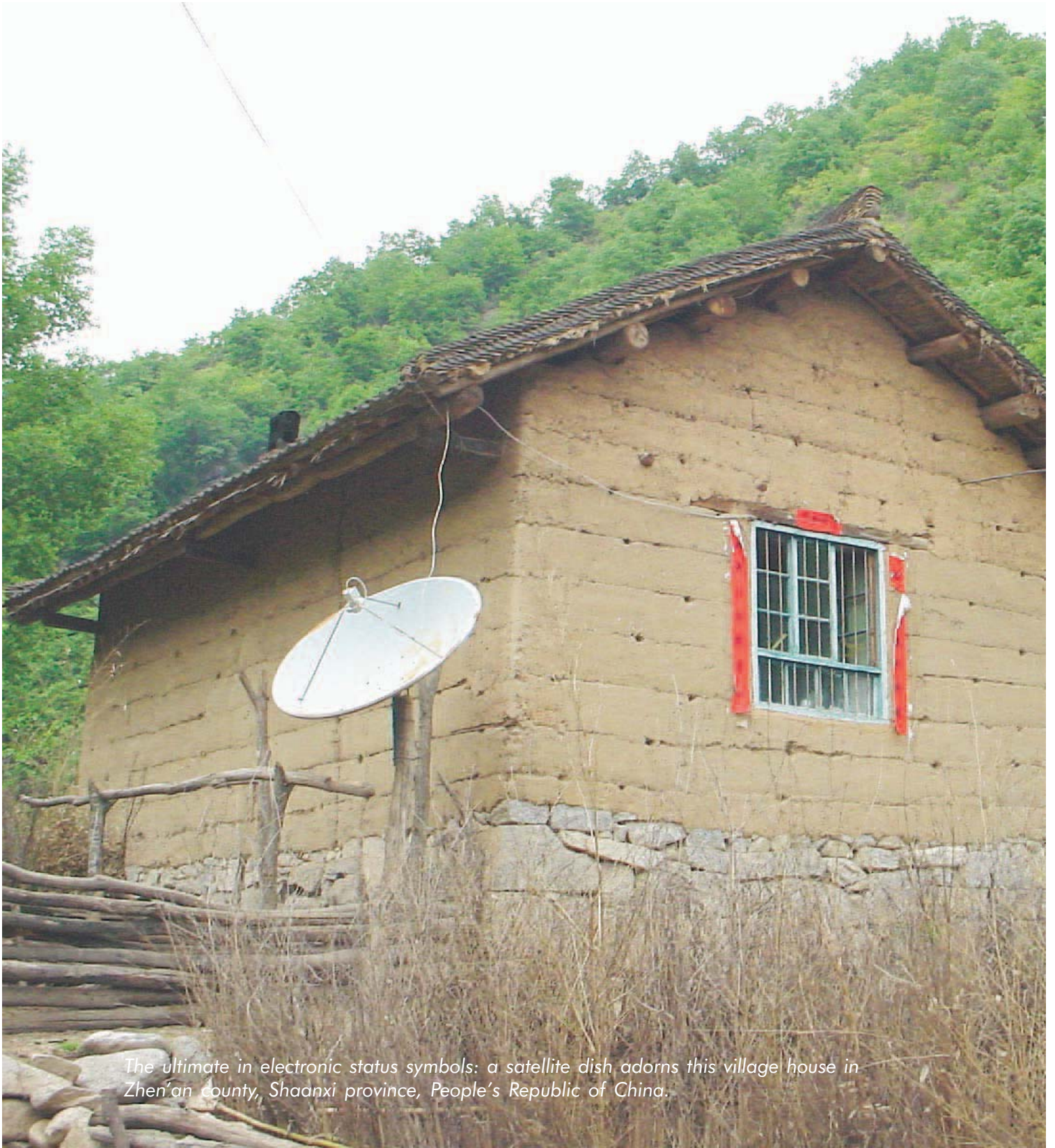


An illustration of the "double difference" research design.

ager, the study coordinator, and representatives of the JBIC.

The Thailand national seminar took place in April 2003, the PRC national seminar was held in August 2003, and the India national seminar was held in October 2003. Further comments were received at the Stage 3 draft report review workshop held in Manila in October 2003. These comments suggested that additional work would be needed by each of the country teams to meet the RETA expectations. Final reports on the country studies were delivered to ADB by April 2004. The country case studies are described in greater detail in the next three chapters of this report.





*The ultimate in electronic status symbols: a satellite dish adorns this village house in Zhen'an county, Shaanxi province, People's Republic of China.*