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Pakistan

Household Use of Commercial Energy

Report

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ENERGY SECTOR MANAGEMENT ASSISTANCE PROGRAMME (ESMAP)

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Pakistan
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Energy Sector Management Assistance Program (ESMAP)

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Abbreviations and Acronyms

CNG	Compressed Natural Gas
CPI	Consumer Price Index
FATA	Federally Administered Tribal Areas
FY	Fiscal Year
HIES	Household Integrated Economic Survey
HSD	High Speed Diesel
LPG	Liquefied Petroleum Gas
NWFP	Northwest Frontier Province
OGRA	Oil and Gas Regulatory Agency
PDC	Price Differential Claim
PDL	Petroleum Development Levy
PIHS	Pakistan Integrated Household Survey
TOE	Tons of Oil Equivalent
WAPDA	Water and Power Development Authority

Units of Measure

Btu	British thermal units, a unit of energy equal to the work done by a power of 1,000 watts operating for one hour
cf	Cubic feet
kg	Kilograms
kW	Kilowatts
kWh	Kilowatt-hours
M	1,000
M³	Cubic meters
MM	1,000,000
V	Volts

Currency Equivalents

Calendar Year	*Rs = US$1.00*
1990	21.8
1991	23.8
1992	25.1
1993	28.1
1994	30.6
1995	31.7
1996	36.1
1997	41.2
1998	45.8
1999	51.4
2000	53.9
2001	61.8
2002	59.6
2003	57.7
2004	58.3
2005	59.6

Note: *All dollar values in this report are U.S. dollars.*

Executive Summary

1 The energy sector in Pakistan has undergone a number of changes in the last decade. In the downstream oil sector, the government shifted to a formula-based pricing policy for petroleum products, although this policy was reversed in 2004 and 2005 against the backdrop of steeply rising international oil prices. The Oil and Gas Regulatory Agency has been established, setting prescribed rates for natural gas and conducting public hearings. In the power sector, several reform steps have been taken, among them reducing the generation capacity shortfall and improving bill collection. These measures affect the availability of energy as well as the prices charged to, and paid by, consumers.

2 This study aimed to examine the impact of changing availability of different energy sources and their price levels on household energy choice, consumption, and expenditures. Knowledge of household expenditures and energy consumption patterns is an essential building block for further work on possible policies in the energy sector and associated poverty and social impact analysis. To this end, the four most recent household expenditure surveys—conducted in 1994, 1997, 1999, and 2001—were analyzed in detail. The survey periods included those with low fuel prices (1999) and a time of rising world oil prices (2001). No household expenditure surveys are available from the last two years, when the increase in fuel prices has far outstripped general inflation. Nevertheless, between 1994 and 2001, prices of electricity, natural gas, kerosene, and liquefied petroleum gas (LPG) rose more rapidly than the consumer price index (CPI), potentially offering insights into how households might react to, and manage, sharply rising energy prices. The household survey analysis was supplemented by focus group discussions and individual interviews conducted in 2004 and 2005. Participants were asked questions about reasons for energy choice, the quality of service provided, evidence of increasing competition, affordability of different energy sources, benefits and costs, and commercial malpractice.

3 Many findings in this study were consistent with international experience, while others were somewhat surprising:

- *Access and uptake*. Uptake of electricity, natural gas, and LPG increased with time in both absolute and percentage terms, indicating that increasing access outstripped the population increase. As in other countries, the rate of uptake rose with increasing income for these three energy sources. In the case of LPG, the uptake rate fell for the bottom 10 percent between 1994 and 2001. For electricity and natural gas, the uptake rate increased across all income groups.
- *Price increase and affordability.* Prices of electricity, natural gas, kerosene, and LPG rose faster than the CPI between 1994 and 2001. Households appeared to consider natural gas affordable. Kerosene is apparently becoming too expensive, and many households have dropped it from their energy portfolio. In response to rising prices of commercial

energy, the uptake of free biomass increased slightly from 1994 to 2001 in both urban and rural areas. The largest percentage increase in the uptake of free biomass occurred among the bottom 40 percent in urban areas.

- *Consumption.* Consumers did not cut back on their consumption of electricity and natural gas, but they did cut back their LPG and kerosene consumption. Consumption of fuelwood increased, especially among those making use of freely acquired fuelwood.
- *Energy mix.* The most dominant household energy mix changed from kerosene-biomass-electricity in 1994 to biomass-electricity in the subsequent survey years. Natural gas-electricity, undoubtedly the top combination in the so-called energy ladder, moved from being the fourth most prevalent energy mix in the first three surveys to the second in 2001.

These findings are detailed below.

Household Expenditure Survey Findings

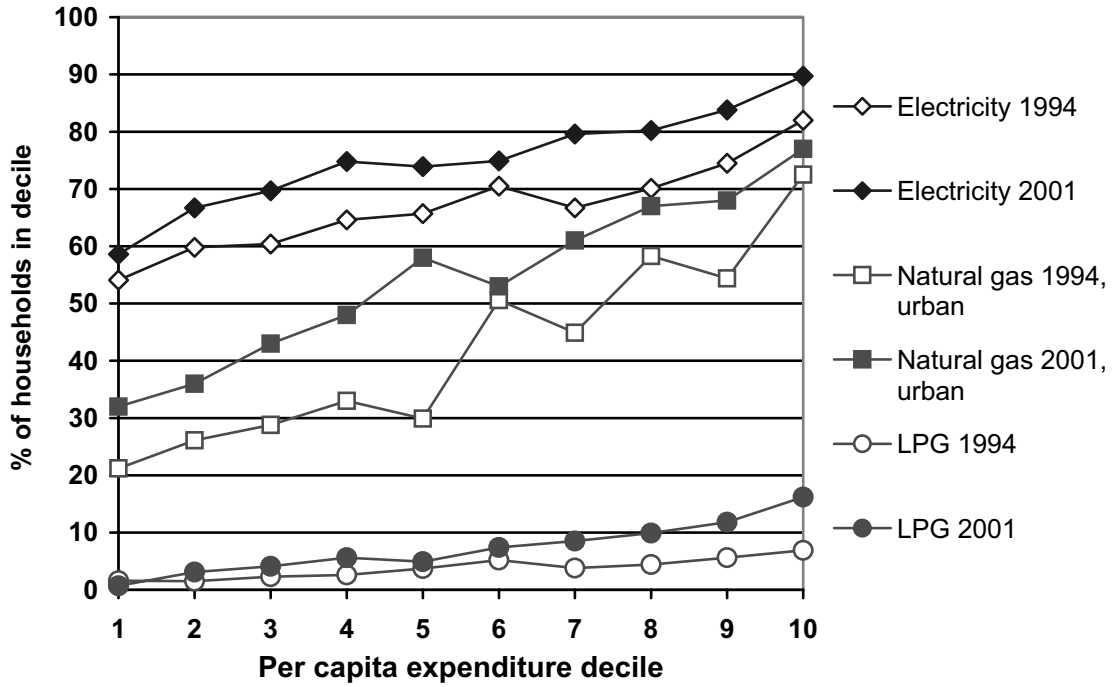
4 Each survey was analyzed by expenditure decile, location (urban and rural), and province. Expenditures are taken as surrogates for income. Between 1994 and 2001, household expenditures—which in this study do not include expenditures on durable goods but do include imputed values of freely acquired consumption goods—increased a modest 6 percent in real terms. The percentages of households using natural gas (which is available primarily in urban areas), LPG, and electricity rose, while the percentage using kerosene declined. Rising electricity coverage would reduce the need to use kerosene for lighting, although kerosene lamps might still be used during power outages. Electricity did not exhibit a steady increase; in fact, the percentage using electricity did not change much for the last three surveys.

5 The uptake of biomass—fuelwood, dung, agricultural residues, and bagasse—remained essentially steady between 1994 and 2001. While fuelwood use declined somewhat, dung use showed no sign of decline, even among urban households. The percentage of households using agricultural residues increased between 1994 and 2001, as did the percentage of households making use of free biomass. This latter increase occurred in both urban and rural areas but was greater in urban areas in percentage terms. That said, the uptake rate among rural households in 2001 was almost seven times that among urban households. Increasing reliance on free biomass throughout the country is somewhat surprising, since economic development typically leads to declining availability of free biomass, while rising income enables households to switch to commercial fuels. Increasing uptake of free biomass might suggest declining cash income in real terms. As expected, the increase in the uptake of free biomass was greater among the poor than among the non-poor. The uptake of purchased fuelwood fell between 1994 and 2001, with the poor registering the greatest decline. In 2001, about one-fifth of households in both urban and rural areas were purchasing fuelwood.

6 The uptake of electricity, LPG, kerosene, biomass, and fuelwood in Pakistan, and of natural gas in urban areas (most natural gas users are urban residents), is plotted in Figure 1 and Figure 2 as a percentage of those in each expenditure decile. In

this report, decile 1 represents the poorest 10 percent of the population, and decile 10 the richest 10 percent. As expected, the uptake of electricity, natural gas, and LPG rose with increasing decile. The percentage of households using biomass fell slightly, but because the total population increased between 1994 and 2001, the *number* of households using biomass increased by 3 million. The percentage of households using fuelwood fell, primarily in the lower deciles; but the total number of households using fuelwood increased by almost 2 million, again because of growing population. The fall in the percentage of households using kerosene was most dramatic. Quantities examined showed that, averaged among those who reported using kerosene, monthly consumption fell during this period also.

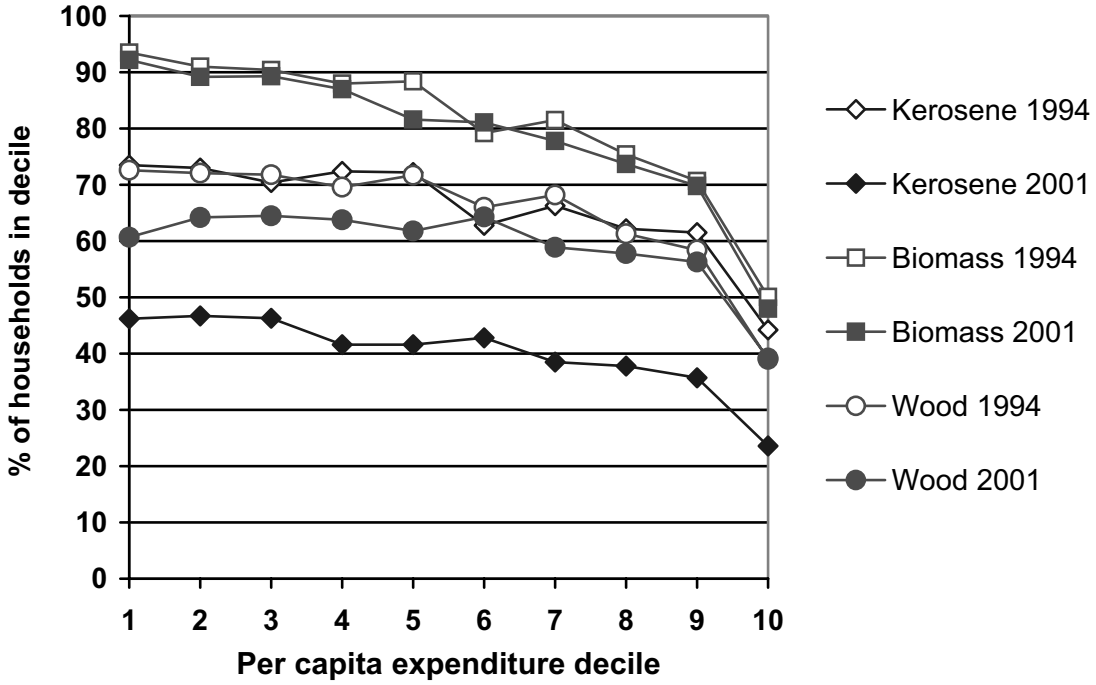
Figure 1: Historical Progression of Natural Gas, LPG, and Electricity Uptake



7 Leading household energy choices for the entire population as well as urban and rural households are shown in Figure 3. In this figure, "biomass and electricity" indicates the percentage of households that were using only biomass and electricity to meet all their household energy needs. Nationally, more households used electricity for lighting and powering appliances, and biomass for all other needs—cooking, heating water, and space heating—than any other energy combination in 2001. To the extent that biomass-electricity replaced biomass-kerosene, this represents progress. A disturbing sign, however, is that the percentage of households using kerosene-biomass-electricity declined sharply between 1994 and 2001, while the percentage using biomass-electricity nearly doubled. This changing pattern is to some extent caused by households substituting kerosene for biomass in cooking in response to rising kerosene prices. Because biomass is more time consuming and polluting to use, this fuel substitution

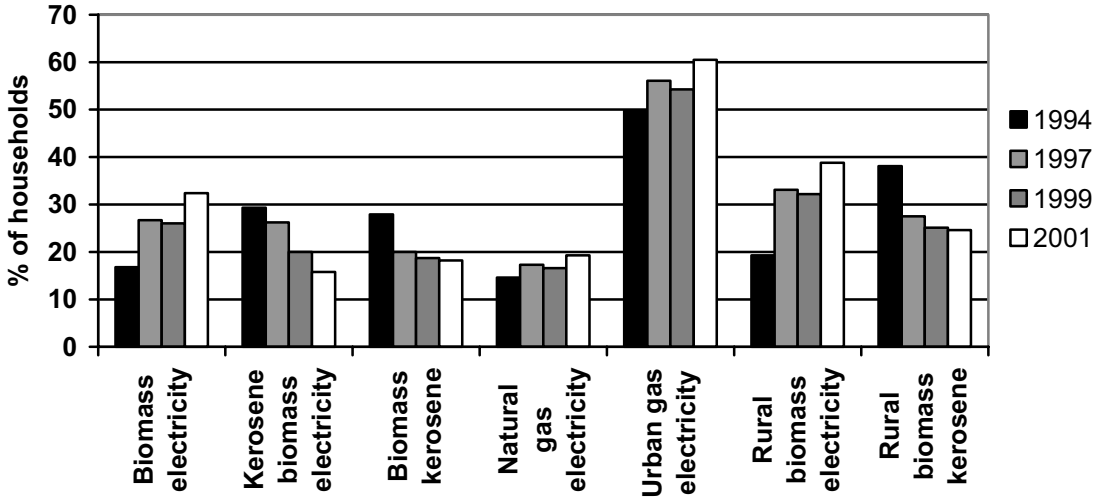
represents a socially undesirable, if not inevitable, consequence of petroleum price deregulation against the backdrop of rising world oil prices.

Figure 2: Historical Progression of Wood, Biomass, and Kerosene Uptake



8 Natural gas-electricity is at the top of the so-called energy ladder and dominates household energy choice among urban households. In rural areas, biomass-electricity was the most common choice in 2001. Biomass-kerosene, the most common choice in 1994, was less common by 2001, presumably because an increasing percentage of households was able to replace kerosene for lighting with electricity as a result of expanding electricity supply.

Figure 3: Household Energy-Choice Combinations



9 Comparison of household expenditures and tariffs suggested that electricity and natural gas users did not cut back on monthly consumption in response to rising tariffs. By far the greatest expenditure was on electricity, Rs 320 per month, followed by Rs. 240 on natural gas, in 2001. Table 1 shows expenditures on purchased energy as a share of total household expenditures. The percentage share increased from 4.0 percent in 1994 to 5.6 percent in 2001, with electricity contributing the most to this increase.

Table 1: Purchased Energy as Share of Household Expenditures

In Percentage of Total Spending, Averaged across all Households

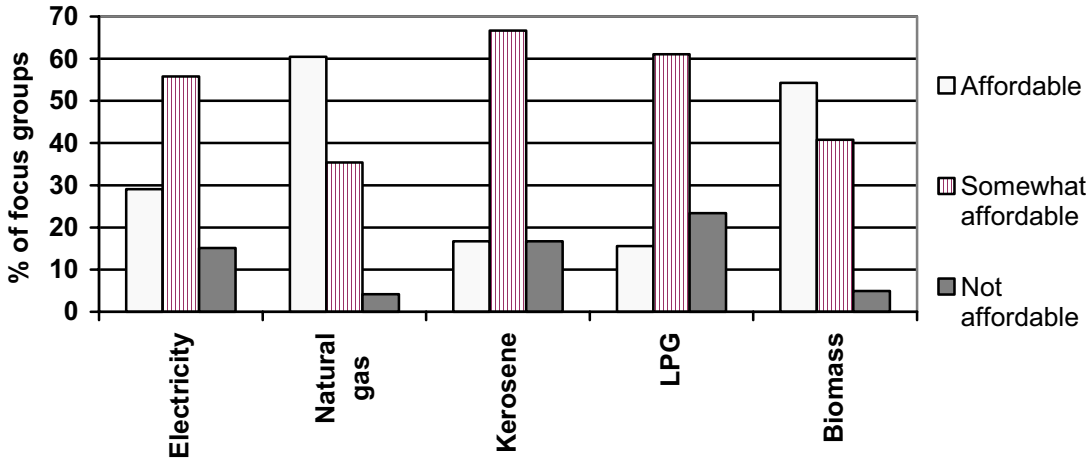
Area and Year	*Electricity*	*Natural Gas*	*Kerosene*	*LPG*	*Biomass*	*Total Energy*
National						
1994	1.7	0.3	0.7	0.1	1.1	4.0
1997	2.4	0.4	0.5	0.2	0.9	4.4
1999	2.8	0.4	0.4	0.3	0.9	4.8
2001	3.6	0.6	0.4	0.2	0.8	5.6
Urban						
1994	2.7	1.0	0.5	0.2	1.0	5.6
1997	3.2	1.3	0.5	0.3	0.9	6.1
1999	3.7	1.3	0.4	0.3	0.8	6.6
2001	4.9	1.8	0.2	0.3	0.7	7.9
Rural						
1994	1.3	0.0	0.7	0.1	1.1	3.3
1997	2.0	0.0	0.6	0.2	0.9	3.7
1999	2.4	0.1	0.4	0.2	0.9	4.0
2001	3.0	0.1	0.5	0.2	0.8	4.7

Focus Group Discussions and Individual Interviews

10 Eighty-nine focus groups in Punjab, Sindh, and Balochistan, consisting of 44 all-male groups and 45 all-female groups, and 67 individuals in Punjab and Balochistan were interviewed. The responses given by focus groups on the affordability of different purchased energy sources are shown in Figure 4.

11 Focus group discussions and individual interviews confirmed that natural gas was nearly universally favored by households. It was considered affordable, clean, and efficient, and there were indications that households would accept higher gas prices than the tariffs in effect at the time of the interviews. Those who were able to obtain natural gas connections tended to drop all other fuels, and some previous users of biomass even reported fuel cost savings.

Figure 4: Affordability of Energy



12 Focus groups and individuals interviewed were less happy with electricity, the poor citing financial hardships caused by rising tariffs, and many expressing the view that free (illegal) use of electricity by the rich raises the overall cost of electricity supply. Many poor people who cannot afford the connection fees arrange to be connected to their neighbors' electricity or natural gas supply. Because of a rising block tariff structure, those with secondary connections end up paying more, even if their neighbors do not cheat them, because the bulk of the supply to the officially connected neighbor is charged higher tariff rates. There was suspicion that the officially connected neighbors often overcharged, becoming free riders in effect.

13 Fewer respondents believed that sector deregulation led to an increase in the number of suppliers or an improvement in the quality of supply service for kerosene than for LPG. Very few reported a marked improvement for either fuel in this regard. To the extent that the number of kerosene users seems to be falling, a decrease in the number of shops selling kerosene would be the expected market response. Only a minority replied that transporting LPG cylinders for refill was not a problem. No one cited competition in prices as a mitigating factor against recent world oil price increases, although the counterfactual (that is, how much prices would change if a different level of competition prevailed) would not be easy to establish. The respondents noted that some households substituted kerosene for biomass for cooking because of higher kerosene prices. A majority said that short-selling occurred, especially for LPG. Black marketing of LPG was also said to be common.

Observations from the Study

14 The most frequently found household energy mix in rural areas was biomass-electricity. The proportion of households using only these two energy sources was nearly independent of household income, averaging 29 percent in 2001. This suggests how much progress still remains to be made before modern commercial fuels become widely used for cooking and heating in rural Pakistan. The household fuel of choice—natural gas—will not be available for most rural households given infrastructure constraints. This leaves kerosene and LPG as the only viable alternatives, with the latter

the fuel of choice for rural households that are willing and able to pay for it because of its widely recognized cleanliness and convenience. Given recent rises in the international price of LPG, the transition to LPG is likely to take a long time in rural areas.

15 For urban and peri-urban households, extending the supply of natural gas appears to be important. Focus groups and individuals with no access to natural gas universally expressed the desire to be connected to it; some voiced the opinion that they would probably not mind paying more for it; and many cited the social benefits of switching to natural gas, including a positive impact on the health of women and children from eliminating exposure to smoke, time saved from faster cooking and cleaning up afterward, time saved from not having to go out and collect fuelwood or other forms of biomass, and its relatively low cost compared to kerosene and LPG.

16 Given the seeming willingness of households to pay a premium for its convenience and cleanliness, phasing out cross-subsidies for residential users of natural gas seems political feasible. This action would free up more financial resources for gas companies, enabling them to carry out pipeline extension projects more quickly. Natural gas pricing is one policy area that merits government attention. Connecting new households to natural gas presents a challenge. The current connection fees are already subsidized, but poor households find it difficult to pay them, forcing them to resort to secondary connections as the only viable means of obtaining access and often paying more for natural gas consumption than if they were officially connected. Providing new electricity connections to all households is arguably even more important but also presents a greater challenge: unconnected households tend to be in rural areas lacking scale economies and good infrastructure. Given the large benefits of natural gas and electricity connection, it is worth pursuing avenues for enabling poor households to acquire new connections to the extent possible. Options that are revenue neutral are particularly worth considering, such as rolling connection fees into monthly payments.

17 It is not possible for the government to protect consumers from rising oil prices indefinitely. While the government may not be able to help consumers directly with prices, it is important that it continue to establish and enforce adequate technical and safety standards, and ensure consumer protection, especially against black marketing and short-selling. Both short-selling and the black market increase effective fuel prices and hurt consumers. Regulating the sector to minimize the occurrence of commercial malpractice is an important government role. A black market for LPG would emerge only in the face of a serious supply-demand imbalance and implicit price ceilings, since the sector is supposed to be fully deregulated. In this regard, the government's attempt to keep end-user prices low by informally capping ex-plant prices of LPG may actually be backfiring.

18 If a detailed poverty and social impact analysis concerned with further improvement of sector performance were to be carried out, this study would provide useful information on the responses of households to changes in energy prices and availability. In addition, new data as well as updating of data used in this study would be needed. A new household expenditure survey would be especially valuable. Additional data that would be useful include:

- Data from utility companies on national as well as provincial consumption, revenue collection, costs of supply and new connections, outages, load shedding, and losses during transmission and distribution
- Links between costs incurred by utility companies and fuel tax structure, and the government budget
- Recent trends in energy efficiency and scope for additional energy savings in home appliances, housing, and elsewhere.

These data would enable more direct comparison of household survey data and utility company data, a better assessment of the ability of households to pay for energy at economic prices, and an analysis of options for government intervention to help the poor offset higher energy prices. At the same time, this study raised questions about available data. Some unexpected results, such as relatively high uptake rates of electricity and LPG in some rural areas, might suggest a sampling bias rather than a true reflection of higher uptake. Uncertainties about secondary or illegal connections made it difficult to reconcile household survey results with data provided by utility companies. These discrepancies are worth pursuing in future studies.

19 Allowing domestic fuel prices to rise with international prices does not imply that the government should stop helping the poor. Keeping prices artificially low distorts the market, prevents consumers from receiving correct price signals, prolongs non-essential use of energy, and slows network expansion in the case of electricity and natural gas. As some focus group participants said, as concerned as they were about increasing electricity tariffs, they were even more concerned about education fees, because they could cut back on electricity consumption but could not negotiate with schools to reduce school fees. Targeted social safety net measures—whereby support is given for the essential goods consumed by the truly needy, such as reduced fees for education—are likely to be more cost effective than means to keep prices below market-determined levels. Compensation to the poor for rising energy prices should be integrated in broader, targeted, safety net programs.

1

Pakistan Energy Sector: Background

1.1 The energy sector in Pakistan has undergone a number of changes in the last decade. In the downstream oil sector, the government has moved to a formula-based pricing policy for petroleum products, although this policy was reversed in 2004 and 2005 against the backdrop of steeply rising international oil prices. The Natural Gas Regulatory Agency was established by ordinance in 2000, and was replaced by the Oil and Gas Regulatory Agency (OGRA) in 2002. OGRA sets prescribed prices for natural gas and conducts public hearings on the matter.[1] In the power sector, several reform steps have been taken, among them reducing the generation capacity shortfall and improving bill collection. These measures affect the availability of energy as well as the prices charged to, and paid by, consumers.

1.2 This study was undertaken to examine the impact of energy price levels on household energy choice, consumption, and expenditures. For further work looking at possible policies in the energy sector and associated poverty and social impact analysis, knowledge of household expenditures and energy consumption patterns would be an essential building block. To this end, the four most recent household expenditure surveys—conducted in 1994, 1997, 1999, and 2001—were analyzed in detail. The survey periods included those with low fuel prices, especially 1999, and a time of rising world oil price in 2001. No household expenditure surveys are available from the last two years, when the increase in fuel prices has far outstripped general inflation. Nevertheless, between 1994 and 2001, prices of electricity, natural gas, kerosene, and liquefied petroleum gas (LPG) rose more rapidly than the consumer price index (CPI), potentially offering insights into how households might react to, and manage, steeply rising energy prices. The household survey analysis was supplemented by focus group discussions and individual interviews conducted in 2004 and 2005, a period of rapidly rising world oil prices. The participants were asked questions about the quality of service provided, evidence of increasing competition, affordability of different energy sources, benefits and costs, and commercial malpractice.

[1] In this report, a "prescribed price" for natural gas is the amount a natural gas licensee would be entitled to receive from each category of its retail consumers for natural gas in order to achieve its total revenue requirement.

1.3 This chapter provides a general background on the energy sector in Pakistan, focusing on oil, natural gas, and electricity. Chapter 2 discusses the findings of the household surveys. Survey analysis results by province are given in annex 4. Chapter 3 reports the findings from focus group discussions and individual interviews. Conclusions are summarized in chapter 4.

Energy Consumption

1.4 Energy consumption in Pakistan grew at an average annual rate of 4 percent between fiscal 1991–92 (July to June) and fiscal 2003–04.[2] The fastest growing energy source was LPG, the consumption of which increased at an annual rate of 8.4 percent during this period—albeit from a very low base—followed by coal at 5.9 percent and natural gas at 5.6 percent. The share of oil declined from 47–48 percent of total energy consumption in the 1990s to less than 40 percent by fiscal 2004, whereas the natural gas share increased from 29 percent to 35 percent. The statistics provided in the *Pakistan Energy Yearbook* (HDIP and MPNR various years) are show in Table 1.1.

1.5 In terms of consumption among different consumer classes, the domestic sector (residential consumers) showed the greatest increase in energy use between fiscal 1992 and fiscal 2004; this sector's energy consumption grew at an annual rate of 5.4 percent. The next highest annual growth rate (5 percent) was recorded by the commercial sector. As a share of total consumption, the industrial sector has historically led energy use, followed closely by the transport sector. In fiscal 2004, the industrial sector consumed 38 percent of total energy, the transport sector 32 percent, and the domestic sector 22 percent. Sector consumption of energy in Pakistan is given in Table 1.2.

1.6 Consumption per capita of oil, natural gas, LPG, and electricity by households can be calculated by taking consumption of different energy sources in the domestic sector and dividing by the total population. The results are shown in Table 1.3. Per capita oil consumption fell markedly during the period covered. LPG consumption grew at an average annual rate of more than 6 percent, and natural gas and electricity at 4–4.5 percent each. Note that LPG domestic consumption data should be interpreted with caution, as it is difficult to separate out LPG sold to small commercial establishments from that sold to households. Up to fiscal 2002, LPG consumption in the domestic sector was estimated by assuming that three-quarters of net supplies of LPG were consumed by that sector in the absence of more detailed data.

[2] Fiscal 2004 hereafter.

Table 1.1: Energy Consumption by Source in Pakistan

Source	*FY 1992*	*FY 1993*	*FY 1994*	*FY 1995*	*FY 1996*	*FY 1997*	*FY 1998*	*FY 1999*	*FY 2000*	*FY 2001*	*FY 2002*	*FY 2003*	*FY 2004*
Oil, TOE	8,517,346	9,183,098	9,668,274	10,091,877	11,172,070	10,856,223	10,938,831	11,509,120	11,960,449	11,586,791	11,088,593	10,865,717	11,145,365
% of Total	47.2	47.2	47.4	47.7	48.3	48.0	46.9	47.7	47.3	45.9	43.3	41.3	38.5
Gas, TOE	5,258,439	5,719,472	5,970,644	6,311,229	6,887,163	6,650,445	7,297,211	7,481,699	8,092,767	8,141,996	8,568,111	9,114,902	10,072,264
% of Total	29.1	29.4	29.3	29.8	29.8	29.4	31.3	31.0	32.0	32.2	33.5	34.6	34.8
Coal, TOE	1,368,694	1,440,567	1,561,546	1,343,151	1,449,084	1,432,119	1,258,159	1,362,823	1,261,579	1,292,480	1,484,994	1,691,274	2,703,906
% of Total	7.6	7.4	7.7	6.4	6.3	6.3	5.4	5.7	5.0	5.1	5.8	6.4	9.3
Electricity, TOE	2,759,024	2,972,001	3,044,325	3,212,650	3,399,119	3,478,669	3,629,926	3,526,038	3,712,584	3,956,724	4,122,661	4,288,227	4,682,063
% of Total	15.3	15.3	14.9	15.2	14.7	15.4	15.5	14.6	14.7	15.7	16.1	16.3	16.2
LPG, TOE	144,790	145,824	132,954	184,791	222,637	202,865	221,282	232,525	257,688	277,809	339,704	352,766	380,370
% of Total	0.8	0.7	0.7	0.9	1.0	0.9	0.9	1.0	1.0	1.1	1.3	1.3	1.3
Total, TOE	18,048,293	19,460,962	20,377,743	21,143,698	23,130,073	22,620,321	23,345,408	24,112,206	25,285,067	25,255,801	25,604,063	26,312,886	28,983,968
Annual Growth, %	6.4	7.8	4.7	3.8	9.4	-2.2	3.2	3.3	4.9	-0.1	1.4	2.8	10.2

Note: *FY= Fiscal Year.*

Source: *HDIP and MPNR* (various years).

Table 1.2: Energy Consumption by Sector

Sector	FY 1992	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Domestic, TOE	3,333,214	3,598,483	3,790,280	4,283,678	4,753,612	4,829,408	5,356,095	5,343,706	5,709,084	5,825,500	5,895,458	6,092,468	6,278,918
Commercial, TOE	516,263	561,653	597,270	635,741	693,730	726,549	684,454	756,618	779,689	777,825	809,113	851,857	927,633
Industrial, TOE	7,004,067	7,561,875	7,896,944	7,881,219	8,721,304	8,014,362	8,000,864	8,290,687	8,663,489	8,608,411	8,808,974	9,318,309	11,103,662
Agriculture, TOE	769,487	758,120	790,693	788,978	805,804	857,193	820,135	717,323	675,026	666,475	691,758	694,783	734,202
Transport, TOE	5,915,139	6,421,225	6,744,287	6,984,357	7,496,164	7,538,503	7,742,402	8,302,492	8,785,472	8,685,806	8,612,474	8,771,365	9,281,160
Other Govt, TOE	510,122	559,605	558,269	569,726	659,457	654,307	741,457	701,381	672,306	691,785	786,285	584,103	658,393
Total, TOE	18,048,292	19,460,961	20,377,743	21,143,699	23,130,071	22,620,322	23,345,408	24,112,206	25,285,067	25,255,801	25,604,063	26,312,886	28,983,968
Annual Growth, %	N.A.	7.8	4.7	3.8	9.4	-2.2	3.2	3.3	4.9	-0.1	1.4	2.8	10.2

Note: *FY= Fiscal Year; N.A. = Not Available.*
Source: *HDIP and MPNR* (various years).

Table 1.3: Per Capita Household Energy Consumption

Parameter	*FY 1992*	*FY 1993*	*FY 1994*	*FY 1995*	*FY 1996*	*FY 1997*	*FY 1998*	*FY 1999*	*FY 2000*	*FY 2001*	*FY 2002*	*FY 2003*	*FY 2004*
Population (millions)	112	115	118	121	124	127	130	133	136	140	143	147	150
Oil (kg)	5.7	3.2	5.2	5.0	5.0	4.1	4.0	3.8	3.6	3.3	2.4	2.0	1.6
Gas (MMBtu)	0.6	0.6	0.7	0.8	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LPG (kg)	0.9	0.9	0.8	1.1	1.2	1.1	1.2	1.2	1.3	1.4	1.8	1.8	1.9
Electricity (kWh)	102	115	120	129	138	140	144	146	157	163	162	161	172

Notes: *FY= Fiscal Year. LPG consumption through FY 2001 assumes that 75 percent of net supplies was consumed by households.*
Sources: *HDIP and MPNR* (various years) *for energy consumption; World Bank* (2006) *for population.*

1.7 Natural gas consumption per capita grew steadily until fiscal 1998, after which it remained at about the same level. This trend could be taken to suggest that aggregate consumption grew at the same rate as the population. Because the last census in Pakistan was conducted in 1998—giving a total population of 132,352,000, 32.5 percent of whom were residing in urban areas—subsequent population figures in Table 1.3 are estimated. Electricity consumption shows an increase until fiscal 2001, at which point per capita consumption remained essentially unchanged for three years, followed by an increase in fiscal 2004. All in all, during the period examined, per capita electricity consumption increased nearly 70 percent, which strongly indicates increasing connection to electricity by previously unconnected households. Data estimation difficulties notwithstanding, expansion of LPG use is evident, doubling between fiscal 1992 and fiscal 2004.

1.8 Consumption data during the last two years are available from other sources. Despite rising oil prices, energy consumption grew 8 percent in 2004 (*Business Recorder* 2005c). Consumption of petroleum products rose 10 percent between fiscal 2004 and fiscal 2005. This increase was partly a result of power plants turning to fuel oil following droughts, higher consumption of high speed diesel (HSD) due to growth in agriculture, and increases in the sale of jet fuel. Markedly higher oil prices might have moderated consumption growth, but the government capped fuel prices to curb inflation. Consumption of kerosene and light diesel oil, already low, fell further during this period. Consumption in metric tons for the two fiscal years is shown in Table 1.4.

Table 1.4: Petroleum Product Consumption in Fiscal 2004 and 2005

Product	*Fiscal 2004*	*Fiscal 2005*	*Growth (%)*
Fuel Oil	3,629	4,555	26
HSD	7,421	7,696	4
Gasoline	1,257	1,329	6
Aviation Fuel	795	920	16
Kerosene	258	231	-10
Light Diesel Oil	190	160	-16
Total	13,548	14,892	10

Note: *Consumption is expressed in thousand metric tons.*
Source: *Business Recorder* (2005b).

Downstream Oil and Gas Sector

1.9 There are six refineries in Pakistan. According to the Ministry of Petroleum and Natural Resources, indigenous crude oil meets 18 percent of total demand; the remaining 82 percent of demand is met through imports of crude oil, high speed diesel, and fuel oil. In fiscal 2005, 8.3 million tons of crude oil, 4.2 million tons of HSD, and 1.5 million tons of fuel oil were imported, at a total cost of $4.5 billion. For fiscal 2006, import projections are 8.9 million tons for crude, 4.6 million tons for HSD, and 1.8 million tons for fuel oil (MPNR 2005).

1.10 Pakistan has seven oil marketing companies: Pakistan State Oil, Shell Pakistan, Caltex Pakistan, Total Parco, Attock Petroleum, Admore Gas, and Pearl Parco. Three more licenses were recently issued to Hascombe, Overseas Oil Trading Company, and Askar. State-owned Pakistan State Oil supplies 65 percent of total demand. Its market share is 44.7 percent for gasoline, 60 percent for HSD, and, 80 percent for furnace oil (*Frontier Star* 2005).

1.11 Since July 1, 2001, the Oil Companies Advisory Committee has been authorized to review, set, and announce the ex-depot prices of gasoline, kerosene, and light diesel oil twice a month in accordance with the approved pricing formula. This pricing formula is based on Arab Gulf fuel prices and consists of ex-refinery/import-parity price, customs and excise duty, petroleum development levy (PDL), distribution margin for oil marketing companies (currently 3.5 percent of ex-depot sale price), dealers' commission (4.0 percent of ex-depot sale price), inland freight equalization margin (which is based on actual transportation costs determined by oil marketing companies), and a 15 percent general sales tax. Import duties of 6 percent on kerosene and light diesel oil and of 10 percent on HSD have been imposed since July 2002, offering protection to domestic refineries. Fuel oil and aviation fuel have been fully deregulated; HSD is partially deregulated. The frequency of upward and downward price adjustments for gasoline and diesel between July 1, 2001, and October 31, 2005, is shown in Table 1.5.

Table 1.5: Frequency of Price Adjustments

Number of Times Prices Were	*Gasoline*	*Diesel*
Increased	45	42
Decreased	23	23
Unchanged	37	40

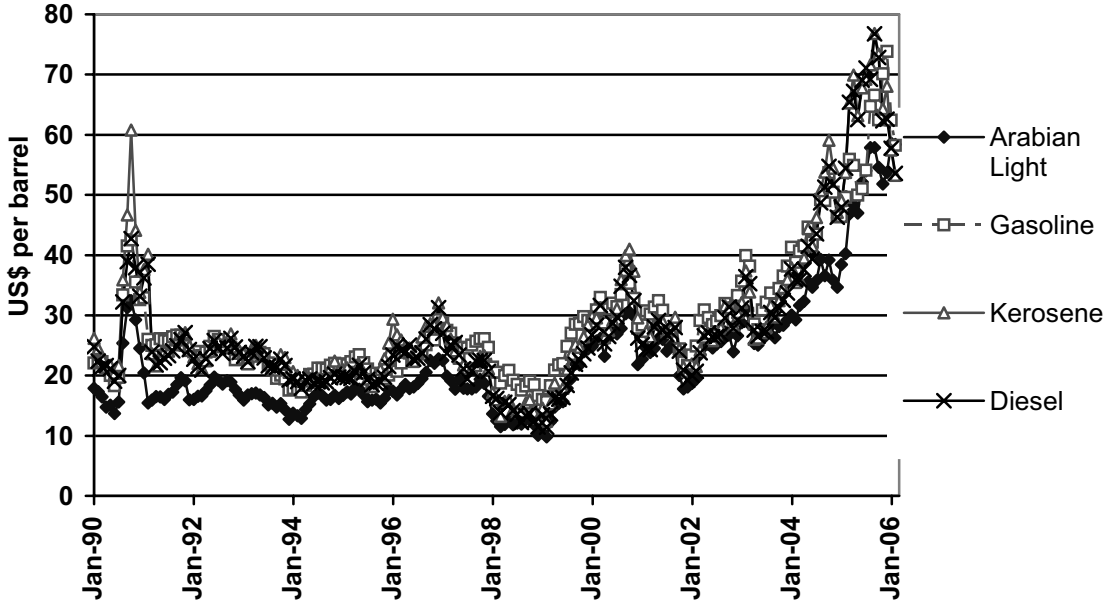
Source: *MPNR* (2005).

1.12 LPG was deregulated in 2000. Seventy-four provisional licenses have been issued for marketing LPG, and 30 companies are thus far operational. OGRA has also issued eight LPG production licenses (*Business Recorder* 2005a). The licensed private firms are free to import LPG, and marketing companies can set prices based on prevailing market conditions. In practice, an informal price ceiling continues to be applied to domestically manufactured LPG. This ceiling is currently about $300 per ton, against international LPG prices exceeding $500 per ton since October 2005. This implicit price ceiling discourages LPG imports, creating a shortage, a "black market," and high prices paid by end users. In winter, LPG consumption rises above domestic production capacity, historically requiring LPG imports. With the coming on stream of a new plant at Jam Shoro in Sindh with a daily capacity of 500 tons, there could be surplus LPG in Pakistan in summer in the future.

1.13 What led to recent government intervention in fuel product pricing was the steep rise in world oil prices in 2004 and 2005. Prices of Saudi Arabian Light and of Arab Gulf gasoline, kerosene, and diesel since January 1990 are shown in Figure 1.1. Oil prices essentially doubled between January 2004 and August 2005. LPG prices since

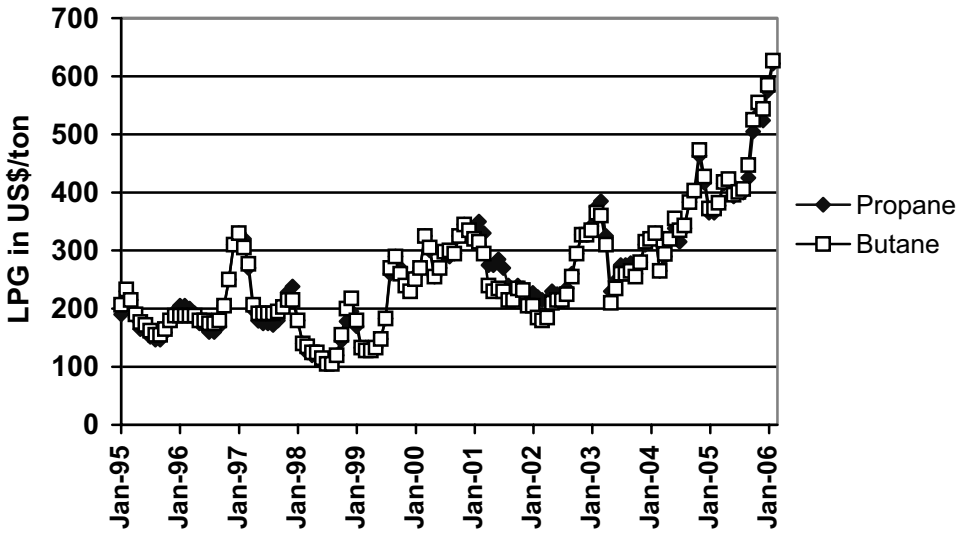
January 1995 are shown in Figure 1.2. Rising international prices of crude oil and petroleum products have created serious concerns about inflation and led the government to cap retail prices through fuel tax reductions or waivers and reimbursements to oil marketing companies through a price differential claim (PDC), introduced in 2004.

Figure 1.1: Crude Oil and Petroleum Product Prices



Note: *Petroleum product prices are for premium gasoline, jet kerosene, and gas oil with 0.5 percent sulfur in the Persian Gulf; oil prices are for term prices for Arabian Light, free-on-board for Asia.*
Source: *Energy Intelligence* (2006).

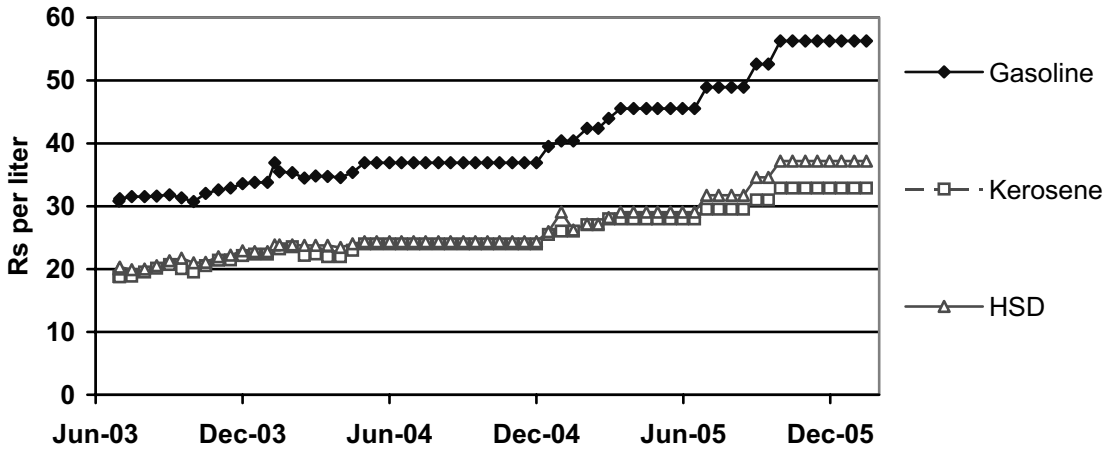
Figure 1.2: Saudi Aramco Contract Propane and Butane Prices



Source: *Platts Commodity News* (various issues).

1.14 The government capped domestic sale prices repeatedly in 2004 and 2005 (MPNR 2005). The government also reduced the PDL in May 2004 and eliminated the PDL on all petroleum products except aviation fuel in August 2004. Since then, PDLs at varying levels have been brought back from time to time. The precise dates when the PDL was eliminated can be determined from the price structures given in annex 1. For example, the government waived the PDL on kerosene entirely between August 1 and December 15, 2004, and between March 1, 2005, and end-February 2006 (at the time of this report writing). In addition, the government introduced a PDC beginning on August 16, 2004, whereby fuel prices were subsidized and oil companies reimbursed for the subsidy. The PDC particularly targeted kerosene and diesel. In November 2005, the Ministry of Petroleum and Natural Resources estimated that the differences between the prices of kerosene, HSD, and light diesel oil, based on the pricing formula and the actual prices in effect, were Rs 7.13, Rs 4.47, and Rs 4.13 per liter, respectively. As of October 31, 2005, the total reduction in revenues to the government was Rs 70 billion (about $1.2 billion), and the PDC had amounted to Rs 21.4 billion ($360 million) (MPNR 2005). The government was able to carry a large fiscal burden to keep fuel prices low in part because of rising revenue—the total government revenue was 7.6 percent higher in fiscal 2005 than in fiscal 2004 (Pakistan Press International 2005)—and falling fiscal deficit. These trends enabled the government to freeze domestic prices of gasoline, kerosene, and diesel from May to mid-December 2004 and from mid-March to June 2005. Price structures for gasoline (called motor spirit), kerosene, light diesel oil, and HSD are shown in annex 1. The ex-depot prices of gasoline and kerosene, notified by the Oil Companies Advisory Committee, and the retail prices of HSD, reported by Pakistan State Oil, since June 30, 2003, are shown in Figure 1.3. The government's attempts at price smoothing are evident.

Figure 1.3: Prices of Gasoline, Kerosene, and High Speed Diesel



Note*: Ex-depot prices are shown for gasoline and kerosene, and retail prices for HSD.*
Sources: *www.ocac.org.pk/price.asp for gasoline and diesel, www.psocl.com/products/pol.asp for HSD.*

1.15 Natural gas retail tariffs continue to be regulated with significant variation across consumer classes. Earlier, the government set a goal of eliminating most gas tariff distortions by June 2005 to be more cost-reflective, including increasing tariff rates for

households except lifeline consumption, and making the subsidy to the fertilizer industry transparent. However, achievement of this goal has fallen behind schedule. In most deregulated gas markets, residential tariffs are considerably higher than those for larger users to reflect the higher cost of supply to small users. In Pakistan, industrial users are cross-subsidizing residential users, as shown in Table 1.6 and detailed in annex 1. It should be noted that LPG cylinders used by households in Pakistan contain 11.8 kilograms (kg) each, and, as such, the first block for residential users of 100 cubic meters (m^3) per month is equivalent to more than 7 LPG cylinders. The first block for natural gas is therefore far in excess of the equivalent average monthly LPG consumption by even well-to-do urban households, about one-and-a-half to two cylinders. In fiscal 2002, about three-quarters of natural-gas-using households consumed less than 100 m^3 per month according to the data provided by the two gas transmission and distribution companies (World Bank 2003).

1.16 *The Pakistan Oil and Gas Sector Review* (World Bank 2003) assessed developments in the oil and gas sector and made a number of policy recommendations. In particular, it reported that the government still played a major role in the gas sector, determining retail tariffs (OGRA determines the prescribed prices only for gas utilities and has an advisory role with respect to retail prices); allocating gas to various end consumers as long as shortages persisted; and, as majority owner of the two transmission and distribution companies, approving the companies' capital expenditure programs. Retail gas tariffs were not consistent with the cost of service to different classes of consumers. Large subsidies were being given to one-fifth of households in Pakistan that happened to have access to natural gas, nearly all of them in urban areas; and to the fertilizer industry. In economic terms, the annual subsidies amounted to some Rs 9 billion for households and Rs 14 billion for the fertilizer industry. More than 90 percent of the volume of gas sold to households was at the subsidized tariff applicable to the first two slabs, and even high-volume consumers were entitled to discounts on the first two slabs. The better-off urban households were the primary beneficiaries of this tariff structure. To stop cross-subsidization of households by other sectors, an average increase in tariffs of approximately 70 percent for high gas-consumption households was proposed, to be phased in over several years. As a first step, the report recommended reducing the size of the first slab, to be provided at a lifeline rate, to 50 m^3 per month during the heating season and 30 m^3 during the rest of the year. Notwithstanding this reduction in the size of the subsidized first block, gas would still remain far cheaper than alternative modern fuels for households.

Table 1.6: Representative Changes in Natural Gas Retail Tariffs

Category	*01-07-1992*	*19-08-1993*	*09-06-1994*	*14-06-1995*	*16-05-1996*	*01-01-1997*	*16-08-1999*	*01-07-2000*	*01-07-2003*	*01-07-2005*	*01-01-2006*
Domestic											
(i) Up to 3.55 Mcf/Month (Up to 3.3719 MMBtu)	31.00	35.65	36.36	40.24	42.69	49.09	55.23	63.51	69.31	73.95	80.98
(ii) 3.55 to 7.1 Mcf/Month (3.3719-6.7438 MMBtu)	34.10	39.21	42.35	47.89	50.76	58.38	65.58	75.53	104.42	127.62	147.41
(iii) 7.1 to 10.64 Mcf/Month (6.7438-10.1157 MMBtu)	38.75	46.50	50.22	65.38	69.30	79.70	89.66	103.11	167.06	204.17	235.84
(iv) 10.65 to 14.2 Mcf/Month (10.1157-13.4876 MMBtu)	46.50	55.80	60.26	78.45	83.16	95.63	107.58	123.72	217.32	265.59	306.79
(v) Above 14.2 Mcf/Month (Above 13.4876 MMBtu)	46.50	55.80	60.26	78.45	83.16	95.63	107.58	123.72	217.32	265.59	306.79
Average Price = 0.5*(i)+0.3*(ii)+ 0.1*(iii)+0.05*(iv)+0.05*(v)	34.26	39.82	41.93	48.87	51.82	59.59	67.01	77.10	104.42	122.24	138.98
Commercial	61.41	70.62	76.27	94.57	100.24	115.28	135.02	155.27	193.82	234.67	271.07
Industrial											
(i) General	54.57	62.75	67.77	84.05	89.09	102.46	120.00	138.00	172.26	208.56	240.91
(ii) Cement	39.54	39.54	67.77	84.05	89.09	102.46	120.00	138.00	209.78	240.28	277.55
CNG Station	—	—	—	65.89	70.50	70.50	120.00	138.00	172.26	208.56	240.91
Fertilizer											
SNGPL & SSGC Systems											
(i) For Feedstock											
Pak-American Fertiliser	22.50	22.50	22.50	27.90	29.57	34.01	34.01	34.01	36.77	36.77	36.77
FFC Jordan	—	—	—	—	—	—	34.93	34.93	36.77	36.77	36.77
Dawood/PakArab	22.50	22.50	22.50	27.90	29.57	34.01	55.20	55.59	67.26	83.24	83.24
Pak-China/Hazara	22.50	22.50	22.50	27.90	29.57	34.01	60.08	60.08	71.38	83.24	88.34
(ii) For Fuel	54.73	66.22	66.22	84.05	89.09	102.46	120.00	138.00	172.26	208.56	240.91
Mari System											
(i) For Feedstock											
FFC/Engro Chemical (New)	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	13.09	—	—
FFC/Engro Chemical (Old)	9.75	9.75	9.75	12.09	12.82	23.39	43.76	43.76	66.31	82.06	82.06
Pak Saudi	9.75	9.75	9.75	12.09	12.82	23.39	34.43	34.43	66.31	82.06	82.06
(ii) For Fuel	43.44	52.56	52.56	66.62	70.62	81.21	95.05	109.31	172.26	208.56	240.91
Power											
SNGPL & SSGCL Systems	54.57	62.75	67.77	84.05	89.09	102.46	120.00	138.00	172.26	208.56	240.91
Liberty Power Limited	—	—	—	—	—	—	—	156.01	235.77	262.03	303.25
Raw gas sold to WAPDA's Gudu Power Station											
(i) Sui Field (917Btu)	30.68	43.73	47.23	66.10	78.10	92.08	107.84	124.02	—	—	—
(ii) Kandhkot (866Btu)	28.92	41.24	44.54	62.37	73.70	86.89	101.77	117.04	166.41	201.47	232.72
(iii) Mari (754)	25.05	35.78	38.64	54.17	64.02	75.50	88.42	101.68	161.85	195.95	226.34
(iv) Sara/Suri Fields	—	—	—	—	—	—	—	—	161.85	195.95	—

Notes: *CNG = Compressed Natural Gas for automotive use; FFC = Fauji Fertiliser Company; SNGPL = Sui Northern Gas Pipelines Limited; SSGCL = Sui Southern Gas Company Limited; WAPDA = Water and Power Development Authority; — = Not Applicable. Tariffs are in Rs per MMBtu except for residential consumers, for whom tariffs are expressed as Rs per thousand cubic feet.*
Source: *OGRA.*

Electricity Sector

1.17 The Pakistan government has been implementing power sector reforms since the mid-1990s aimed at improving the sector's operational performance, putting the sector on a commercial footing, and attracting private investment for capacity expansion and through the divestiture and privatization of existing public sector assets. Key elements of the reform program have been to:

- Unbundle the Water and Power Development Authority (WAPDA)—which supplied electricity to all areas of the country except Karachi—into a number of autonomous entities to handle thermal and hydro-power generation, transmission, and distribution
- Implement steps to improve the operational and financial performance, as well as managerial and commercial orientation, of the public sector entities
- Establish an independent regulatory agency to set technical, safety, and performance standards and tariffs (which would enable the sector entities to cover their operational and investment requirements without recourse to the government budget) and to regulate the sector
- Provide incentives for private investment in thermal generation as detailed in the 1994 Independent Power Producer Policy
- Privatize existing assets, starting with the Karachi Electric Supply Corporation.

1.18 The first four steps in this phase of the reforms have largely been implemented, albeit with delays. The corporatization of WAPDA is nearing completion, and several independent companies and entities now handle power generation, transmission, and distribution in their respective service areas. The Independent Power Producer Policy was successful in achieving its intended objective: to enhance generation capacity and overcome the severe capacity shortfalls that were experienced during the early 1990s. About 3,000 megawatts of thermal generating capacity was installed by the private sector between 1997 and 2001. As a result, capacity constraints—and rationing of supplies to consumers during peak demand periods—have been greatly reduced. The National Electric Power Regulatory Authority was established by an act of parliament in December 1997. In accordance with its mandate, the regulatory authority has:

- Issued licenses to generation, transmission, and distribution entities
- Issued rules, regulations, and performance standards to govern the operations of the entities in the sector
- Held tariff hearings and determined tariff rates (and other charges) for various functions and consumer categories.

1.19 Plans to privatize the power sector got off to a slow start. With the exception of the Kot Addu Power Plant, which was privatized in 1996, there were no further asset sales until 2005. The sale of the Karachi Electric Supply Corporation to a group of local and foreign investors, completed in late 2005, is expected to provide a boost to the privatization program.

1.20 Efforts have also been made to improve operational and commercial performance, but with limited success to date. Technical and nontechnical losses remain high (25–27 percent) and the government provides about Rs 50 billion annually to cover operating costs and investment needs. However, substantial progress has been made in some areas, such as in improving revenue collection and reducing arrears. For example, in the late 1990s, consumer receivables were about 20 percent of the amounts billed (and much higher for some companies and in some regions within the companies). Bill collection from the public sector, including the government, was especially challenging. Partly reflecting strong and sustained efforts by the management of WAPDA and of the companies set up to handle generation, transmission, and distribution functions, most distribution companies in recent years have achieved 100 percent bill collection from private consumers and (broadly) acceptable levels of collection from the public sector.

1.21 The improvement in bill collection has helped allay further deterioration in the sector's finances—an important development given that revenues collected per unit of electricity sold declined in nominal terms between fiscal 1999 and fiscal 2000, and stagnated in real terms between fiscal 1999 and 2001 (see Table 1.7). The higher collection rate may also explain why consumers responded, during the focus group discussions and individual interviews conducted for this study, that they were paying more for electricity than in the past (see chapter 3): the utilities are serious about enforcing payment and disconnecting defaulting consumers.

1.22 Limited progress has been made in reducing cross-subsidies through larger tariff increases for the low-tariff categories and smaller increases for consumers whose rates were already higher than the system average. As shown in Table 1.7, tariff increases for residential and agricultural consumers exceeded that for the CPI, while those for industrial and commercial users were significantly lower.

1.23 Electricity tariff rates for household/residential consumers today range from as low as approximately Rs 1.34 per kilowatt-hour (kWh), or $0.022/kWh, for consumption of up to 50 kWh per month, to as high as Rs 6.67/kWh, equivalent to about $0.11/kWh, for monthly consumption of more than 1,000 kWh. For consumption exceeding 50 kWh, the tariff is Rs 2.48/kWh for the first 100 kWh, which is approximately $0.04/kWh. The evolution of electricity tariffs is given in annex 1. Based on the data provided by WAPDA and electricity distribution companies, this tariff structure translated to an average rate for residential users of Rs 3.34/kWh (less than $0.06/kWh) during fiscal 2003. The cost of supply to households is well in excess of $0.08/kWh.

1.24 The average revenues collected from different consumer classes by WAPDA and electricity distribution companies between fiscal 1996 and fiscal 2003 are given in Table 1.7. Residential tariffs were the lowest among all consumer classes up to fiscal 1998. These tariffs remain the second lowest, despite the fact that the cost of supply is much higher than those for industrial and commercial users. This pattern of residential consumers paying less than industrial and commercial users is fairly typical of electricity tariffs in developing countries in the early stages of power sector reform. Similar to the situation for natural gas, as the restructuring proceeds to reflect the level of competition and the cost of service delivery to different consumer categories, tariffs for industrial and

commercial users decrease at the expense of residential consumers who are the beneficiaries of cross-subsidy arrangements.

Table 1.7: Average Revenue per Kilowatt-Hour of Electricity Sold

Consumer Class	*FY1996*	*FY1997*	*FY1998*	*FY1999*	*FY2000*	*FY2001*	*FY2002*	*FY2003*	*Growth (%)*
				Nominal Tariff in paisas per kWh					
Domestic	136	156	185	235	233	259	318	334	13.7
Commercial	537	565	665	718	703	704	708	703	3.9
Industry	336	375	411	488	416	416	419	442	4.0
Bulk Supply	295	286	341	401	406	424	489	504	8.0
Agriculture	131	163	187	233	231	258	293	333	14.3
System Average	136	156	185	235	233	259	318	334	13.7
				Tariff in paisas per kWh Adjusted for CPI, FY2003 Base Year					
CPI	74.1	82.2	89.3	93.9	97.9	101.6	104.8	108.1	5.5
Domestic	193	198	219	263	252	268	318	334	8.2
Commercial	761	716	787	804	760	729	708	703	-1.1
Industry	476	475	487	546	450	431	419	442	-1.1
Bulk Supply	418	362	404	449	439	439	489	504	2.7
Agriculture	186	206	221	261	250	267	293	333	8.7
System Average	314	311	337	368	346	349	373	395	3.3
				Tariff in US cents/kWh					
Exchange Rate, Rs to $1.00	33.48	38.89	43.05	46.66	51.74	58.22	61.52	58.57	—
Domestic	4.06	4.01	4.30	5.04	4.50	4.45	5.17	5.43	—
Commercial	16.04	14.53	15.45	15.39	13.59	12.09	11.51	11.43	—
Industry	10.04	9.64	9.55	10.46	8.04	7.15	6.81	7.19	—
Bulk Supply	8.81	7.35	7.92	8.59	7.85	7.28	7.95	8.19	—
Agriculture	3.91	4.19	4.34	4.99	4.46	4.43	4.76	5.41	—
System Average	6.62	6.32	6.61	7.04	6.19	5.79	6.06	6.41	—

Notes*: — = Not Applicable. Calendar 2000 = 100.*
Sources: *Collected revenues from WAPDA, exchange rate from the IMF* (2006)*, and the CPI from World Bank* (2006).

1.25 Table 1.7 shows that the largest percentage increase in the revenue collected per kWh occurred in the agricultural sector, closely followed by the domestic sector. The revenues collected in these two sectors are still considerably lower than for other consumers, and less than one-half of those for commercial users. Nevertheless, in terms of the rate at which their average tariff rates were increased, residential consumers—the focal consumers of this study—paid nearly 14 percent more each year on average in nominal terms, and 8.2 percent more in real terms. In the seven-year period between fiscal 1996 and fiscal 2003, the rate of power tariff increase outstripped inflation

by 68 percent for residential consumers. By way of comparison, during the same period, natural gas tariff rates for residential consumers increased at an annual rate of 9.0 percent in nominal terms and 3.2 percent in real terms. In both cases, tariff increases exceeded inflation.

2

Household Survey Analysis

2.1 This chapter summarizes the findings from the four most recent household expenditure surveys in Pakistan. The objective of the survey data analysis was to assess how household energy choice and consumption patterns have changed over the years in response to developments in the energy sector and in the overall economy—in particular, in the face of changing household income, rural-urban migration, shifts in prices, and the varying availability of a specific fuel or electricity—as well as how expenditures on energy compared to overall household expenditures and cost-of-living adjustments.

2.2 The data from four surveys were studied for this purpose: the 1993–94 and 1996–97 Household Integrated Economic Survey (HIES), and the 1998–99 and 2001–02 Pakistan Integrated Household Survey (PIHS). In 1998, HIES and PIHS were merged; as a result, minor modifications were made to the data collection methods and questionnaire. The 2001–02 survey was the second survey after the merger. The surveys asked questions about expenditures, including those on electricity, natural gas, LPG, kerosene, and various forms of biomass. Data from areas outside of the four provinces were not available in every survey. For example, the 1998–99 PIHS had data on Azad Jammu and Kashmir, the Northern Areas, and the Federally Administered Tribal Areas (FATA), but data from these three areas were not available in the 1993–94 HIES. The total sample size ranged from about 14,600 to 16,150 in the four surveys. The precise timing of the data collection for the 1993–94 and 1996–97 surveys is not known, but they are believed to have been carried out in calendar 1994 and calendar 1997, respectively.[3] The bulk of the 1998–99 survey was carried out in calendar 1999, and of the 2001–02 survey in calendar 2001. A detailed description of the survey questionnaire is given in annex 2.

2.3 For each survey, the total population was divided into 10 deciles on the basis of expenditure per capita (excluding expenditures on durable goods) adjusted for geographical differences in the cost of living. In this report, decile 1 represents the lowest expenditure per capita and decile 10 the highest. Each expenditure decile contains the same number of *individuals*. Because energy is purchased by households, and there are economies of scale in household use of energy—one light bulb can provide light for

[3] Because the 1993–94, 1996–97, and 1998–99 HIES are believed to have followed the same survey schedule, timing of the data collection for the first two surveys (which is not explicitly known) is deduced from the timing of the data collection for the 1998–99 survey (which is known).

reading and other activities whether one person or five people are in the room—an alternative methodology is to assign the same number of *households* to each decile. However, since the household size decreases almost twofold from the lowest to the highest decile, assigning the same number of households gives a disproportionately large weight to higher expenditure individuals. For this reason, each decile group was assigned the same number of individuals rather than households. Because there are many more poor households in rural areas, the lower deciles are populated predominantly by rural residents; conversely, there are more urban residents *and* households in the highest decile than in rural areas, as shown in annex 3.

2.4 Household surveys asked about the values in rupees of fuelwood, kerosene, charcoal, coal and peat, dry dungcakes, natural gas, LPG, electricity, bagasse, and agricultural wastes for fuel purposes (such as cotton stick, sawdust, shrubs, weeds, and tobacco sticks) consumed. Where a household obtained an energy source for free (given in kind, or collected or grown by self), imputed cash values were recorded. The surveys also asked about the quantities of the energy sources consumed with the exception of natural gas and electricity. In this report, biomass is defined to comprise fuelwood, dry dungcakes, bagasse, and agricultural wastes. Outliers were examined only for kerosene and LPG, for which both quantities consumed and rupees paid were reported. Prices paid were computed from these two pieces of information, and those with extremely low or high prices, or quantities that were much too high for consumption by households, were omitted from analysis.[4] For electricity and natural gas, only expenditures (and not amounts consumed) were reported, and it was not possible to judge if the reported figures could be considered outliers.[5]

2.5 The surveys were analyzed nationally and by province. Each geographical region was further split into urban and rural areas since rural household energy use patterns are distinctly different from those in urban areas. The numbers of households using and buying a specific energy source, the amounts consumed and purchased (which are different if an energy source is freely available), the amount of cash paid, and the imputed values in the case of noncash acquisition were examined. The amounts spent were compared to total household expenditure (which does not include expenditures on durable goods). Some numbers presented in this report are taken unedited from the statistical software package Stata and are not intended to indicate the number of significant figures.

Descriptive Statistics

2.6 According to the survey findings, Pakistan's total population increased from 91 million in 1994 to 129 million in 2001. These estimates are considerably smaller than those given by the World Development Indicators: 119 million in 1994 and 141

[4] This resulted in 45 and 17 observations being deleted from the 1993–94 and 1996–97 HIES, respectively. In addition, four observations, for which the respondents appeared to report kilograms of LPG purchased rather than number of cylinders, were accordingly adjusted in the 1996–97 HIES survey data.

[5] While attempts could have been made to identify outliers on the basis of expenditures alone, as shown at the end of this chapter, expenditures reported by electricity generation companies are higher than those reported in the household surveys; hence, households with very high expenditures were not deleted.

million in 2001 (World Bank 2006). The last national census conducted in Pakistan, in 1998, reported a total population of 132 million. The population figures calculated from the surveys are incomplete because the 1993–94 HIES included only the four major provinces, and the 2001–02 PIHS did not include the FATA. Thus, the survey findings are not truly representative of the entire country. The share of the urban population declined slightly from 30 to 28 percent according to the survey findings, against 32.5 percent identified in the 1998 national census, despite the omitted areas in the surveys being predominantly rural. These comparisons give some indication of the surveys' limitations.

2.7 The total number of households increased by 4.4 million from 14.1 million to 18.5 million. Of this increase, 70 percent of additional households were in rural areas. Household expenditures are listed in nominal and real terms in Table 2.1. They include imputed costs of freely obtained goods (such as food, wood, housing) but exclude expenditures on durable goods. Between 1999 and 2001, expenditure per capita in urban areas fell even in nominal terms. In real terms, per capita expenditure fell slightly between 1994 and 2001, as did household expenditure between 1999 and 2001 in both rural and urban areas.[6] One noticeable feature of the data is a marked increase in the size of household between 1997 and 1999. This observed increase in household size is believed to be, in part, a result of different accounting procedures rather than an actual increase. The fall in per capita expenditure can in turn be explained partially by the recorded increase in household size, which was not fully offset by the increase in total household expenditure.

[6] There is evidence that the CPI might be overestimating the price index increase between 1999 and 2001 in Pakistan. Accounting for this overestimation would reduce the extent of decline in expenditures during this period.

Table 2.1: Population Statistics, by Survey Year

Parameter	*1994*	*1997*	*1999*	*2001*
Total Population	90,700,000	99,700,000	121,000,000	129,000,000
Urban Population	26,900,000	30,200,000	34,000,000	36,500,000
Percentage Urban	30	30	28	28
Rural Population	63,800,000	69,500,000	86,800,000	92,400,000
Percentage Rural	70	70	72	72
Total Number of Households	14,100,000	16,100,000	17,800,000	18,500,000
Number of Urban Households	4,100,000	4,700,000	5,100,000	5,300,000
Number of Rural Households	10,100,000	11,300,000	12,700,000	13,200,000
Per capita Expenditure [1]	672	919	1,054	1,046
Urban per Capita Expenditure [1]	860	1,132	1,407	1,365
Rural per Capita Expenditure [1]	596	830	912	918
Household Expenditure [2]	3,713	5,082	6,274	6,446
Urban Household Expenditure [2]	4,751	6,306	7,940	7,988
Rural Household Expenditure [2]	3,293	4,570	5,604	5,826
Consumer Price Index [3]	62.7	86.6	95.8	103.1
Adjusted per Capita Expenditure [4]	1,105	1,094	1,135	1,046
Urban per Capita Expenditure [4]	1,415	1,348	1,515	1,365
Rural per Capita Expenditure [4]	980	988	982	918
Household Expenditure [4]	6,106	6,052	6,754	6,446
Urban Household Expenditure [4]	7,814	7,510	8,547	7,988
Rural Household Expenditure [4]	5,415	5,443	6,033	5,826

[1] Nominal per capita expenditures in rupees per month.
[2] Nominal total household expenditures in rupees per month.
[3] The CPI is from World Bank)2006), calendar 2000 = 100.
[4] Monthly expenditures adjusted for the CPI with 2001 as the base year.

2.8 By way of comparison, statistics from other sources are given in Table 2.2. Monthly consumption per capita in this table is computed from gross domestic product (GDP) after subtracting investment, net government spending, and net exports, leaving the residual as consumption by final consumers. Per capita consumption figures differ from per capita expenditures obtained in household expenditure surveys for two reasons. First, the numbers in Table 2.1 do not include expenditures on durable goods. Second, there are measurement errors with both approaches. For example, the numbers in Table 2.2 show an increase in per capita consumption between 1994 and 2001, growing at an average of 5.6 percent annually in real terms. This growth is in part due to a 20 percent increase between 1999 and 2000, which would suggest a measurement error.

Table 2.2: Comparison Statistics from World Development Indicators

Calendar Year	*Urban Population % of Total*	*GDP per Capita (US$)*	*Monthly per Capita Consumption*[1]	
			Current Rs	*2004 Rs*
1990	31	371	487	1,385
1991	31	410	522	1,327
1992	31	428	619	1,438
1993	31	442	689	1,454
1994	32	435	775	1,455
1995	32	495	920	1,539
1996	32	505	1,027	1,556
1997	32	486	1,180	1,604
1998	33	473	1,222	1,565
1999	33	467	1,375	1,691
2000	33	531	1,721	2,027
2001	33	505	1,864	2,129
2002	34	493	1,886	2,085
2003	34	555	1,992	2,141
2004	34	632	2,226	2,226

[1] Total household consumption divided by total population
Source: *World Bank* (2006).

2.9 The number of people in each decile, split into urban and rural areas, is shown in annex 3. The number of households was fairly constant in rural areas across the 10 deciles, but in urban areas the number increased sixfold from decile 1 to decile 10. In all four surveys, there were more people in rural areas in each decile except the top decile for which the urban population exceeded the rural.

2.10 Monthly expenditures per capita as a function of expenditure decile are shown in Table 2.3. A corresponding table expressed in 2001 rupees is given in Table A3.2 in annex 3. There was a sixfold increase in expenditure per capita from decile 1 to decile 10 in 2001. Because household size decreases sharply with increasing expenditure per capita, the difference in household expenditure is much smaller—about threefold between decile 1 and decile 10. The decline in nominal expenditure per capita between 1999 and 2001 was observed only in the top decile, but this decile's contribution was sufficiently large to bring down the average. In real terms, the highest expenditure per capita across the four survey years was recorded in 1997 for the bottom seven deciles in both urban and rural areas. For the top three deciles, the highest expenditure per capita was in 1999, with the exception of the seventh urban and top rural decile, for which the highest expenditure was in 1997.

Table 2.3: Nominal Monthly Expenditure per Capita in Rupees

	1994			*1997*			*1999*			*2001*		
Decile	*National*	*Urban*	*Rural*	*National*	*Urban*	*Rural*	*National*	*Urban*	*Rural*	*National*	*Urban*	*Rural*
1	252	256	252	365	375	364	373	378	373	402	409	401
2	320	320	320	467	470	467	491	496	489	516	518	515
3	366	366	366	533	535	532	566	567	566	589	587	590
4	410	410	410	596	596	596	641	640	641	659	660	659
5	454	454	454	657	656	657	714	716	713	730	729	730
6	505	505	505	726	724	726	793	794	793	813	813	813
7	568	571	567	813	815	812	897	897	896	917	918	917
8	655	657	654	936	940	935	1,037	1,038	1,037	1,058	1,057	1,059
9	809	815	805	1,134	1,135	1,133	1,291	1,302	1,286	1,294	1,298	1,293
10	1,614	1,701	1,523	2,092	2,151	2,026	2,558	2,892	2,185	2,413	2,735	2,069
Total	672	860	596	919	1,132	830	1,054	1,407	912	1,046	1,365	918

Energy Use Patterns

2.11 Based on experience in other countries (ESMAP 2003a and 2003b), general observations may be made about household energy use in low-income countries with a large rural population and fairly abundant supply of biomass, as is the case in Pakistan. All households would prefer to use electricity for lighting, if electricity is available and affordable. Poor households may encounter financial problems trying to pay the connection fee. Kerosene is used as an alternative source of energy for lighting by households that are not connected to electricity and by other households during power outages, but kerosene is almost universally more expensive per unit of lighting. For cooking and heating purposes, free biomass, if available, tends to be used extensively in rural areas, even among high-income households and nearly universally by low-income households. Middle- and high-income households in urban areas prefer to use gaseous fuels—natural gas if available, and LPG otherwise—because of convenience and cleanliness.

2.12 If biomass has to be purchased but is cheaper than other fuels, the poor use biomass. Kerosene is used to start a fire from biomass (for cooking, for example); it is also used as a cooking and heating fuel. Kerosene is an intermediate fuel in that some households switch from biomass to kerosene before switching again to a gaseous fuel. Depending on relative fuel prices, however, a number of households switch directly from biomass to a gaseous fuel. Kerosene is not as clean or convenient as LPG or natural gas. As a result, if the price difference between a gaseous fuel and kerosene (per unit of usable energy) is not too large, those who can afford it would prefer a gaseous fuel. Cash-constrained urban households may use kerosene regularly as a cooking fuel because it, unlike LPG, may be purchased in small quantities—which, for example, makes it easier

for daily wage earners to lay out small amounts of cash (albeit frequently) to buy fuel—if biomass is not much cheaper.

2.13 As the foregoing suggests, households in developing countries use multiple energy sources for a variety of reasons—including the need to have backup fuels, varying availability of a given energy source, changing relative fuel prices, and fluctuating household income. In the very long run, as income rises, households eventually move up the so-called energy ladder to use only electricity and natural gas, or electricity and LPG if natural gas is not available, or electricity only, for all household energy needs. Near the bottom of the energy ladder are those households that use kerosene for lighting and biomass for cooking and heating. Throughout South Asia, households with no electricity connection usually use kerosene for lighting. Kerosene is effectively the only fuel with a "dual" purpose: it is used for both lighting and cooking or heating. LPG, natural gas, and biomass are used for cooking and heating. Although electricity can be used for cooking, such use of electricity is rare in South Asia. With rising income and expanding availability of modern commercial energy, the percentages of households using electricity, natural gas, and LPG rise; those using kerosene and biomass tend to fall. These generally observed patterns were found in Pakistan, with some exceptions.

2.14 The percentages of households in Pakistan using different energy sources are shown in Table 2.4. The table includes both purchased energy and freely acquired energy—energy given in kind or grown or collected by the household (mostly biomass). Although the four surveys asked about use of coal and charcoal, the numbers of households that reported consumption of these two fuels were so small they are not included in this report. The percentages of households using natural gas, LPG, and electricity rose between 1994 and 2001, while the percentage using kerosene declined. Electricity did not exhibit a steady increase; in fact, the percentage using electricity did not change much for the last three survey years, falling from 1997 to 1999 and then rising in 2001. Biomass use remained steady between 1994 and 2001. While fuelwood use declined some, dung use showed no sign of decline, even among urban households. The percentage of households using agricultural residues increased.

2.15 Because the number of households covered by the survey rises each year, electricity and natural gas connection can continue to expand and still show a drop in percentage coverage. As Table A3.3 and Table A3.4 in annex 3 show, there was an increase in the number of households using various energy sources with the exception of kerosene for which there was a steady fall, and fuelwood between 1999 and 2001. The number of urban LPG users fell by 0.1 million in 2001, but the number of urban natural gas users increased by 0.4 million. This finding would suggest that most new natural gas users were not previous users of LPG. The number of LPG-using households decreased more in urban areas than the corresponding increase in rural areas, resulting in a small net loss of about 40,000 between 1999 and 2001 when the LPG market was increasingly deregulated. There was an implicit price cap imposed by the government in 2001, as today, resulting in a supply shortage.

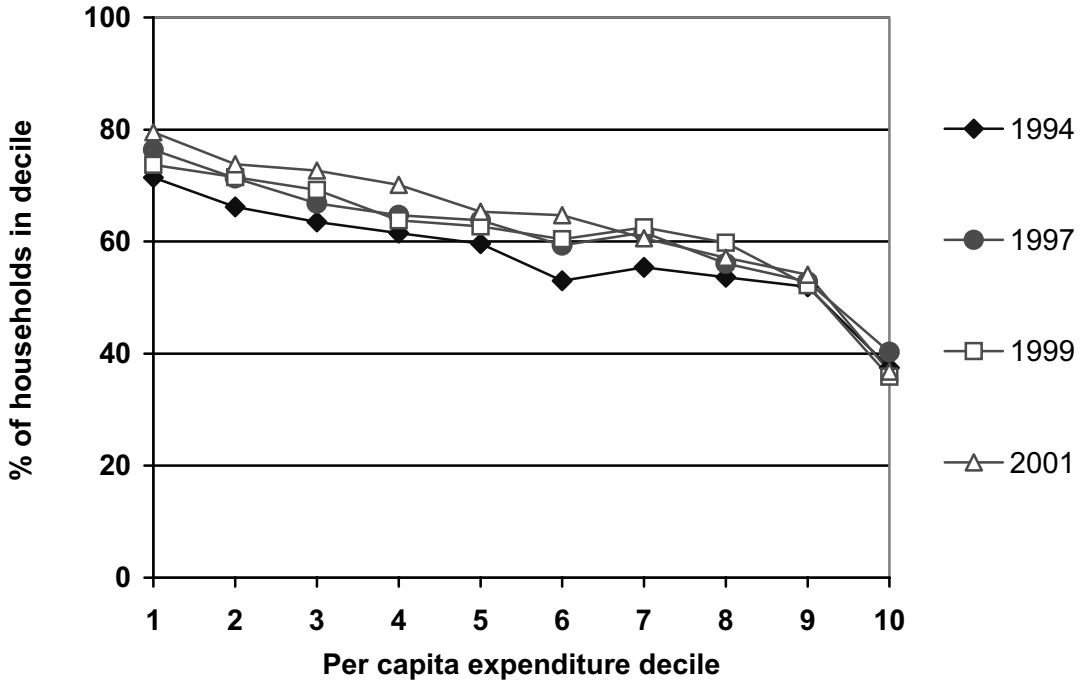
Table 2.4: Percentage of Households Using Different Energy Sources

Area and Survey Year	*Biomass*	*Wood*	*Dung*	*Agr Resid*[1]	*Electricity*	*Kerosene*	*Natural Gas*	*LPG*
National								
1994	78	63	29	21	68	64	15	4.1
1997	77	63	27	22	78	51	17.7	5.3
1999	77	63	31	20	73	45	17.4	8.6
2001	77	58	31	26	77	39	20	8.1
Urban								
1994	36	32	8.9	3.6	95	33	51	6.4
1997	31	29	7.1	3.3	97	26	57	7.3
1999	31	27	9.1	3.7	94	24	56	10.2
2001	31	25	8.8	5.2	96	14	62	8.1
Rural								
1994	96	76	37	28	58	77	0.5	3.1
1997	97	77	35	29	70	62	1.2	4.5
1999	95	77	39	27	65	54	1.8	8.0
2001	95	71	39	34	69	49	3.3	8.1

[1]Agricultural residue refers to bagasse, cotton sticks, sawdust, shrubs, weeds, tobacco sticks, and so on, used for fuel purposes.

2.16 As expected, the percentages of users and buyers are virtually the same for commercial fuels—electricity, kerosene, natural gas, and LPG—but quite different for biomass, for which free acquisition is common, especially in rural areas. The percentage of households using free biomass increased from 56 percent in 1994 to 61 percent in 2001. This is somewhat surprising, since economic development typically leads to declining availability of free biomass, while rising income enables households to switch to commercial fuels. Increasing uptake of free biomass might suggest declining cash income in real terms. Among the bottom three deciles, there was a steady increase in the percentage of households using free biomass with time. Predictably, use of free biomass was most common among the poorest 10 percent, but the difference between the rich and the poor was much more pronounced in urban areas. In 2001, for example, 37 percent of the bottom decile but only 4 percent of the top decile used free biomass in urban areas, in contrast to 83 percent and 72 percent for the bottom and top, respectively, among rural households. Figure 2.1 shows a breakdown of biomass use for each survey year by expenditure decile; annex 3 gives a breakdown of its use in urban and rural areas, and also examines fuelwood, dung, and agricultural residues individually.

Figure 2.1: Percentage of Households Using Free Biomass



2.17 In contrast to increasing use of free biomass, the proportion of households purchasing fuelwood declined from 27 percent in 1994 to 21 percent in 2001. The details are given in Figure A3.6 in annex 3. The decline was largest for the bottom decile, whereas there was an increase, if anything in the top decile. Among the urban population, the proportion of households purchasing fuelwood fell in every decile. Among rural households, the proportion fell sharply for the lower deciles—especially the bottom one—but increased for the top two deciles.

2.18 Because households use multiple energy sources, the prevalence of various energy-source combinations has relevance in policy making. The top four energy-choice combinations in each survey year are shown in Table 2.5. In this table, "kero-bio-elec" indicates, for example, that the household used only these three energy sources and no other. Similarly, "bio-kero" would mean that the household did not use any electricity, but only biomass and kerosene. The top five energy-choice combinations are shown by decile in annex 3 for each survey year.

Table 2.5: Number of Households in the Top Four Energy-Choice Combinations

	Top Choice	*Second Choice*	*Third Choice*	*Fourth Choice*
National				
1994	Kero-bio-elec	Bio-kero	Bio-elec	Gas-elec
# of Households	4,100,000	3,900,000	2,400,000	2,100,000
1997	Bio-elec	Kero-bio-elec	Bio-kero	Gas-elec
# of Households	4,300,000	4,200,000	3,200,000	2,800,000
1999	Bio-elec	Kero-bio-elec	Bio-kero	Gas-elec
# of Households	4,600,000	3,600,000	3,300,000	3,000,000
2001	Bio-elec	Gas-elec	Bio-kero	Kero-bio-elec
# of Households	6,000,000	3,600,000	3,400,000	2,900,000
Urban				
1994	Gas-elec	Kero-bio-elec	Bio-elec	Kero-elec
# of Households	2,000,000	780,000	430,000	280,000
1997	Gas-elec	Kero-bio-elec	Bio-elec	Kero-elec
# of Households	2,700,000	710,000	540,000	250,000
1999	Gas-elec	Kero-bio-elec	Bio-elec	LPG-elec
# of Households	2,800,000	630,000	550,000	270,000
2001	Gas-elec	Bio-elec	Kero-bio-elec	LPG-elec
# of Households	3,200,000	870,000	360,000	190,000
Rural				
1994	Bio-kero	Kero-bio-elec	Bio-elec	Biomass
# of Households	3,800,000	3,400,000	1,900,000	190,000
1997	Bio-elec	Kero-bio-elec	Bio-kero	LPG-kero-bio-elec
# of Households	3,800,000	3,500,000	3,100,000	220,000
1999	Bio-elec	Bio-kero	Kero-bio-elec	Biomass
# of Households	4,100,000	3,200,000	2,900,000	910,000
2001	Bio-elec	Bio-kero	Kero-bio-elec	Biomass
# of Households	5,100,000	3,200,000	2,600,000	620,000

2.19 Nationally, of the top four combinations, biomass appears in three out of four. Natural gas-electricity, representing the top of the energy ladder, moved from fourth place to second for the first time in 2001. To the extent that biomass-electricity is replacing biomass-kerosene, it seems to represent substitution of electricity for kerosene for lighting purposes, a positive step. But a large increase in the number of households using biomass-electricity and a fall in the number of those using kerosene-biomass-electricity is potentially worrying. If these changes represent a switch from kerosene-biomass-electricity to biomass-electricity because the number of hours of power outage had declined markedly and kerosene was no longer needed for lighting, this would mean progress. But if instead these changes represent households that were previously using

kerosene for cooking or heating and dropping it because of its rising price and reverting to biomass, this would be a socially undesirable consequence of price deregulation against the backdrop of rising international oil prices. More data would be needed to identify the cause of this shift in energy use combination patterns, and this is pursued qualitatively in chapter 3.

2.20 In urban areas, natural gas-electricity has been the leading household energy choice since 1994. Both urban and rural households steadily dropped kerosene from their fuel portfolio. There continued to be a large number of rural households that reported using only biomass and kerosene, although there was a net decline of 580,000 households in this category between 1994 and 2001. There was a net gain of 3.2 million households in the biomass-electricity category, and presumably some households that were in the biomass-kerosene category "graduated" to biomass-electricity. One worrying sign is that the number of rural households that reported using only biomass increased by 460,000 between 1994 and 2001. These households were presumably relying on candles and other means for lighting and minimizing the use of lighting. Surprisingly, biomass-electricity, the top combination among rural households, appeared at a nearly constant proportion in every decile, averaging 39 percent of all rural households in 2001. In contrast, this combination was predictably concentrated among lower deciles in urban areas. As expected, the natural gas-electricity combination dominated the upper decile urban households.

2.21 The historical progression of the uptake of electricity, natural gas, LPG, kerosene, fuelwood, and biomass in Pakistan as a function of expenditure decile is shown in Figure 2.2 and Figure 2.3. Figure 2.2, which illustrates the use of three types of modern commercial energy (natural gas, LPG, and electricity), shows the anticipated pattern of increasing uptake with increasing expenditure per capita. Conversely, Figure 2.3 shows that the use of "traditional fuels"—fuelwood as well as all biomass in general—tended to decline with increasing expenditure per capita, although fuelwood uptake in 2001 was nearly constant in the bottom nine deciles. Use of kerosene, which is an intermediate fuel, also declined with increasing expenditure per capita. Of the six forms of energy plotted in the two figures, kerosene uptake saw the largest change, registering a significant fall.

Figure 2.2: Historical Progression of Natural Gas, LPG, and Electricity Uptake

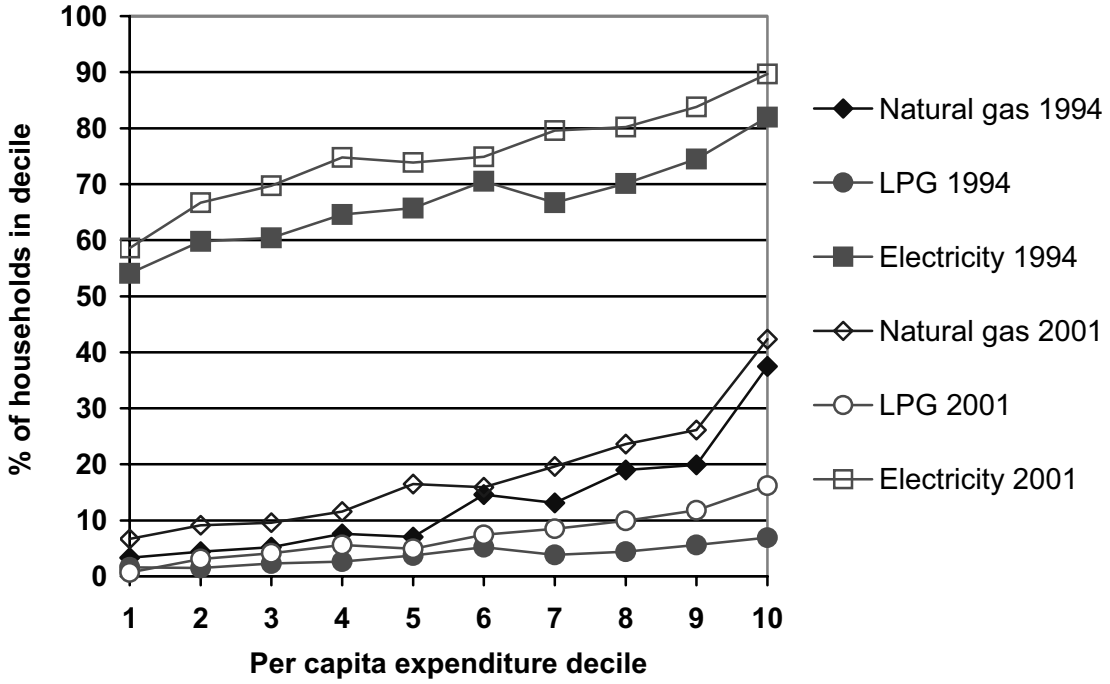
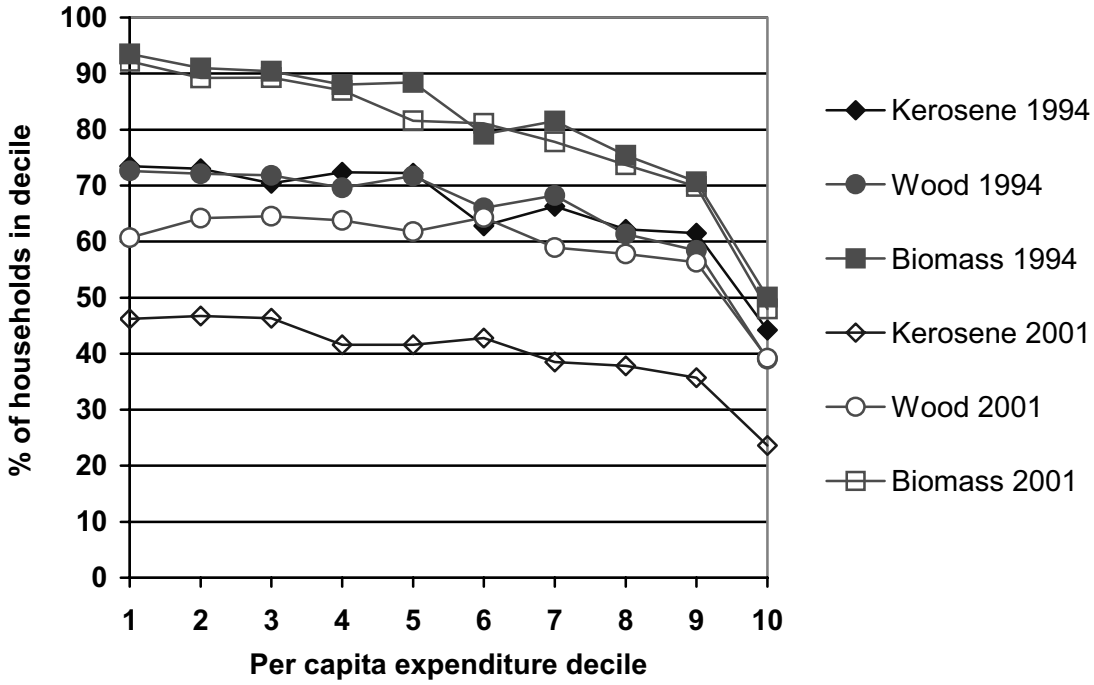


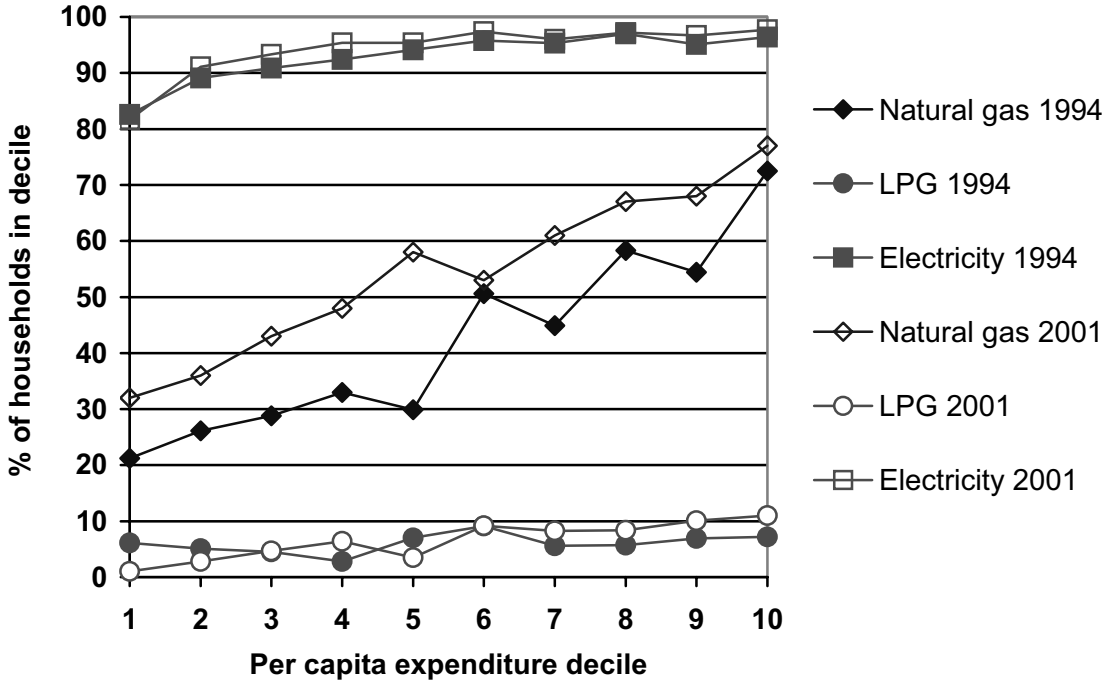
Figure 2.3: Historical Progression of Wood, Biomass, and Kerosene Uptake



2.22 Figure 2.4 and Figure 2.5 show the uptake of natural gas, electricity, and LPG in urban areas and of LPG, kerosene, and electricity in rural areas, respectively. Natural gas is typically not available in rural areas; in fact, those "rural" households

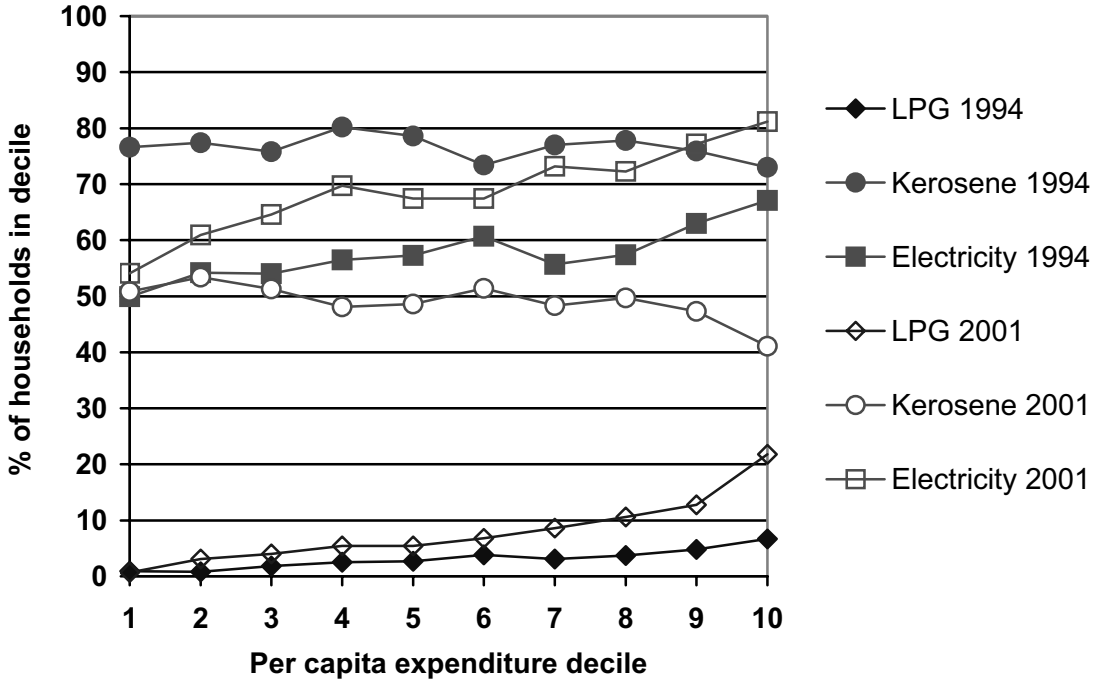
consuming natural gas in the surveys are effectively residing in peri-urban areas. Figure 2.4 shows that the percentage of urban households in each decile that used electricity remained essentially the same between 1994 and 2001. There was a marked increase in the percentage of urban households using natural gas in virtually every decile, but not much change in the uptake of LPG, which remained limited. In contrast, in rural areas, there was a considerable improvement in electricity connection except for the bottom two deciles and a measurable increase in LPG uptake among upper deciles, as shown in Figure 2.5. Kerosene uptake fell across all deciles.

Figure 2.4: Natural Gas, LPG, and Electricity Uptake in Urban Pakistan



2.23 Energy uptake figures say nothing about how much energy is being consumed. Unfortunately, reliable information on amounts of energy consumed is very difficult to obtain in standard household expenditure surveys. Specialized energy surveys with much more detailed questions are typically needed. International experience suggests that one exception is kerosene, for which household respondents appear to be able to recall how much they purchased and what they paid. Neither the HIES nor the PIHS collected information on amounts consumed for natural gas or electricity, but only on monthly expenditures.

Figure 2.5: LPG, Kerosene, and Electricity Uptake in Rural Pakistan



2.24 Table 2.6 shows how much LPG, kerosene, and fuelwood were consumed by households in a month in Pakistan as well as the computed prices for kerosene and LPG. In addition to the sharp price increase reported, the sudden drop in the amount of LPG consumed in 2001 might be partly due to the fact that the question on the quantity consumed was changed in the 2001–02 PIHS from "how many cylinders" to "how many kilograms" of LPG were consumed. The computed LPG prices had a relatively large coefficient of variation, on the order of 30 to 60 percent. The computed kerosene prices had a smaller coefficient of variation (10 to 25 percent), except in 1997 when the variation was very large. Computed prices were constant across all deciles except for LPG in 1997 and 1999, when these increased strongly with increasing decile. While LPG prices differed between rural and urban areas, rural households did not pay consistently more than urban. The computed kerosene prices were constant across all expenditure deciles with slightly higher prices in rural than in urban areas for all four surveys. Although the price difference between rural and urban households was small, this trend was consistent in every expenditure decile and every survey year. The computed prices were somewhat higher than the administered prices in effect at the time. One significant deviation is the LPG cylinder price in 2001; this is discussed in 2.26. Large standard deviations and prices that are strongly dependent on expenditure per capita are likely to indicate problems with the data.

Table 2.6: Amount Purchased or Consumed by Households per Month

Area and Survey Year	*LPG Cylinder Buyers*	*Rs/Cylinder*	*Liters Kerosene Buyers*	*Rs/liter Kerosene Buyers*	*Kg Wood, all Households*	*Kg Wood Users*	*Kg Wood Buyers*
National							
1994	1.3	105	4.5	7	76	121	98
1997	1.4	164	3.7	12	94	150	106
1999	1.7	150	3.7	13	87	139	111
2001	0.6	384	2.8	19	84	145	113
Urban							
1994	1.2	109	8.7	7	32	100	95
1997	1.5	174	8.0	12	33	113	107
1999	1.9	164	8.0	12	30	111	105
2001	0.8	379	5.5	19	31	120	110
Rural							
1994	1.4	103	3.8	7	94	125	99
1997	1.3	196	3.0	12	120	156	105
1999	1.7	142	3.0	13	110	142	114
2001	0.6	385	2.5	19	105	148	114

Notes*: LPG cylinder buyers = number of LPG cylinders purchased per month; Rs/cylinder = nominal rupees paid per cylinder; all households = averaged across all households; users = averaged across all users; buyers = averaged across purchasers only.*

2.25 In the case of kerosene, it is clear that not only the number of users but the amount consumed by kerosene-using households declined steadily. Fuelwood consumption, in contrast, appeared to increase. When averaged across all households, the quantity of fuelwood consumed did not decline between 1994 and 2001 despite declining percentage of fuelwood-using households. That said, the large increase in the amount of fuelwood consumed between 1994 and 1997 may reflect measurement errors, for example for 1994. If that were the case, the amount of fuelwood consumed actually declined from 1994 to 2001. Predictably, those who had access to free fuelwood consumed more than those who had to pay for wood.

2.26 In 2001, LPG cylinder prices were in the vicinity of Rs 200–250. In February 2001, the maximum LPG cylinder retail price was set at Rs 214 (Pakistan Press International 2001). In July 2001, LPG cylinder prices were about Rs 230–240 (Asia Pulse 2001). The computed price of Rs 384 is markedly higher. However, 75 percent of the 1,819 households that reported LPG consumption gave responses that corresponded to exactly Rs 30 per kg of LPG, or Rs 354 for 11.8 kg cylinder. There is no obvious explanation for this discrepancy. One-half of these households spent Rs 170 or less a month on LPG and consumed 5 kg or less. It is worth noting that LPG cylinder prices had

risen to a winter season peak level of Rs 525 by the beginning of November 2005 (*Dawn* 2005),[7] and even higher in mid-January 2006 (*Business Recorder* 2006).

2.27 The next two tables focus on cash expenditures, excluding energy sources given in kind or grown or collected by the household. Such an analysis may shed light on household cash expenditure patterns and constraints. Table 2.7 shows nominal, unadjusted monthly expenditures on electricity, natural gas, kerosene, LPG, fuelwood, and biomass by purchasers. Only those forms of energy obtained for cash are considered, and the results are averaged across purchasers only. The CPI increased 64 percent over this period. Expenditures on kerosene, LPG, and fuelwood increased at about the same rate or slightly less. Table 2.6 indicates that the price of kerosene rose faster than the CPI, but consumers reduced their consumption of kerosene, thereby mitigating the sharp increase in the kerosene price in financial terms. It is difficult to draw conclusions on LPG because of data problems, but expenditures on LPG increased at the slowest rate among the fuels cited. This would be consistent with a reduction in the amount of LPG consumed per household. As for fuelwood, consumption per household increased during this period while expenditures increased at a rate slightly less than that of the CPI, meaning that the effective price of wood fell.

2.28 The sharp rise in the amounts paid for electricity, followed by those for natural gas, is striking. Expenditures on natural gas rose at the same rate as the gas tariff, from which it follows that households were not consuming any more in 2001 than in 1994. Expenditures on electricity tripled between 1994 and 2001, more than the tariff increase. It appears that electricity consumption in kilowatt-hours per household increased between 1994 and 2001.

2.29 Higher expenditures are not a problem if income is rising even faster. Therefore, in addition to examining expenditure levels, it is informative to look at the percentage share of total household expenditure spent on various types of energy. Table 2.8 shows cash expenditures on various energy sources as a percentage of total household expenditure, averaged across purchasers only. This table thus reflects the combined impact of changing energy prices, amounts consumed, and changing total household expenditure. Recall that household expenditures increased at a slightly higher rate than the CPI. Expenditures on kerosene, LPG, and biomass increased at a rate comparable to, or slightly lower than, the CPI; hence, they maintained about the same percentage share across purchasers. The share of expenditures on electricity and natural gas increased over time because their expenditures rose much faster than the CPI.

[7] This coincided with the end of Ramadan, when more cooking fuels are used.

Table 2.7: Monthly Expenditure on Purchased Energy

Nominal Rupees Averaged across Purchasers

Area and Survey Year	*Electricity*	*Natural Gas*	*Kerosene*	*LPG*	*Wood*	*Biomass*
National						
1994	105	115	32	146	108	112
1997	163	153	40	218	146	148
1999	255	202	47	235	167	174
2001	318	237	53	230	174	182
Urban						
1994	149	115	59	149	109	113
1997	219	155	82	251	146	152
1999	342	202	95	278	167	173
2001	430	238	103	282	171	179
Rural						
1994	75	102	27	143	108	112
1997	130	103	32	196	145	147
1999	205	202	39	213	167	174
2001	255	229	47	209	175	182

Table 2.8: Purchased Energy in Pakistan

In Percentage of Total Household Spending, Averaged across Purchasers

Area and Survey Year	*Electricity*	*Natural Gas*	*Kerosene*	*LPG*	*Biomass*	*Total Energy*
National						
1994	2.5	2.1	1.1	3.3	3.8	4.0
1997	3.1	2.2	1.0	3.7	3.6	4.5
1999	3.8	2.5	1.0	3.0	3.4	5.0
2001	4.7	3.0	1.0	2.9	3.4	5.9
Urban						
1994	2.9	2.1	1.6	3.4	3.5	5.6
1997	3.4	2.2	1.8	4.0	3.5	6.2
1999	4.1	2.4	1.8	3.3	3.4	6.8
2001	5.2	2.9	1.8	3.5	3.4	8.0
Rural						
1994	2.3	2.2	1.0	3.3	3.9	3.4
1997	2.9	2.0	0.9	3.6	3.6	3.7
1999	3.7	2.9	0.8	2.8	3.4	4.3
2001	4.5	3.7	0.9	2.6	3.4	5.0

2.30 The last column in Table 2.8 reflects—in addition to changing prices, consumption, and total household expenditure—the percentage of households using different forms of purchased energy. The share of expenditure on all forms of purchased energy rose, with the increase coming from electricity and, to a lesser extent, natural gas. Although rural natural gas-consuming households had to increase the share of expenditures devoted to natural gas by close to 70 percent between 1994 and 2001, natural gas is used by only a small percentage of those households classified as residing in rural areas, and hence its impact on overall energy expenditures is small. In contrast, electricity is nearly universally consumed in urban areas, and its coverage in rural areas is rapidly expanding. That the rural cash expenditures on energy are dominated by electricity can be seen by comparing the percentage spent on total energy (5.0 percent) with that on electricity (4.5 percent).

2.31 From a policy perspective, it is important to examine energy expenditures averaged over all households, regardless of whether they consume a specific form of energy or not. This is because the impact of rising prices is not as serious if a given form of energy is consumed by a small fraction of the population, compared to one that is universally consumed. For an indication of overall effects of price changes, the data in Table 2.7 can be averaged across all households rather than only those that purchase energy; Table 2.9 shows these findings. Three factors can contribute to an increase when

expenditures are averaged across all households: (1) an increase in the percentage of households consuming the given form of energy, (2) an increase in the price of energy, and (3) an increase in the amount consumed. Several features of Table 2.9 are worth highlighting. Electricity dominates expenditures on energy, reflecting both relatively high expenditures and large uptake. Natural gas is the second largest expenditure in urban areas and, predictably, the lowest in rural areas. The largest increases between 1994 and 2001 are observed with electricity and natural gas, and the relative increase across years is larger here than in Table 2.7, reflecting growing connection rates.

Table 2.9: Nominal Monthly Household Expenditures on Purchased Energy

In Rupees, Averaged across all Households

Area and Survey Year	*Electricity*	*Natural Gas*	*Kerosene*	*LPG*	*OGE*	*Non-OGE*	*% OGE*
National							
1994	71	17	20	6	114	34	77
1997	125	27	20	12	183	37	83
1999	184	34	21	20	259	46	85
2001	239	47	20	18	325	45	88
Urban							
1994	139	59	20	9	227	35	87
1997	208	88	21	18	335	39	90
1999	314	111	22	28	475	41	92
2001	404	145	14	22	585	40	94
Rural							
1994	43	0.5	20	4	69	33	67
1997	90	1	20	9	120	37	77
1999	131	4	21	17	172	48	78
2001	173	8	23	17	220	47	82

Note*: OGE = oil products, gas, and electricity; non-OEG = biomass, coal, and charcoal.*

2.32 Table 2.10 shows the same data as Table 2.8 but averaged across all households. There is a marked increase in the percentage share of electricity in both urban and rural areas, and of natural gas in urban areas, reflecting both increasing tariffs and increasing uptake. These two sources of energy—particularly electricity—contribute to the overall increase in the percentage of total household expenditure spent on energy. The share of total energy in the table is comparable to data for India, where electricity, kerosene, and LPG prices continue to be subsidized. The 1999–2000 National Sample Survey in India shows that urban households spent on average 7.5 percent of total household expenditure on purchased energy, and rural households 4.1 percent; across all households, this averages out to 5.0 percent (ESMAP 2003a).

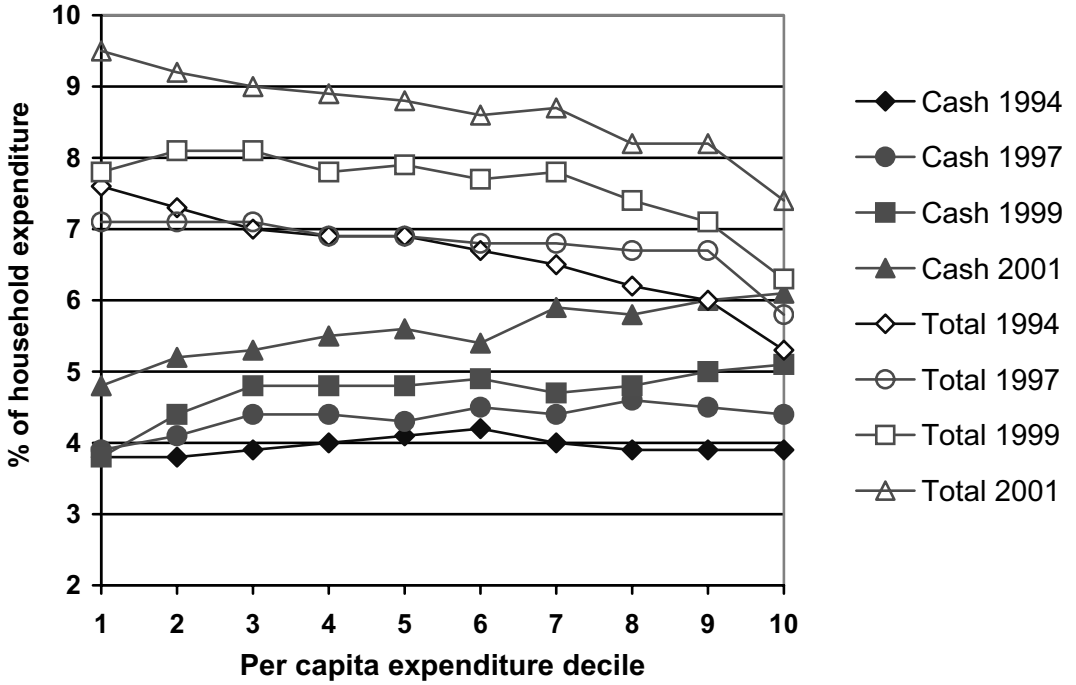
Table 2.10: Purchased Energy as Share of Household Expenditures

In Percentage of Total Spending, Averaged across all Households

Area and Survey Year	*Electricity*	*Natural Gas*	*Kerosene*	*LPG*	*Biomass*	*Total Energy*
National						
1994	1.7	0.3	0.7	0.1	1.1	4.0
1997	2.4	0.4	0.5	0.2	0.9	4.4
1999	2.8	0.4	0.4	0.3	0.9	4.8
2001	3.6	0.6	0.4	0.2	0.8	5.6
Urban						
1994	2.7	1.0	0.5	0.2	1.0	5.6
1997	3.2	1.3	0.5	0.3	0.9	6.1
1999	3.7	1.3	0.4	0.3	0.8	6.6
2001	4.9	1.8	0.2	0.3	0.7	7.9
Rural						
1994	1.3	0.0	0.7	0.1	1.1	3.3
1997	2.0	0.0	0.6	0.2	0.9	3.7
1999	2.4	0.1	0.4	0.2	0.9	4.0
2001	3.0	0.1	0.5	0.2	0.8	4.7

2.33 The foregoing results describe average effects on consuming as well as all households, but do not tell how different income groups have been affected. To probe this question, the following four figures show the share of different energy sources out of total household spending as a function of per capita expenditure decile, including natural gas in urban areas and electricity on account of their high contributions to rising household expenditures on energy. Figure 2.6 plots cash as well as total (inclusive of imputed and cash values) expenditures on energy as a percentage share of total household expenditure in each decile. The percentage share of expenditure on household energy, which is to a large extent an essential good, decreases with increasing household income when the total value of the energy consumed is considered. However, when only cash payments are considered, the expenditure on energy increases with increasing decile because the poor make greater use of cash-free biomass. This pattern is typical of developing countries where a large segment of the population has access to free traditional fuels. As long as the opportunity costs of obtaining cash-free fuels are very low because there are few or no income-generating opportunities for those currently spending time collecting or growing free biomass, it is difficult for commercial fuels to compete with traditional. The difference between total and cash expenditures is largest for the bottom decile for this reason. In terms of cash expenditure, the percentage share was essentially constant across deciles in 1994, but has been rising with increasing decile in recent years.

Figure 2.6: Energy as Share of Household Expenditures in Pakistan



2.34 The next three figures examine natural gas and electricity. Figure 2.7 and Figure 2.8 show the percentage share of natural gas and electricity, respectively, in urban areas averaged across all households. In the case of natural gas, there was little change over the years examined for the top decile but a large increase in the lower deciles, with the greatest increase observed for decile 5. As for electricity, the percentage share was nearly constant across the deciles and rose steadily with time. Figure 2.9 illustrates electricity in rural areas. The percentage share showed a rising trend with increasing decile.

Figure 2.7: Expenditure on Natural Gas in Urban Pakistan

In Percentage of Total Household Spending, Averaged across all Households

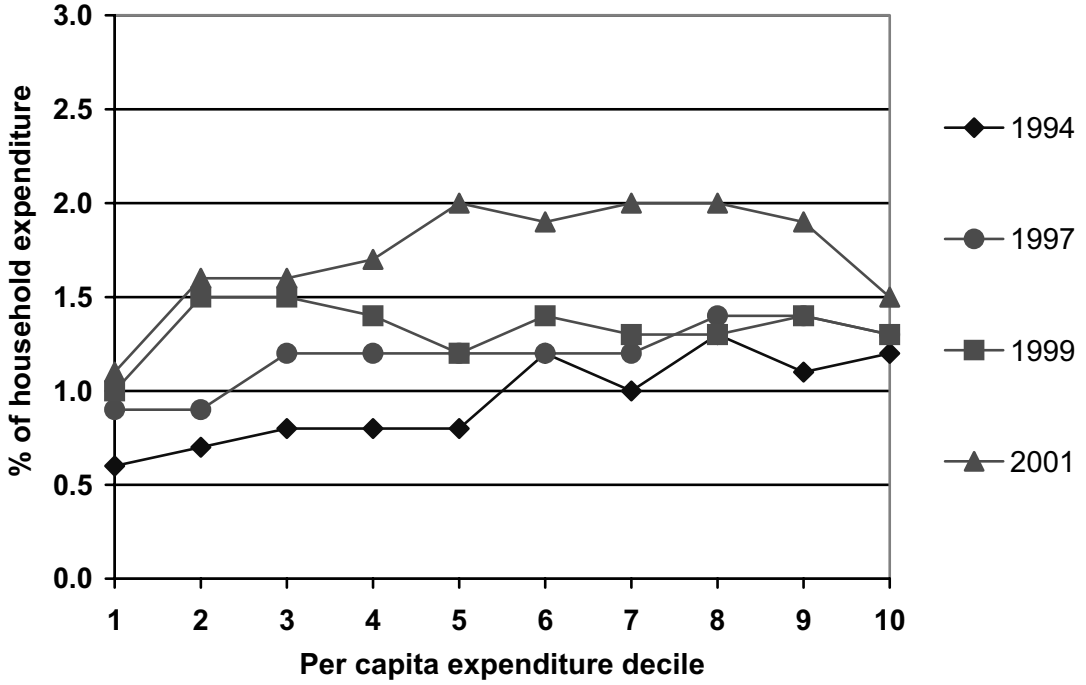


Figure 2.8: Expenditure on Electricity in Urban Pakistan

In Percentage of Total Household Spending, Averaged across all Households

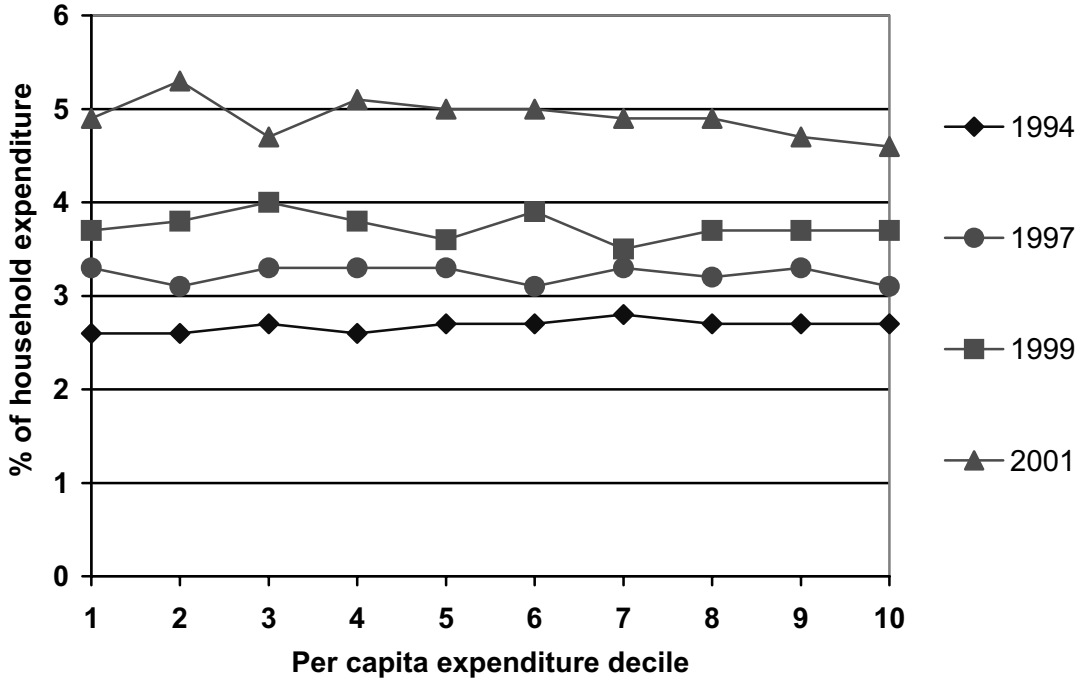
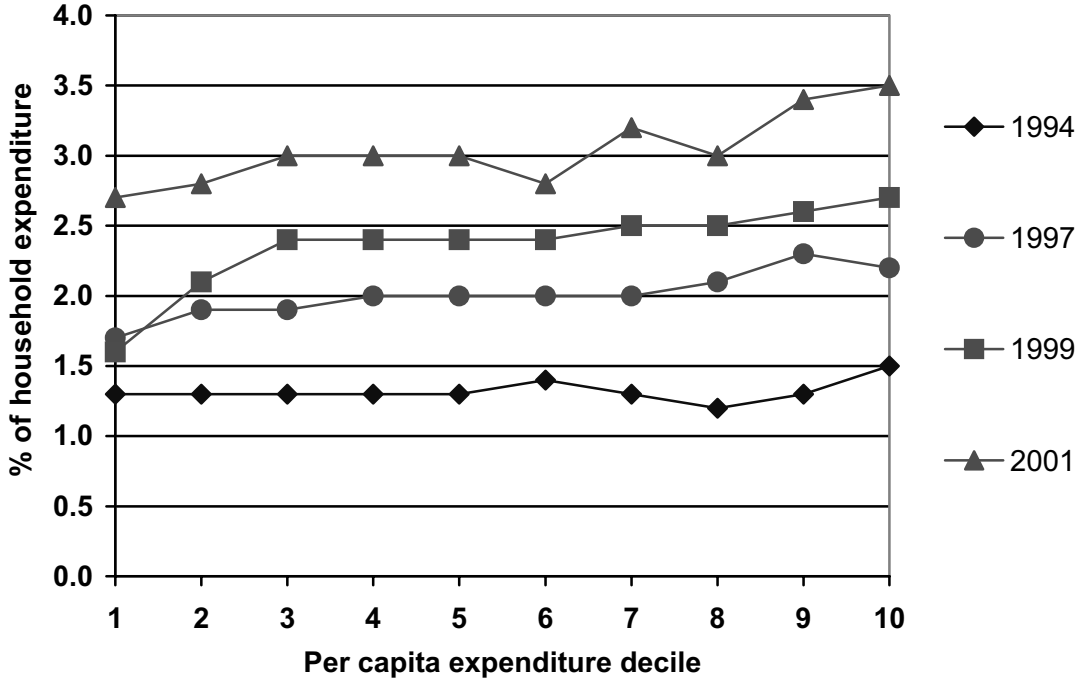


Figure 2.9: Expenditure on Electricity in Rural Pakistan

In Percentage of Total Household Spending, Averaged across all Households



Provincial Differences

2.35 The survey data were also analyzed by province. This analysis incurs statistical problems because of the smaller sample size. For example, for the 2001–02 PIHS, the sample size was 6,304 for Punjab, 3,702 for Sindh, 2,665 for the Northwest Frontier Province (NWFP), 2,023 for Balochistan, 634 for Azad Jammu and Kashmir, and 457 for the Northern Areas. Some results, such as the 1999 survey findings in Balochistan, looked decidedly odd (see annex 4 for details). This section briefly summarizes the differences between various regions and national averages; sample size limitations should be borne mind in interpreting this information. The details are given in annex 4.

2.36 Punjab, the largest province in the country, dominates the national trends described in the foregoing sections. It was slightly richer than the rest of the country on a per capita basis, but poorer on the basis of household expenditures in 1999 and 2001. In 2001, its rural population was richer and urban population poorer than the national average on a per capita basis.

2.37 Household uptake of fuelwood was markedly lower in Punjab than the national average, but the uptake of dung and agricultural residues was higher. The uptake of kerosene and LPG was also lower, but amounts consumed by purchasers were about the same. LPG users in Punjab paid higher prices than the national average in 1997 and 1999, both in urban and rural areas. If this is true (and not an artifact of data problems), this situation is quite different from the current LPG market. In the 1990s, a sizable

fraction of the LPG consumed in Punjab was supplied by coastal refineries. After the Parco refinery—located mid-country—came on stream in September 2000, the need for trucking LPG upcountry from Karachi was reduced considerably. The LPG supply and distribution chain in Punjab is more developed, and retail prices of LPG are today in keeping with retail prices in other major consumption centers. Expenditures on electricity, natural gas, and LPG by purchasers were higher, as were the corresponding percentage shares of total household income. Fuelwood consumption, reported in kilograms, was much lower than the national average, suggesting greater reliance on other fuels. The top four energy-choice combinations were essentially the same as the national ranking.

2.38 Sindh, the second largest province, is considerably more urban than the rest of the country, with 39 percent of its total population being urban compared to a national average of 28 percent in 2001. Sindh is the richest province when expenditures are averaged across the entire provincial population, but the rural population was significantly poorer than the national average by 2001. On the basis of household expenditures, the rural population was consistently poor and the urban richer.

2.39 The natural gas connection rate in Sindh was the highest in the country, and 80 percent higher than the national average in 2001. Correspondingly, the uptake of kerosene and LPG was much lower in Sindh than the national average among urban households. In fact, the LPG uptake was one-eighth the national average in 2001. The electricity connection rate, however, was lower in rural areas than the national average; conversely, kerosene uptake was higher. The uptake of biomass by households was lower than the national average, including less for dung and markedly less for agricultural residues in both urban and rural areas. Fuelwood uptake was lower among urban households but much higher among rural.

2.40 The top energy-choice combination was natural gas-electric for the province in all four surveys, reflecting a larger percentage of the urban population as well as higher natural gas uptake than in the rest of the country. In rural areas, however, the top combination was biomass-kerosene. An analysis of purchasers showed that expenditures on electricity and natural gas were lower than the national average, those on kerosene were about the same or slightly higher, and those on fuelwood were lower except in 2001. The kilograms of fuelwood consumed rose sharply between 1999 and 2001, both among users and averaged across all households. In 2001, there was a large difference in the price of LPG between urban (Rs 354 per cylinder) and rural (Rs 412 per cylinder) purchasers.

2.41 The NWFP is more rural than the rest of the country, with 15 percent of its population living in rural areas against the national average of 28 percent in 2001. Expenditures per capita were lower than the national averages in both urban and rural areas in four surveys. On the basis of household expenditures, rural households were slightly better off than the national average, but urban households were poorer in three out of four surveys. Despite a smaller percentage of households living in rural areas, the electricity connection rate in 2001 was no lower than the national average and, in fact, was as high as that in Sindh. The statistical limitations of provincial analysis should be borne in mind in interpreting this (somewhat unexpected) finding. The uptake of biomass, including fuelwood, was higher in the NWFP than the national average; uptake of

kerosene and LPG was much higher; and uptake of natural gas was much lower. The uptake of agricultural residues was lower. The uptake of biomass, fuelwood, dung, and LPG by urban households was higher than the national average, kerosene much higher, and natural gas much lower. The uptake of fuelwood, dung, and electricity by rural households was higher, kerosene and LPG much higher, and agricultural residues lower. That the uptake of LPG was considerably higher in rural areas compared to the rest of the country is surprising given lower rural expenditures per capita, and may reflect a sampling bias, as speculated at the end of this section.

2.42 The top energy-choice combination in Sindh was kerosene-biomass-electricity. Natural gas-electricity was not among the top four combinations in 2001, reflecting a rural bias. Purchasers paid less for LPG (in 1997 and 1999) and bought smaller quantities of kerosene. Fuelwood consumers (purchasers as well as those using free fuelwood) consumed more wood than the national average in each survey year. Expenditures on electricity were considerably lower, indicating much smaller consumption; expenditures on natural gas were higher. When expressed as a percentage share of total household expenditure averaged across all households, expenditures on electricity were not much lower than the national average due to higher connection rates. Expenditures on kerosene and natural gas were lower, but those on LPG, kerosene, and biomass were higher, resulting in overall percentages on energy being the same as or slightly higher than the national average.

2.43 Balochistan is also more rural than the rest of the country, with only 17 percent of its population living in urban areas in 2001. The province was poorer than the national average except in 1999, in which there appeared to have been serious data problems: household expenditures jumped from Rs 3,887 in 1997 to Rs 6,580 in 1999. The electricity connection rate in rural areas was much lower than the national average. The uptake of kerosene and LPG was higher and of natural gas was lower; LPG increased dramatically from 3 percent to 20 percent from 1997 to 1999, falling to 12 percent in 2001, again suggesting data problems in 1999. The uptake of biomass, including fuelwood, was much higher, and of dung and agricultural residues much lower. The top energy-choice combination was biomass-kerosene for all four surveys for the province as a whole, and gas-electricity in urban areas. The computed LPG prices seemed inconsistent, suggesting data problems with expenditures or consumption or both. Consumption of fuelwood in kilograms was greater than the national average, among purchasers as well as averaged across all households. The percentage share of total household expenditure on purchased energy, averaged across all households, was much lower for electricity and natural gas, higher for kerosene and biomass, and lower for total purchased energy, than the national average. The expenditures on energy among users were much lower on electricity, lower on LPG, and higher on natural gas and fuelwood, than the national average.

2.44 Only 10 percent of the population of Azad Jammu and Kashmir lived in urban areas in 2001. Averaged across the entire region, expenditure levels were about the same as the national average. The rural population, however, was richer. Household uptake of biomass was greater (but lower for dung and agricultural residues), as was the

uptake of kerosene and LPG. The electricity connection rate was much higher in rural areas than the national average. There was essentially no natural gas available.

2.45 The residents in the Northern Areas were poorer than the national average. Household uptake of biomass, kerosene, and LPG was higher, but that of agricultural residues lower, and there was essentially no use of dung or natural gas. Lastly, in the FATA, which was all rural, the uptake of biomass was much higher than the national average, of LPG greater, and of electricity much lower. The uptake of kerosene was virtually universal.

2.46 One possible explanation for the surprisingly high percentages of households using electricity (rural NWFP, rural Azad Jammu and Kashmir) and LPG (rural NWFP, rural Azad Jammu and Kashmir, rural Northern Areas, and the FATA) could be that the households sampled were not representative. This would arise, for example, if only areas with reasonably good road infrastructure were accessed for the surveys.

Comparison with Data from Utility Companies

2.47 The findings from the 2001–02 PIHS were compared with information on the payments collected for natural gas and electricity consumption by the utility companies and the numbers of customers connected. The utility companies provided data for calendar 2001.

2.48 The total number of households connected to natural gas was 3.3 million according to the data from the gas companies, and 3.7 million according to the household survey. Monthly household expenditure on gas was Rs 237 according to the 2001–02 PIHS, and Rs 284 according to gas company data. Table 2.11 compares the percentage of natural gas consumers who paid up to Rs 100 per month, between Rs 100 and Rs 150 per month, and so on, according to the 2001–02 PIHS and the amounts collected by the two gas companies. Consistent with higher average monthly bill collection, the gas company data are more skewed toward higher expenditures. This may be due in part to the practice of officially connected households to supply natural gas to their neighbors, as discussed in chapter 3; this would result in higher apparent monthly expenditures (which actually cover consumption by several households) by those who are officially connected and paying bills to gas companies.

Table 2.11: Natural Gas Payment Distribution for Calendar 2001

Monthly Expenditure in Rupees versus Percentage of Households

Data Source	*Rs 0–100*	*100–150*	*150–200*	*200–250*	*250–300*	*300–400*	*400+*
2001–02 PIHS	12	33	19	11	9	8	8
Gas Company Data	18	19	15	10	10	13	15

2.49 For electricity, data from the distribution companies were available for Punjab, Balochistan, and the NWFP, but not for Sindh. The numbers of households that paid for electricity and the average monthly expenditures or payments made are compared in Table 2.12. The number of households paying for electricity from the

household data is consistently higher, and conversely the monthly amount paid is consistently lower. The higher number of electricity-consuming households can be explained in part by secondary connections, amounting to some 18 percent in these provinces according to the differences in the numbers from the two data sources. When the average monthly expenditure is adjusted for secondary connections—by dividing the total revenue collected by the electricity distribution companies by the number of customers from the household survey data—the monthly payment remains higher by about 10 percent in Punjab and the NWFP than the average reported in the PIHS. It is lower by 15 percent in Balochistan. These differences are probably within measurement errors.

Table 2.12: Electricity Connections and Monthly Payments for Calendar 2001

Province and Data Source	*Number of Households Connected*	*Average Rs per Month per Household*
Punjab Utility Data	7 million	449
Punjab PIHS Data	8.3 million	334
Balochistan Utility Data	230,000	253
Balochistan PIHS Data	360,000	190
NWFP Utility Data	1.35 million	383
NWFP PIHS Data	1.75 million	269

2.50 A comparison of the distribution of monthly expenditures on electricity was made in Punjab and the NWFP using data from the gas companies and the 2001–02 PIHS. The results, given in Table 2.13, show that the household data are much more skewed toward lower expenditures than the electricity distribution company data. This finding is consistent with the lower average monthly expenditures reported in the PIHS. As mentioned earlier, this discrepancy may be explained in part by the practice of neighbors supplying electricity to others.

Table 2.13: Electricity Payment Distribution for Calendar 2001

Monthly Expenditure in Rupees versus Percentage of Households

Province and Data Source	*Rs 0–85*	*85–190*	*190–330*	*330–660*	*660–1,300*	*1,300+*
Punjab Utility Data	20.0	19.0	20.1	24.1	11.4	5.4
Punjab PIHS Data	26.5	40.7	21.9	8.7	1.8	0.5
NWFP Utility Data	24.3	21.2	22.5	20.4	7.8	3.8
NWFP PIHS Data	42.6	33.2	16.9	5.9	1.2	0.1

2.51 The PIHS data were analyzed to determine payment distribution by expenditure decile in calendar 2001. The results for all households using natural gas and electricity are shown in Table 2.14 and Table 2.15, respectively. Taking natural gas as an example, for each decile, the households that pay for natural gas were split into those that paid up to Rs 100 per month, between Rs 100 and Rs 150 per month, and so on. Shown in

the last column is the percentage of households in each decile that reported paying for natural gas.

Table 2.14: Monthly Natural Gas Expenditure Distribution

Decile	*0–100*[1]	*100–150*[1]	*150–200*[1]	*200–250*[1]	*250–300*[1]	*300–400*[1]	*400+*[1]	*All HH*[2]
1	20	31	20	13	4	6	6	6.6
2	12	40	15	11	13	5	4	9.0
3	15	25	24	14	9	6	7	9.1
4	17	34	20	11	6	8	4	11.5
5	12	36	17	13	10	7	5	16.3
6	10	32	18	12	12	7	8	15.6
7	14	30	22	9	6	10	10	19.3
8	14	35	15	11	9	9	7	23.2
9	13	34	22	10	8	8	6	25.8
10	12	38	19	9	8	6	8	41.5
Total[3]	12	33	19	11	9	8	8	19.8

[1] Percentage of households that paid for natural gas that spent the amount shown in rupees per month. Each row between "0–60" and "500+" adds up to 100 percent.
[2] . Percentage of households in each decile that paid for electricity.
[3] National average for electricity users.
Source*: 2001–02 PIHS.*

Table 2.15: Monthly Electricity Expenditure Distribution

Decile	*0–60*[1]	*60–100*[1]	*100–150*[1]	*150–200*[1]	*200–300*[1]	*300–400*[1]	*400–500*[1]	*500+*[1]	*All HH*[2]
1	22	25	21	15	11	4	1	1	57.3
2	26	24	19	13	13	3	2	1	65.6
3	23	24	22	13	11	4	2	2	68.0
4	19	28	22	14	10	3	2	2	72.9
5	22	25	18	12	13	5	2	2	72.7
6	20	26	20	13	12	4	3	2	73.1
7	18	23	24	15	12	3	2	2	78.4
8	22	23	21	13	12	5	2	3	79.0
9	23	24	18	13	12	5	3	4	82.1
10	17	23	20	14	11	5	3	6	88.1
Total[3]	21	24	20	13	12	4	3	4	75.3

[1] Percentage of households that paid for electricity that spent the amount shown in rupees per month. Each row between "0–60" and "500+" adds up to 100 percent.
[2] Percentage of households in each decile that paid for electricity.
[3] National average for electricity users.
Source*: 2001–02 PIHS.*

2.52 Table 2.14 shows that 20 percent of those in decile 1 that paid for natural gas paid less than Rs 100 per month. Nearly two-thirds of natural gas users spent less than Rs 200 per month. According to the tariff schedule in effect in calendar 2001, monthly consumption of 50 m^3 cost about Rs 150. Because the rate of natural gas connection is low among the lower deciles, the results do not have much statistical significance and contain large uncertainties. Bearing this limitation in mind, it is curious that there are no large differences in consumption patterns across deciles. One possible explanation is that lower income households are more likely to have secondary connections from their neighbors, paying more per unit of natural gas consumed.

2.53 Electricity has much higher connection rates than natural gas, and hence the results have greater statistical significance. According to the information provided by the electricity distribution companies, Rs 200, Rs 300, and Rs 400 per month in calendar 2001 corresponded approximately to monthly consumption of about 90–100 kWh, 120–140 kWh, and 160–180 kWh, respectively. Expenditures did not vary markedly among deciles up to Rs 400 per month. In particular, there is surprisingly little variation in the bottom seven deciles. The last category—those spending more than Rs 500 per month—showed a steady increase in percentage share of households with increasing decile, increasing sixfold from the bottom to the top decile, albeit starting from a very low base. Overall, even the top decile did not show a markedly skewed bias toward higher consumption. Although the prevalence of secondary connections among low deciles offers one possible explanation for limited variation across deciles, this finding calls for further investigation.

3

Focus Group Discussions and Interviews

3.1 Household surveys show that an additional 4.7 million and 1.6 million households, respectively, took up electricity and natural gas between 1994 and 2001. The number of households using kerosene fell during the same period by 1.9 million, the number of households using LPG increased by about 0.9 million, and the number of households using biomass increased by 3.1 million.

3.2 By their nature, household expenditure surveys do not provide information on the quality of energy service (reliability of electricity supply, power fluctuations, reliability of kerosene or LPG delivery, transaction costs of purchasing a particular fuel), nor reasons for household fuel choice. Discussions with household energy users are needed to answer these questions. From September 2004 to June 2005, 89 focus group discussions and 67 individual interviews were conducted in order to supplement the data provided by household surveys and utility companies, and to assess the impact of recent changes in the oil, gas, and electricity sectors. Individual interviews enabled the study team to hear views that might not be openly shared in group settings—for example, on potentially sensitive topics—and to pursue interesting leads to obtain more detailed information. While focus group members were entirely energy consumers, the individuals interviewed also included fuel suppliers and local leaders.

Site, Group, and Individual Selection

3.3 Focus group discussions were conducted in Punjab (September 2004–March 2005), Sindh (April–June 2005), and Balochistan (March–April 2005), and individual interviews in Punjab (October 2004–March 2005) and Balochistan (March–April 2005). The exact locations and characteristics of the groups and individuals are given in annex 5. The 89 focus groups consisted of 16 all-male and 16 all-female groups in Sindh, 20 all-male and 21 all-female groups in Punjab, and 8 all-male and 8 all-female groups in Balochistan. The 67 individuals interviewed—46 men and 21 women—consisted of 31 consumers (13 men and 18 women), 13 suppliers (5 LPG suppliers, 7 fuelwood suppliers, and 1 dung supplier, all male), and 23 local leaders (20 men and 3 women). Based on the observations of the interviewers and the known socioeconomic characteristics of the neighborhoods in which the participants lived, the groups were broadly categorized into three income groups:

- Lower low income, with an estimated average monthly income of Rs 7,000 for a family of approximately 6–8 persons
- Upper low income, with an estimated average monthly income of Rs 10,000 for a 6–8 member family
- Middle income, with an estimated average monthly income of Rs 15,000 for a 6–8 member family.

The geographical distribution of the focus groups and their estimated income status are given in Table 3.1. In terms of socioeconomic classification, 38 focus groups and 26 individuals were estimated to be from lower low-income, 31 focus groups and 27 individuals from upper low-income, and 20 focus groups and 14 individuals from middle-income households. All 20 of the middle-income focus groups were from urban areas and had access to electricity; all but one had access to natural gas. Among the individuals interviewed, none of the consumers, two suppliers, and more than half of the local leaders were from middle-income households.

Table 3.1: Geographical Distribution of Focus Groups and Individuals

	Sindh			*Punjab*			*Balochistan*		
Income Level	*Urban*	*Rural*	*Total*	*Urban*	*Rural*	*Total*	*Urban*	*Rural*	*Total*
Focus Groups									
Lower Low	2	12	14	0	17	17	1	6	7
Upper Low	10	4	14	8	3	11	4	2	6
Middle	4	0	4	13	0	13	3	0	3
Total	16	16	32	21	20	41	8	8	16
Individual Interviews									
Lower Low	—	—	—	5	12	17	3	6	9
Upper Low	—	—	—	10	6	16	8	3	11
Middle	—	—	—	8	2	10	4	0	4
Total	—	—	—	23	20	43	15	9	24

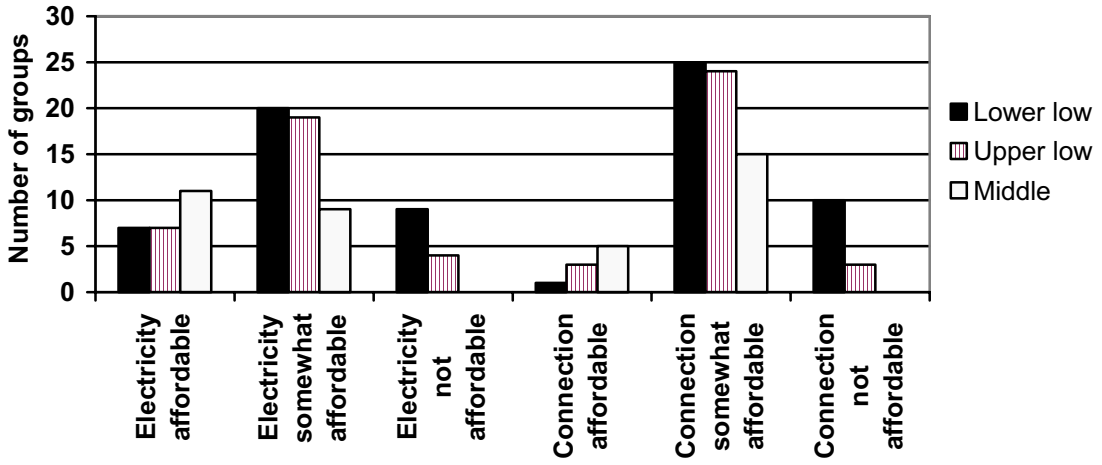
Note: — = *Not Applicable.*

3.4 Responses given to various questions were categorized into four categories: (1) yes, (2) to some extent, (3) no, and (4) not applicable. This chapter breaks down responses into the first three categories and omits those that were not applicable. In interpreting the results, it is important to bear the limitations of these discussions and interviews in mind. The small sample size seriously limited the utility of analysis by gender, income status, or province; subdivision into such groups all too often yielded only a few samples in each category. The results that follow should be taken to be qualitative, and should not be taken to be statistically significant.

Findings from Focus Group Discussions

3.5 Of the 89 focus groups, 86 had electricity. The responses to the questions on whether electricity tariffs and electricity connection fees are affordable are shown in Figure 3.1 as a function of the groups' socioeconomic status. As expected, affordability was associated with respondents' income levels. The majority considered both electricity tariffs and connection fees to be affordable or affordable to some extent, although some low-income groups indicated that they found it difficult to pay for either.

Figure 3.1: Affordability of Electricity

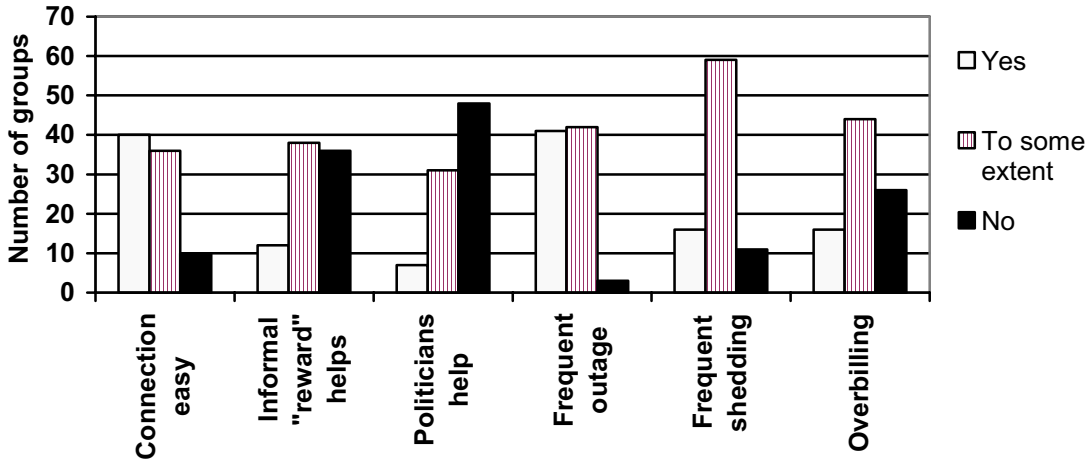


3.6 The participants were also asked the following questions with respect to electricity supply:

- Is it easy to get a connection to electricity? A "no" answer would mean that the sign-up procedure is lengthy and bureaucratic.
- Does it help to give an informal "reward" to power company staff to get an electricity connection in a timely manner?
- Have politicians helped bring electricity to your neighborhood; or alternatively, if you already have an electricity grid, have politicians helped improve the quality of electricity supply (fewer outages, less frequent load shedding)?
- Are power outages frequent?
- Is load shedding (scheduled outages that are announced in advance) frequent?
- Have you experienced overbilling for electricity?

The responses to the above six questions are summarized in Figure 3.2.

Figure 3.2: Electricity Supply Service



3.7 The connection procedure was reported by most to be neither lengthy nor bureaucratic. However, none of the groups in Upper Sindh replied that getting new electricity connections was easy. Giving an informal "reward" to service providers was said by some to speed up getting a new connection. Perhaps consistent with their response to the question on ease of obtaining a new electricity connection, none of the groups in Upper Sindh answered "no" to the question on whether giving an informal reward to service providers could facilitate getting new connections. Bringing in a new power line or natural gas pipeline is sometimes promised during election campaigns. Less than one-half of the focus groups said that politicians have helped bring electricity to the neighborhood or have improved the quality of the power supply.

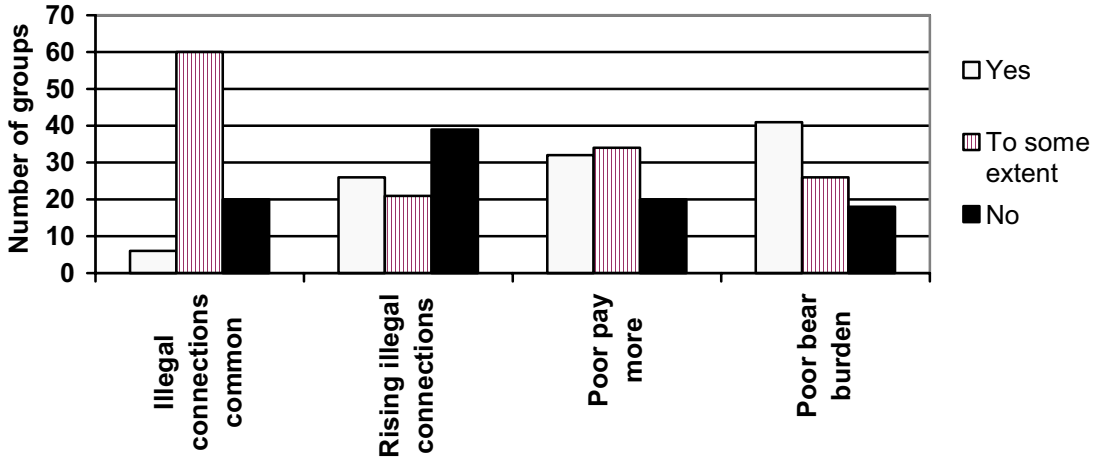
3.8 Nearly half of the focus groups reported that power outages were frequent. Many believed that they had been overbilled at times. Some participants showed high bills, apparently sent out by mistake or generated without proper meter reading. The groups in Upper Sindh in particular appeared to suffer from frequent power outages and load shedding as well as overbilling.

3.9 The participants were also asked the following questions with respect to illegal connections:

- Are illegal electricity connections relatively common (for example, at a frequency of about 15–20 percent)?
- Are illegal connections on the rise?
- Do the poor who are illegally connected to neighbors' electricity supply pay more for electricity than those who are legally connected?
- Do you believe that those who are powerful manage to bypass the system and not pay for electricity, and because the costs are passed onto consumers who pay, the poor end up bearing the burden disproportionately?

3.10 The results are summarized in Figure 3.3. About three-quarters of the groups said that illegal connections were common or somewhat common. About half believed that illegal connections were on the rise. The participants expressed strong negative reactions to illegal supply of electricity and to tampering with meters to reduce the electricity bill. Three-quarters replied that the poor who are illegally connected to electricity pay higher tariffs (to their neighbors, for example) than those who are legally connected. There appeared to be a fairly widespread perception that the rich and the powerful were able to make use of free electricity using their political influence, and that the poor ended up bearing the burden as a result of free-riders' costs being passed through to all paying electricity consumers. This perception was stronger among low-income households than middle-income groups.

Figure 3.3: Illegal Connections to Electricity

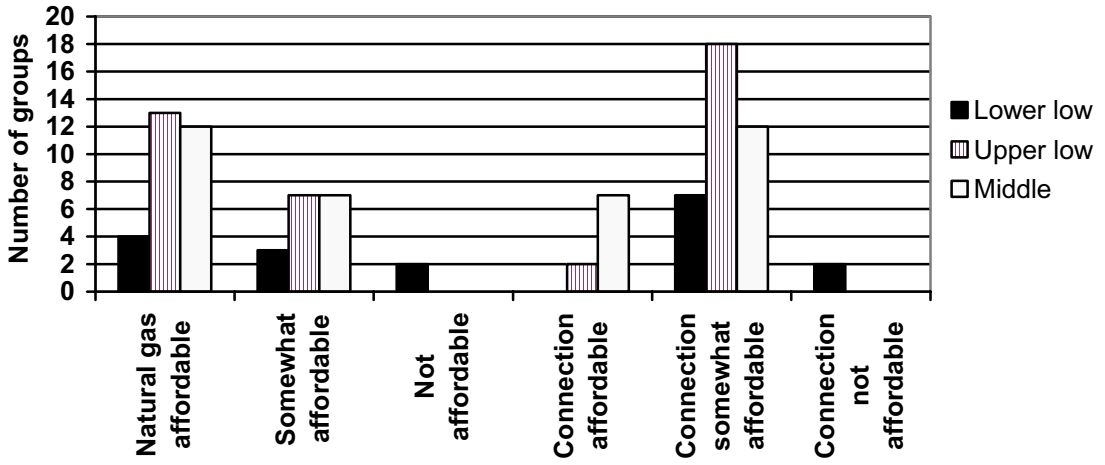


3.11 As expected, the respondents did not prefer or use electricity for space heating or heating water for the most part. Equally predictably, nearly all preferred and used electricity for air conditioning.

3.12 Forty-eight focus groups lived in neighborhoods with natural gas, nine of which were in rural areas. Natural gas was considered affordable by nearly all users. Some groups reported that they did not have access to natural gas but that the houses across the street did; these groups in particular expressed a strong desire to be connected to natural gas because they could observe the benefits of natural gas connection. Responses to questions on the affordability of natural gas tariffs and gas connection charges are shown in Figure 3.4.

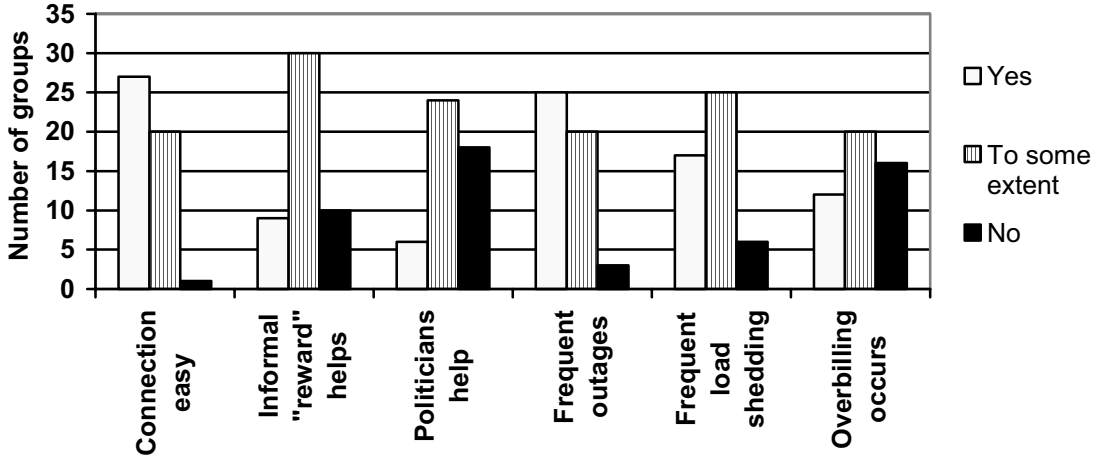
3.13 The poor who cannot afford the connection fee may resort to illegally tapping into neighbors' connections with their consent and pay these officially connected neighbors. One-half of the respondents said that illegal natural gas connections were common (4 percent) or common to some extent (46 percent). In some cases, people reported formation of a co-op, whereby one person obtained a gas connection from the gas supplier and extended the supply to several neighboring households. The majority did not think that the illegal supply of natural gas was on the rise.

Figure 3.4: Affordability of Natural Gas



3.14 The questions asked on the ease of obtaining a new connection, quality of supply, and overbilling for electricity were also asked about natural gas. The results are shown in Figure 3.5. Virtually no group said that obtaining gas connections was difficult in terms of procedure and process. Again, Upper Sindh was the only region where none of the groups said that getting a new gas connection was easy. But a greater percentage (79 percent) said that giving informal "rewards" to natural gas company staff facilitated, at least to some extent, obtaining a new connection, compared to 59 percent in the case of electricity. In particular, none of the groups in Lower Sindh and Balochistan answered "no" to this question. Similarly, a greater percentage (63 percent) said that politicians had helped, at least to some extent, in either bringing a gas pipeline to their neighborhood or improving the quality of gas supply; the comparable proportion for electricity was 44 percent. Nevertheless, the participants cited cases of politicians promising natural gas supply during election campaigns but not following up on the promise after winning the election. Overbilling was perceived to be equally common: 67 percent reporting that overbilling occurred for natural gas compared with 70 percent for electricity. Outages and load shedding were perceived to be more frequent for natural gas than for electricity. It should be mentioned that these are perceptions, and that in practice, outages and load shedding are much less frequent for natural gas. The frequency of natural gas outages were reportedly higher now than in the past, and people noticed them more. With regard to overbilling, one possible scenario is that a bill is issued one month without the service provider actually reading the meter, and in the following month the meter is read and the household is charged for gas consumption in that month plus any shortfall from the previous month. This is perceived as "overbilling" by some, who forget or fail to notice the underbilling of the previous month. The same applies to overbilling of electricity. The 10 groups in Lower Sindh who were using natural gas reported that load shedding was frequent and that they had experienced overbilling.

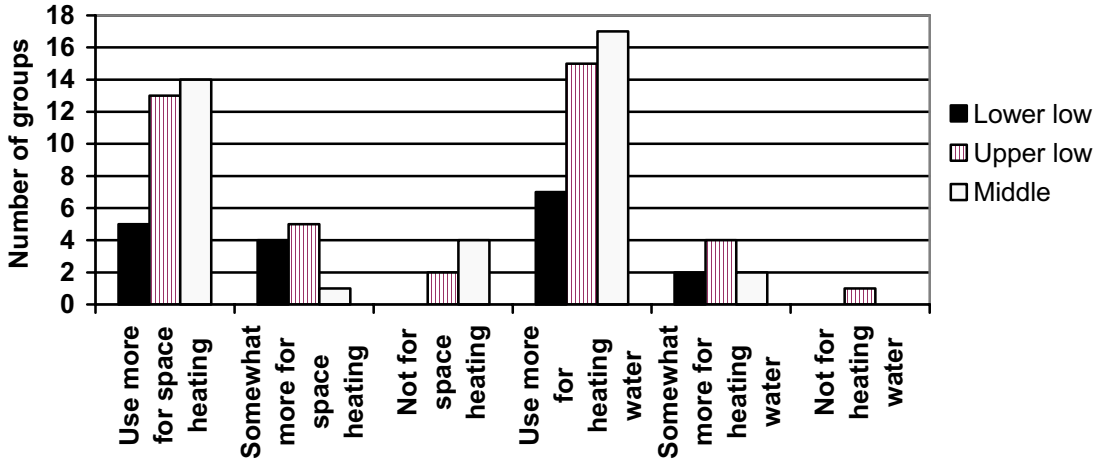
Figure 3.5: Natural Gas Supply



3.15 There were far fewer complaints about the illegal supply of natural gas than of electricity. Only two groups said that illegal supply was common or on the rise. Where the poor were illegally connected to natural gas, eight groups—none of which were from lower low income neighborhoods—thought that the poor ended up paying more for natural gas than if they were legally connected.

3.16 The participants were asked whether there was increased use of natural gas for space heating and for heating water. The results are shown in Figure 3.6. Virtually, all groups agreed that there was increased use of natural gas for space and water heating.

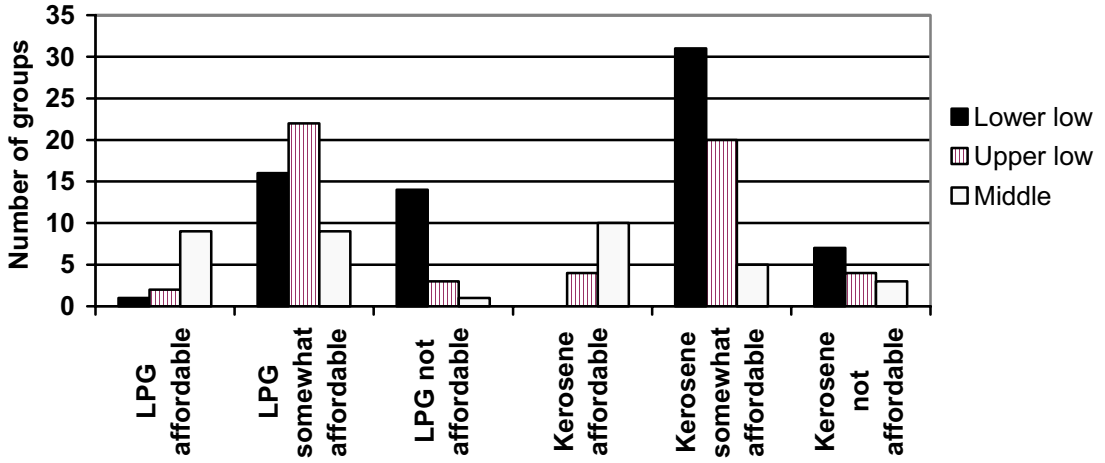
Figure 3.6: Use of Natural Gas for Space and Water Heating



3.17 Seventy-four focus groups lived in communities where LPG refill facilities were available, and 84 in communities where some households were using kerosene. Perceptions regarding the affordability of these two fuels are illustrated in Figure 3.7. Among those who said that these fuels were not affordable, all the middle-income groups in this category were in urban areas. The response presumably reflects cost competitiveness of natural gas compared to LPG and kerosene—namely, it is much

cheaper to use natural gas—and not that kerosene and LPG were inherently too expensive for this income category.

Figure 3.7: Affordability of LPG and Kerosene

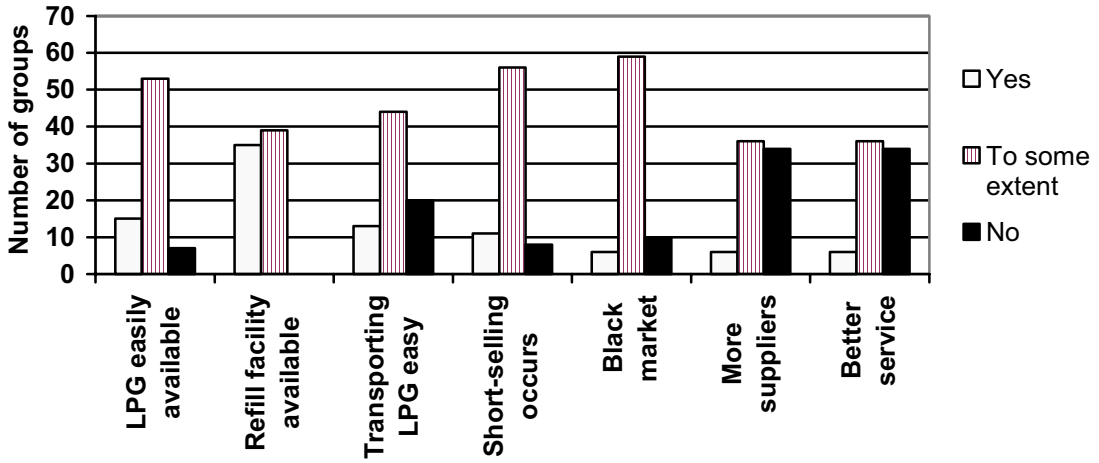


3.18 A number of questions were asked about LPG supply:

- Is LPG easily available most of the time?
- Is there an outlet for obtaining cylinder refills in this neighborhood?
- Is it easy to transport LPG cylinders from the retail outlet to your house?
- Does short-selling (underfilling of LPG cylinders) occur?
- Is there a black market for LPG in times of tight supply; that is, do prices rise exorbitantly at times?
- Are there more suppliers of LPG today than in the past?
- Has the quality of LPG supply service improved on account of increasing competition?

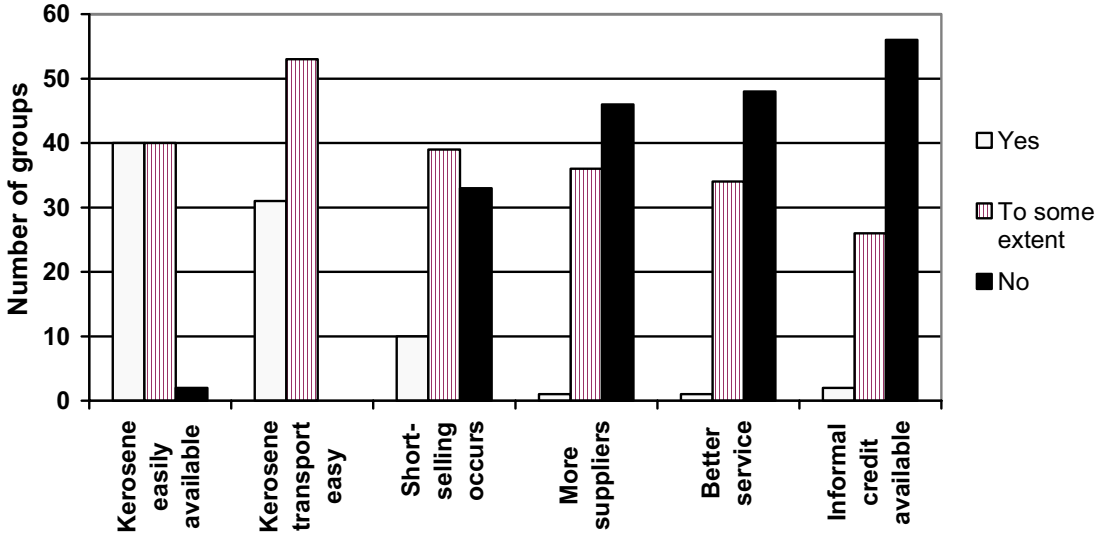
3.19 The responses are given in Figure 3.8. As expected, LPG was more easily available in urban areas than in rural. If there is no free home delivery of LPG cylinders, consumers have to make their own arrangements for taking empty cylinders to the nearest refill outlet and returning home with the refilled cylinders. Because LPG cylinders weigh some 15 kg, those who do not have easy access to transport vehicles or are not connected to refill outlets by tar roads find it difficult to carry LPG cylinders back and forth. This is one barrier to the uptake of LPG, especially in rural areas where road conditions are poorer. Most respondents replied that transporting LPG cylinders entailed some difficulties. Predictably, rural focus groups reported greater difficulties with LPG transport than urban ones; only one rural group said that LPG transport was easy. Short-selling was said to occur often or to some extent, as did sharply increasing LPG prices in times of supply shortage (described as selling LPG on the black market). The answers to the questions on short-selling and the black market did not differ between urban and rural areas. More than half of the focus groups replied that there was some improvement in the number of suppliers and quality of service, but not markedly so.

Figure 3.8: LPG Supply



3.20 The same questions were asked of kerosene, and the results are shown in Figure 3.9. Because kerosene can be sold in smaller quantities, it is easier to transport than is LPG. The focus groups indeed indicated that transporting kerosene was manageable. They also seemed to indicate that short-selling of kerosene was less frequent than that of LPG. Many more respondents said that there was no marked increase in the number of suppliers, or in the quality of service due to greater competition, than in the case of LPG. If, however, the number of kerosene consumers is declining, as the findings of this study suggest, then a market response to such a trend would be a decline rather than an increase in the number of kerosene suppliers. Figure 3.9 also shows participants' response as to whether informal credit for purchasing kerosene was available. About one-third replied that there was some type of informal credit. A comparable percentage said that some type of informal credit was available for LPG purchase also.

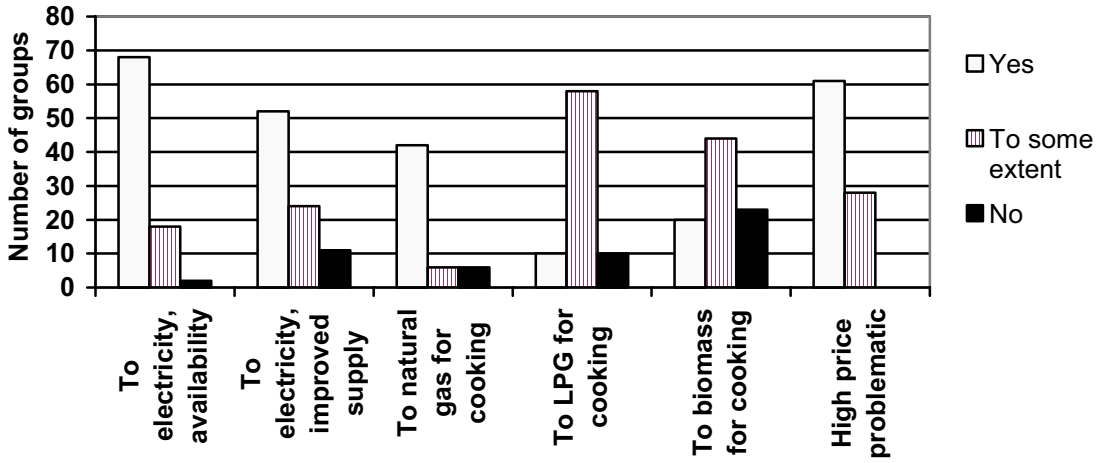
Figure 3.9: Kerosene Supply



3.21 The household expenditure survey analysis showed that kerosene consumption was on the decline. Questions were asked to probe the pattern of fuel switching from kerosene to other energy sources. The questions asked are listed below; results are given in Figure 3.10:

- Is the use of kerosene for lighting declining because more houses are connected to electricity?
- Is the use of kerosene for lighting declining because of improved electricity supply; for example, fewer hours of power outage in aggregate?
- Is kerosene use for cooking declining because some households are switching to natural gas?
- Is kerosene use for cooking declining because some households are switching to LPG?
- Is kerosene use for cooking declining because some households are switching to biomass?
- Is kerosene use for cooking declining because the price of kerosene has been rising?

Figure 3.10: Switching Out of Kerosene



3.22 The two groups that replied that households were not switching from kerosene to electricity on account of greater connection rates lived in neighborhoods with no access to grid electricity. Of the 11 groups that answered "no" to the second question, one had no power grid in the neighborhood, four noted that power outages were frequent, and one reported that neither kerosene nor electricity was affordable.

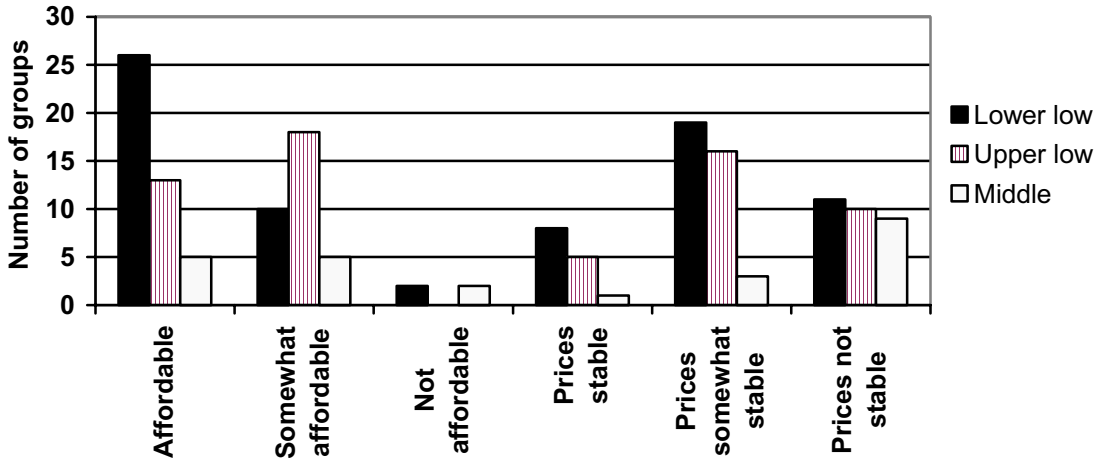
3.23 With regard to fuel switching for cooking, the "no" answers could represent quite different scenarios. In the first instance, for households to be switching out of kerosene for cooking, they would have to have been using kerosene as a cooking fuel some time in the past. If they had not done so, they could also have provided a "no" answer (although the correct answer in that case would have been "not applicable"). Kerosene can impart the smell of a petroleum fuel to the food being cooked, and consequently is not favored for certain types of cooking. If households are currently using

kerosene for cooking, a "no" could mean that they are continuing to use kerosene for cooking, or they are switching out of kerosene but to a fuel other than that stated in the question. The six groups that said that households were not switching to natural gas did not have access to natural gas. Of the 10 that said that households were not switching to LPG for cooking, 8 had access to natural gas. Of the remaining two, one group did not have access to LPG, and the other considered LPG unaffordable. Of the 23 groups that said that households were not shifting to biomass for cooking, 21 had access to natural gas. The remaining two, which had no easy access to LPG, reported that biomass was affordable.

3.24 The answer to the last question—is kerosene consumption declining because of rising price—was not entirely expected. As a function of socioeconomic class, the lower low-income groups were most likely to say "to some extent" (92 percent) instead of "yes" (8 percent), while the middle-income groups unanimously said "yes." Among the upper low-income groups, 71 percent said "yes," and the remaining 29 percent said "to some extent."

3.25 Biomass—fuelwood, dung, crop residues, and even sawdust—is widely used in rural areas. Many rural households have access to free biomass, but they have to supplement the supply with purchased biomass from time to time. Figure 3.11 shows the focus groups' answers to whether or not purchased biomass is affordable and its prices stable. The two middle-income groups that said that biomass was not affordable had access to natural gas. Of the 30 groups that said that biomass prices were not stable, 18 were in urban areas and 12 in rural. Predictably, a much greater proportion of rural groups than urban ones said that biomass was affordable.

Figure 3.11: Affordability of Biomass



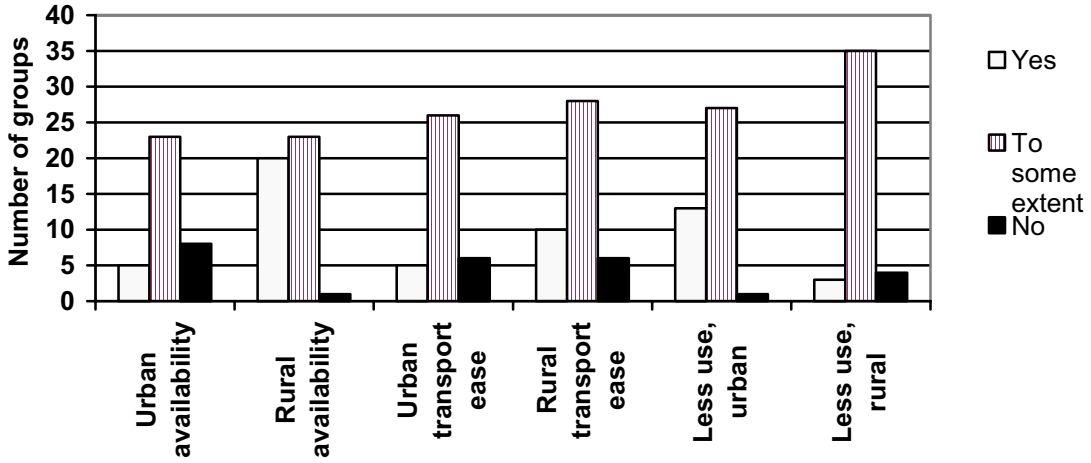
3.26 Answers to the following questions are shown in Figure 3.12, split into urban and rural groups:

- Is biomass readily available?
- Is it easy to transport biomass from the site of purchase or collection to your house?

- Is biomass use declining?

Predictably, biomass was more readily available in rural areas, and a greater percentage of urban groups said that less use was made of biomass today than in the past.

Figure 3.12: Ease of Biomass Purchase and Consumption



3.27 The following questions concerning biomass use patterns were asked, and answers are summarized in Figure 3.13:

- Do you prefer biomass for space heating?
- Is there increased use of biomass for space heating?
- Do you prefer biomass for heating water?
- Is there increased use of biomass for heating water?
- Is fuelwood use declining in favor of natural gas?
- Is fuelwood use declining in favor of LPG?

A surprising number of groups preferred biomass for space and water heating, and noted increased use. To a large extent, this may merely reflect the lower cash outlays required to use biomass.

3.28 Lastly, the focus groups were asked questions about the cleanliness, convenience, efficiency, health effects, time-saving features, and other attributes of different energy sources. The responses regarding cleanliness and convenience are shown in Figure 3.14 and Figure 3.15. The results are as expected, with electricity and natural gas being considered clean and convenient, kerosene less so, and biomass the least clean and convenient.

Figure 3.13: Use of Biomass

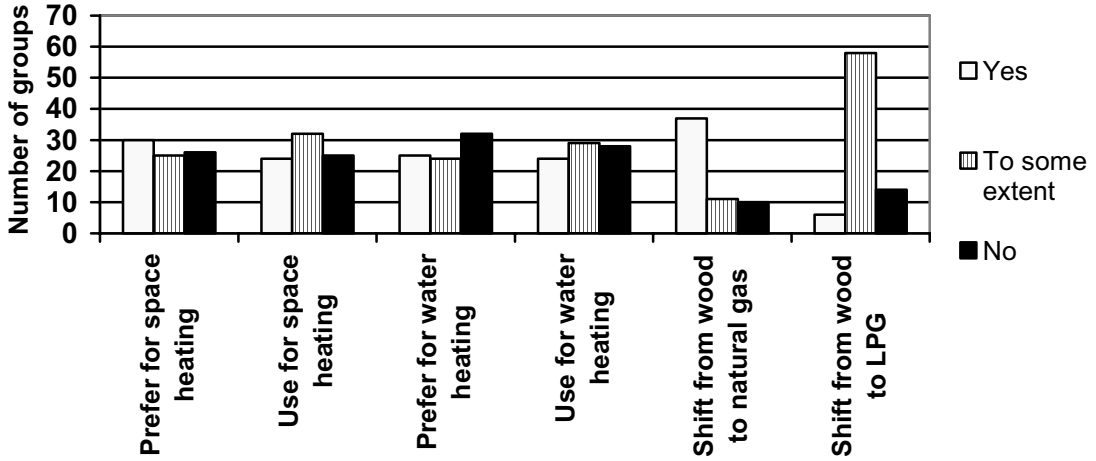


Figure 3.14: Are Energy Sources Clean?

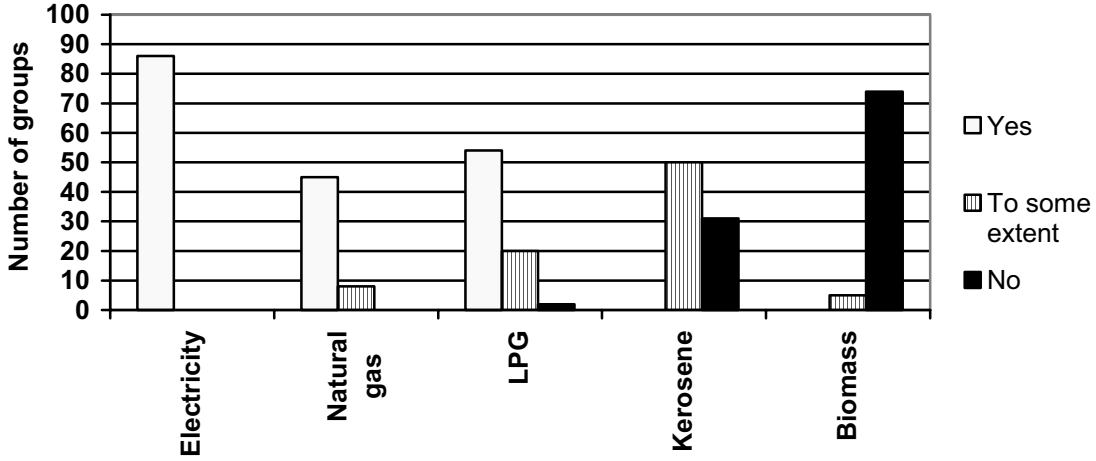
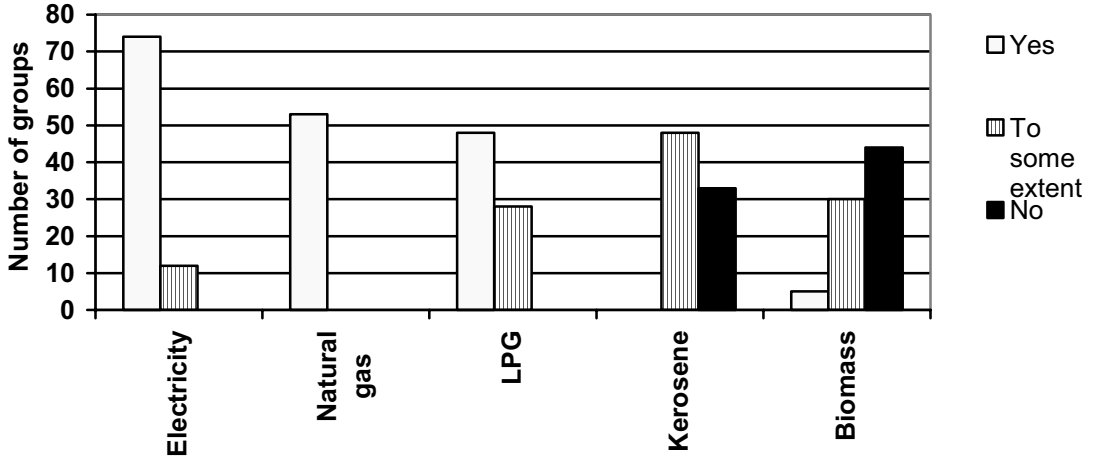


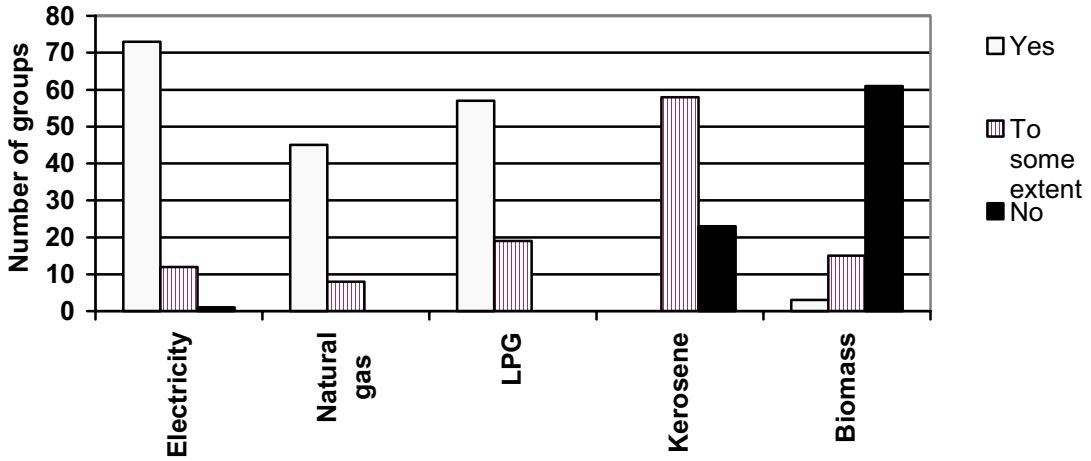
Figure 3.15: Are Energy Sources Convenient?



3.29 Questions were also asked about the impact of different fuel use (but not biomass) on the health of women and children. Natural gas was universally regarded as having a positive impact on health. Kerosene, in contrast, was regarded as having only a limited positive impact or no positive impact on health; no group answered "yes" to the question, "Does kerosene have a positive impact on women's (or children's) health?" The answers given were not the same for women and children, presumably reflecting differences in the duration of exposure to smoke. The cleaner the fuel, the more positive the impact on women's health; conversely, the dirtier the fuel, the more damaging. LPG was considered to have a more positive impact on women's health than children's, kerosene was considered less damaging to children's health than to women's. Answers to the question on whether a given fuel saves women's time was as expected—natural gas was universally regarded as saving time, LPG slightly less so, and kerosene much less. Because men are less involved in cooking in Pakistan, they might be expected to be less aware of the effects of fuel use on health, the time-saving nature of some fuels, or each fuel's cleanliness. But the results showed that there was essentially no gender difference in the responses.

3.30 In terms of efficiency, while the answers broadly tracked the expected trends—electricity and gaseous fuels are efficient, kerosene less so, and biomass the least efficient of all—there were a few exceptions. Some considered biomass to be efficient for certain purposes. For example, boiling milk using dung is considered "efficient" because it enables slow boiling and thickens milk, resulting in a taste favored by many.

Figure 3.16: Are Energy Sources Efficient?



Findings from Individual Interviews

3.31 Perceptions of affordability were similar between individual interviews and focus groups, with the exception of electricity. A far larger percentage of individuals than of focus groups said that electricity was affordable (63 percent versus 29 percent replied "yes"). Questions about the affordability of electricity and natural gas connection were not asked in individual interviews. Most responses were comparable between individual interviews and focus groups.

3.32 One interesting question is whether LPG suppliers saw the state of the LPG market differently from the others. Responses to the questions concerning the LPG market are shown in Table 3.2. It is important to bear in mind that the sample sizes were small, particularly for LPG suppliers who numbered only five. Therefore, the results should not be over-interpreted. The views of the LPG suppliers and those of the others are essentially the same. In particular, the LPG suppliers did not think that short-selling was less frequent, or that the quality of service had improved, any more than the rest of the sample.

Table 3.2: State of LPG Market

Question	*Interviewee*	*Mean*	*Standard Error*	*95% Confidence Interval*
Is LPG Affordable?	LPG Suppliers	2.0	0.0	2.0–2.0
	Rest of Sample	2.1	0.1	1.9–2.2
Is LPG Easily Available?	LPG Suppliers	2.0	0.0	2.0–2.0
	Rest of Sample	2.0	0.1	1.8–2.1
Are there Refill Outlets in this Community?	LPG Suppliers	1.6	0.4	0.5–2.7
	Rest of Sample	1.7	0.1	1.5–1.8
Are there more Suppliers of LPG today?	LPG Suppliers	2.2	0.2	1.6–2.8
	Rest of Sample	2.6	0.1	2.4–2.7
Has the Quality of LPG Service Improved as a Result of Greater Competition?	LPG Suppliers	2.2	0.2	1.6–2.8
	Rest of Sample	2.1	0.1	2.0–2.2
Does Short-selling of LPG Occur?	LPG Suppliers	1.8	0.2	1.2–2.4
	Rest of Sample	1.8	0.1	1.7–2.0
Are LPG Prices Stable?	LPG Suppliers	3.0	0.0	3.0–3.0
	Rest of Sample	2.7	0.1	2.6–2.9

Note: *"Yes" is 1, "to some extent" is 2, and "no" is 3. All answers are weighted equally.*

3.33 A similar analysis was conducted with respect to the seven fuelwood suppliers. All the response averages were within 0.1 of each other when quantified in the same manner as in Table 3.2, with the exception of switching from biomass to LPG and the convenience of biomass use. The average score for fuel switching from biomass to LPG was 1.8 for biomass traders against 2.1 for the rest of the sample. This could merely reflect local market conditions. The average score for whether biomass is a convenient fuel was 1.9 for biomass traders against 2.2 for the others.

3.34 Another interesting question is whether local leaders had different perspectives on community-wide issues from the other participants. To investigate this point, answers to the following questions were analyzed by income status after separating the total sample into local leaders and the rest. The responses were also compared to those from focus group discussions:

- Is it easy to get an electricity connection?
- Does giving informal "rewards" to electricity company staff speed up electricity connection?
- Do politicians help bring power supply to the community or improve the quality of supply?
- Are illegal electricity connections on the rise?
- Is it easy to get a natural gas connection?
- Does giving informal "rewards" to natural gas company staff speed up gas connection?
- Do politicians help bring a natural gas pipeline to the community or improve the quality of gas supply?
- Is there a black market for LPG in times of tight supply?

3.35 The differences in responses to the above questions are shown in Table 3.3. The table describes (1) the differences between responses of local leaders and those of other individuals interviewed, and (2) the differences between responses of focus groups and individuals interviewed.

Table 3.3: Responses from Different Groups

	Local Leaders versus Others	*Individual Interviews versus Focus Groups*
Electricity		
Easy Connection	No Difference	57% of focus groups said no, 12% said yes; 70% of individuals said yes, no individual said no
Giving Informal "Rewards" to Service Providers Helps	Local leaders more likely to say that informal rewards helped; the higher the income, the more likely an individual was to say that informal rewards helped	Focus groups much more likely to say no, especially among middle-income groups
Politicians Help	No Difference	Focus groups more likely to say no
Rising Illegal Connections	No Difference	No Difference
Natural gas		
Easy Connection	Local leaders thought getting a new connection was more difficult	Focus groups thought getting a new connection was more difficult than the individuals interviewed
Giving Informal "Rewards" to Service Providers Helps	Local leaders less likely to say that informal rewards helped	Individuals more likely than focus groups to say that informal rewards helped
Politicians Help	No Difference	No Difference
LPG		
Black Market Exists	Local leaders less likely to say that black marketing of LPG occurred	Focus groups slightly more likely to say that black marketing of LPG occurred

Observations

3.36 The focus group discussions and individual interviews found, perhaps predictably, that responses tended to be more closely correlated with the respondent's estimated income level than with gender or other characteristics. Natural gas was universally described as the cheapest, most efficient, and most convenient fuel. Some respondents had switched to natural gas only a few months earlier and reported that, at about Rs 200 per month, they were able to realize significant fuel cost savings; this included some respondents who had previously purchased fuelwood. People also indicated a willingness to pay a premium for supply reliability and convenience, two benefits of natural gas.

3.37 Many noted that electricity connections were quicker and that there was less load shedding than in the past, although some in remote areas reported higher frequency of load shedding than a few years ago. Some voiced the opinion that load shedding was in part due to illegal tapping of electricity, making cost recovery by utility firms more difficult. High electricity bills solicited a number of comments, and the poor found it especially difficult to pay for electricity. Some also complained about the burdensome process of paying utility bills through banks.

3.38 The existence of illegal connections to electricity or natural gas was acknowledged by many. The practice of connecting neighbors—who might otherwise find it difficult to pay the connection fee—to electricity or natural gas without approval was partly a result of *mohallaydari* (neighborly obligations). It was not unusual, however, to hear complaints of overcharging on the part of the neighbor who is officially connected. This seemed to happen in small towns or peri-urban neighborhoods. In one focus group, more than a dozen participants turned out to be buying natural gas informally from the same household. They complained of overcharging and speculated that the officially connected household might even be getting natural gas for its own consumption for free, cross-subsidized by the households informally supplied by it. There was quite a bit of resentment against the rich, who were believed to use their political influence to bypass the system and obtain free electricity.

3.39 Kerosene was widely available, and its use did not entail the same level of transport difficulties as LPG or fuelwood. However, its consumption was falling because of its high price, increasing availability of electricity (for lighting), and increasing access to natural gas and—in some cases—LPG. Of those who responded to the question of whether kerosene had a positive impact on women's health, 53 percent of focus groups and 32 percent of individuals replied "no." There was reportedly some short-selling of kerosene, further increasing the effective price of that fuel.

3.40 LPG was increasingly available, but door-to-door delivery seemed to occur only in certain urban locations. Transporting LPG to refill cylinders posed a challenge. Because the same-day turnaround of an empty cylinder could not be guaranteed, households needed to have either two cylinders or a backup fuel. Many, especially in rural areas, supplemented LPG with other fuels. Short-selling was more serious for LPG than for kerosene. Based on the number of cylinders the respondents said were needed, it was estimated that 15 to 18 kg of LPG would be needed per month per

household if it were not supplemented by other fuels. However, if underfilling of LPG was common, the amount of LPG effectively consumed would be lower. One interesting observation was that, because cooking with LPG was quicker, mothers could prepare breakfast quickly and children could get to school on time. One woman said that she used LPG to cook breakfast for this reason.

3.41 As expected, biomass remains widely popular in rural areas. Transporting bulky biomass posed a challenge, however. The composition of biomass used as a household fuel was very much location-specific. One rural group in Rawalpindi said that cash-free fuelwood was plentiful and dung was used as a natural fertilizer. Dung is a suitable cooking fuel for certain traditional dishes as well as for boiling milk. Biomass is the most commonly used fuel in rural areas for use in *tandoors*, which are bread-baking ovens. In addition, several respondents mentioned that slow heating and cooking by biomass meant that the family gathered around the stove in the cooking area at night and chatted, something that did not happen with more convenient fuels. But most rural people said they would rather switch to modern clean fuels if they could.

3.42 The poor tend to use any fuel that is cheap or free. A representative from one household said that they were using paper and cardboard packaging materials for bicycles for cooking and heating because these waste materials were available for free. During a field visit, the study team observed an application of sawdust that enabled slow burning and even heating for many hours. This application was said to emit less smoke, but the level of smoke appeared to depend on the nature of sawdust; others said that combustion of sawdust was smoky. Much fuelwood is given in kind by farmers to their laborers. If farm laborers' family members marry, farmers are often expected to give a *rukh* (an entire tree, used to cook feasts).

3.43 The affordability of biomass reported in this chapter refers to that of purchased biomass. As expected, the price of fuelwood varied widely, from Rs 40 to as high as Rs 200 for 40 kg. Households might spend Rs 40 to Rs 400 a month on fuelwood. Prices of dungcake could be anywhere from Rs 10 to Rs 80 per 40 kg, averaging around Rs 40–50. One dungcake supplier said that a family of five might spend about Rs 360 per month, although this seemed like a high estimate.

3.44 The adverse impact on health of solid biomass use appeared to be well known. One local leader reported that three women in his village, all professional bakers, lost their eyesight on account of what he believed was high exposure to smoke. Interestingly, one dungcake supplier said that the better-off believe that the smoke from fuelwood or dung combustion discolors the paint in their houses, and for this reason they preferred LPG.

3.45 The time-consuming nature of fuelwood collection and the impact on children's education was mentioned by many. In rural areas, it was reported that school attendance drops immediately after a storm, because parents ask their children to go out and collect branches that have fallen on the ground. Aside from taking children's time away from attending school and studying, fuelwood collection is tiring and children have less energy to concentrate on studies afterward.

3.46 Members of low-income households that have switched from biomass to LPG said that the pressure on their budget was great. Those who switched from biomass to natural gas were usually happy and handled the transition with relative ease. Electricity as a share of household expenditures is particularly high in summer, and a number of respondents reported feeling stress as a result. For a poor household with a monthly income of Rs 7,000, Rs 500 from monthly consumption of 175 kW of electricity and another Rs 500 from using one LPG cylinder (or 15 liters of kerosene at Rs 33 per liter) would amount to 14 percent of monthly income being spent on energy—a very high percentage. Switching to natural gas would help considerably, because non-electricity energy expenditures can be cut back to Rs 200, but high (relative to income) electricity bills remain. The views expressed by respondents were consistent with these observations. To put this in perspective, however, quite a number also said that school fees concerned and worried them more than electricity bills. People had some control over electricity bills because consumption could be cut—one family reported moving the entire family to the same room to sleep in summer to save on electricity consumption for air conditioning—but they had no control over school fees.

4

Conclusions

4.1 This study examined the changing patterns of household energy use in Pakistan between 1994 and 2001, and conducted group and individual interviews to obtain qualitative information from September 2004 to June 2005. World oil prices nearly doubled between January 2004 and August 2005, but consumers in Pakistan were shielded from the increase to some extent because the government adopted a policy of not entirely passing along price through to consumers and began capping prices in 2004. Between May 1, 2004, and November 1, 2005, Arab Gulf kerosene and diesel prices rose 69 and 75 percent, respectively, whereas the increases of the ex-depot sale prices of these two fuels were limited to 37 and 53 percent, respectively, in Pakistan (MPNR 2005). Although a portion of electricity is generated from fuel oil, the price of which increased more than 70 percent since November 2003, electricity tariffs were frozen during this period.

4.2 Households faced energy price increases that far outstripped general inflation during the four survey periods. The CPI increased 64 percent between calendar 1994 and calendar 2001. During the same period, prices calculated from responses recorded in the survey data increased 270 percent for LPG (although the price in 2001 seemed markedly higher than the price announcements at the time) and 160 percent for kerosene. The average natural gas tariff for households increased 110 percent; the residential electricity tariff for those who consume more than 50 kWh but less than 100 kWh per month increased 100 percent.

4.3 At the same time, natural gas and electricity connections were steadily being extended to new households, and LPG also became more widely available. Rising electricity coverage reduced the need to use kerosene for lighting, although kerosene lamps might still be used during power outages. Households generally responded to higher kerosene prices by cutting back on consumption—enabled in part for some households by newly acquired electricity connections—or by dropping kerosene altogether. In contrast, households did not cut back on consumption of electricity or natural gas; if anything, they may have consumed more electricity with time.

4.4 Against the backdrop of fast-rising commercial energy prices, the percentage of households making use of free biomass increased between 1994 and 2001. The increase occurred in both urban and rural areas. The increase in the rate of uptake was greater in urban areas, although the uptake rate among rural households in 2001 was

more than sevenfold that among urban households. As expected, the increase in the uptake of free biomass was greater among the poor than among the non-poor, although, curiously, the greatest increase occurred in the sixth decile. The uptake of free fuelwood increased from 1994 to 1997, remained the same between 1997 and 1999, and then fell in 2001. The uptake of free dung and agricultural residues increased. In contrast, the uptake of purchased fuelwood fell some between 1994 and 2001, with the poor registering the greatest decline. In 2001, about one-fourth of households in both urban and rural areas were purchasing fuelwood. When the bottom three deciles were examined, the uptake rate in 2001 was 50 percent (decile 3) to 200 percent (decile 1) higher in urban areas. This is consistent with the greater availability of free biomass as well as greater cash constraints on households in rural areas.

4.5 One disturbing trend was the increasing number as well as percentage of households using only biomass and electricity or only biomass. In 2001, 32 percent of all households used only biomass and electricity, including 10 percent of the top decile. Their average monthly household expenditure was Rs 5,690, 12 percent below the national average; they spent an average of Rs 250 per month on electricity. To the extent that the biomass-electricity combination replaced biomass-kerosene, progress was made. A switch from kerosene-biomass-electricity to biomass-electricity is more difficult to interpret. If kerosene was used primarily during power outages and there were fewer power outages in 2001 than 1994, eliminating the need for kerosene as a backup fuel for lighting, then this would again represent progress. But if the reason for dropping kerosene was that it became too expensive to be used as a cooking or heating fuel, such a move would represent a socially undesirable—if not unavoidable—consequence of petroleum price liberalization against the backdrop of rising fuel prices. Although conducted several years after the last available survey, focus group discussions indeed indicated that substituting kerosene for biomass in cooking was occurring. A seemingly large increase in the percentage and number of households using only biomass is also of concern.

4.6 Household expenditure surveys showed that natural gas and electricity were two energy sources for which households were willing to pay. Both sources were regarded as convenient, clean, and efficient. Analysis suggested that users of electricity and natural gas did not cut back on monthly consumption in response to rising tariffs. By far the greatest expenditure was on electricity: Rs 320 per month on average, compared to Rs 240 on natural gas, Rs 230 on LPG, Rs 170 on fuelwood, Rs 100 on dung, and Rs 50 on kerosene, all averaged across purchasers of each fuel in 2001.

4.7 Focus group discussions and individual interviews confirmed that natural gas was nearly universally favored by households. It was considered an affordable fuel, and there were indications that households would accept higher gas prices than the tariffs in effect today. Those who were able to obtain natural gas connections tended to drop all other fuels, and some previous users of biomass even reported fuel cost savings. This wide acceptance of the benefits of natural gas would make it easier for the government to phase out the cross-subsidy for residential natural gas users.

4.8 Focus groups and individuals interviewed were less happy with electricity, the poor citing financial hardships caused by rising tariffs, and many expressing the view that free (illegal) use of electricity by the rich is raising the overall cost of electricity

supply. Many of the poor who cannot afford the connection fees arrange to be connected to their neighbors' electricity or natural gas supply. Because of a rising block tariff structure, those with secondary connections end up paying more, even if their neighbors do not cheat them, because the bulk of the supply to the officially connected neighbor is charged higher tariff rates. There was suspicion that the officially connected neighbors often overcharged, becoming free riders in effect.

4.9 Fewer respondents believed that sector deregulation led to an increase in the number of suppliers or an improvement in the quality of supply service for kerosene than for LPG. Very few reported a marked improvement for either fuel in this regard. To the extent that the number of kerosene users seems to be falling, a decrease in the number of shops selling kerosene would be the expected market response. Only a minority replied that transporting LPG cylinders for refill was not a problem. No one cited competition in prices as a mitigating factor against recent world oil price increases, although the counterfactual (that is, how much prices would change if a different level of competition prevailed) would not be easy to establish in this context. The respondents noted that some households substituted kerosene for biomass in cooking because of higher kerosene prices. A majority said that short-selling occurred, especially for LPG. Black marketing of LPG was also said to be common.

4.10 The most frequently found household energy mix in rural areas was biomass-electricity. The proportion of households using only these two energy sources was nearly independent of household income, averaging 29 percent in 2001. This suggests how much progress still remains to be made before modern commercial fuels become widely used for cooking and heating in rural Pakistan. The household fuel of choice—natural gas—will not be available for most rural households given infrastructure constraints. This leaves kerosene and LPG as the only viable alternatives, with the latter the fuel of choice for rural households that are willing and able to pay for it because of its widely recognized cleanliness and convenience. Given recent rises in the international price of LPG, the transition to LPG is likely to take a long time in rural areas.

4.11 For urban and peri-urban households, extending the supply of natural gas appears to be important. Focus groups and individuals with no access to natural gas universally expressed the desire to be connected to; some voiced the opinion that they would probably not mind paying more for it; and many cited the social benefits of switching to natural gas: a positive impact on the health of women and children from eliminating exposure to smoke, time saved from faster cooking and cleaning up afterward, time saved from not having to go out and collect fuelwood or other forms of biomass, and its relatively low cost compared to kerosene and LPG.

4.12 Given the seeming willingness of households to pay a premium for its convenience and cleanliness, phasing out cross-subsidies for residential users of natural gas seems political feasible. This action would free up more financial resources for the gas companies, enabling them to carry out pipeline extension projects more quickly. Natural gas pricing is one policy area that merits government attention. Connecting new households to natural gas presents a challenge. The current connection fees are already subsidized, but poor households find it difficult to pay them, forcing them to resort to

secondary connections as the only viable means of obtaining access; they often end up paying more for natural gas consumption in this way than they would if they were officially connected.

4.13 Providing new electricity connections to all households is arguably even more important, but it presents a greater challenge: unconnected households tend to be in rural areas lacking scale economies and good infrastructure. Given the large benefits of natural gas and electricity connection, it is worth pursuing avenues for enabling poor households to acquire new connections to the extent possible. Options that are revenue neutral are particularly worth considering, such as rolling connection fees into monthly payments.

4.14 It is not possible for the government to protect consumers from rising oil prices indefinitely. While the government may not be able to help consumers directly with prices, it is important that it continue to establish and enforce adequate technical and safety standards, and ensure consumer protection, especially against black marketing and short-selling. Both short-selling and the black market increase effective fuel prices and hurt consumers. Regulating the sector to minimize the occurrence of commercial malpractice is an important government role. A black market for LPG would emerge only in the face of a serious supply-demand imbalance, since the sector is supposed to be fully deregulated. In this regard, the government's attempt to keep end-user prices low by informally capping ex-plant prices of LPG may actually be backfiring.

4.15 If a detailed poverty and social impact analysis concerned with further improvement of sector performance were to be carried out, this study would provide useful information on the responses of households to changes in energy prices and availability. In addition, new data as well as updating of data used in this study would be needed. A new household expenditure survey might also become available. Additional data that would be useful include:

- Data from utility companies on national as well as provincial consumption, revenue collection, costs of supply and new connections, outages, load shedding, and losses
- Links between costs incurred by utility companies and fuel tax structure to the government budget
- Recent trends in energy efficiency and scope for additional energy savings in home appliances, housing, and elsewhere.

These data would enable more direct comparison of household survey data and utility company data, a better assessment of the ability of households to pay for energy at economic prices, and an analysis of options for government intervention to help the poor offset higher energy prices. At the same time, this study raised questions about available data. Some unexpected results, such as relatively high uptake rates of electricity and LPG in some rural areas, might suggest a sampling bias rather than a true reflection of higher uptake. Uncertainties about secondary or illegal connections made it difficult to reconcile household survey results with data provided by utility companies. These discrepancies are worth pursuing in future studies.

4.16 Allowing domestic fuel prices to rise with international prices does not imply that the government should stop helping the poor. Keeping prices artificially low distorts the market, prevents consumers from receiving correct price signals, prolongs non-essential use of energy, and slows network expansion in the case of electricity and natural gas. As some focus group participants said, as concerned as they were about increasing electricity tariffs, they were even more concerned about education fees, because they could cut back on electricity consumption but could not negotiate with schools to reduce school fees. Targeted social safety net measures—whereby support is given for the essential goods consumed by the truly needy, such as reduced fees for education—are likely to be much more cost effective than means to keep prices below market-determined levels. Compensation to the poor for rising energy prices should be integrated in broader, targeted, safety net programs.

Annex 1

Energy Prices

A1.1 The evolution of natural gas tariffs between July 1992 and the last price adjustment of January 2006 is shown in Table A1.1 to Table A1.3. Electricity tariffs are shown in Table A1.4 and Table A1.5 from August 1993 to November 2003, when they were last increased. The price structures of gasoline, kerosene, and light diesel oil since June 2003, and high speed diesel up to June 2004, are shown in Table A1.6 to.

Table A1.1: Natural Gas Tariff between July 1992 and February 1996

Category	*01-07-1992*	*01-04-1993*	*01-07-1993*	*19-08-1993*	*09-06-1994*	*01-07-1994*	*05-12-1994*	*14-06-1995*	*28-10-1995*	*12-02-1996*
Domestic										
(i) Up to 3.55 Mcf/Month (up to 3.3719 MMBtu)	31.00	31.00	31.00	35.65	36.36	36.36	37.45	40.24	40.24	40.24
(ii) 3.55 to 7.1 Mcf/Month (3.3719-6.7438 MMBtu)	34.10	34.10	34.10	39.21	42.35	42.35	44.04	47.89	47.89	47.89
(iii) 7.1 to 10.64 Mcf/Month (6.7438-10.1157 MMBtu)	38.75	38.75	38.75	46.50	50.22	50.22	52.73	65.38	65.38	65.38
(iv) 10.65 to 14.2 Mcf/Month (10.1157-13.4876 MMBtu)	46.50	46.50	46.50	55.80	60.26	60.26	63.27	78.45	78.45	78.45
(v) Above 14.2 Mcf/Month (Above 13.4876 MMBtu)	46.50	46.50	46.50	55.80	60.26	60.26	63.27	78.45	78.45	78.45
Average Price = 0.5*(i)+0.3*(ii)+ 0.1*(iii)+0.05*(iv)+0.05*(v)	34.26	34.26	34.26	39.82	41.93	41.93	43.54	48.87	48.87	48.87
Commercial	61.41	61.41	61.41	70.62	76.27	76.27	76.27	94.57	94.57	94.57
Industrial										
(i) General	54.57	54.57	54.57	62.75	67.77	67.77	67.77	84.05	84.05	84.05
(ii) Cement	39.54	39.54	39.54	39.54	67.77	67.77	67.77	84.05	84.05	84.05
CNG Station	—	—	—	—	—	—	62.75	65.89	70.50	70.50
Fertilizer										
SNGPL & SSGC Systems										
(i) For Feedstock										
Pak-American Fertiliser	22.50	22.50	22.50	22.50	22.50	22.50	22.50	27.90	27.90	27.90
FFC Jordan	—	—	—	—	—	—	—	—	—	—
Dawood/PakArab	22.50	22.50	22.50	22.50	22.50	22.50	22.50	27.90	27.90	27.90
Pak-China/Hazara	22.50	22.50	22.50	22.50	22.50	22.50	22.50	27.90	27.90	27.90
(ii) For Fuel	54.73	54.73	60.20	66.22	66.22	66.22	66.22	84.05	84.05	84.05
Mari System										
(i) For Feedstock										
FFC/Engro Chemical (New)	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75
FFC/Engro Chemical (Old)	9.75	9.75	9.75	9.75	9.75	9.75	9.75	12.09	12.09	12.09
Pak Saudi	9.75	9.75	9.75	9.75	9.75	9.75	9.75	12.09	12.09	12.09
(ii) For Fuel	43.44	43.44	47.78	52.56	52.56	52.56	52.56	66.62	66.62	66.62
Power										
SNGPL & SSGCL Systems	54.57	54.57	54.57	62.75	67.77	67.77	67.77	84.05	84.05	84.05
Liberty Power Limited	—	—	—	—	—	—	—	—	—	—
Raw gas sold to WAPDA's										
Gudu Power Station										
(i) Sui Field (917Btu)	30.68	30.68	39.66	43.73	47.23	56.84	56.84	66.10	70.80	73.68
(ii) Kandhkot (866Btu)	28.92	28.92	37.40	41.24	44.54	53.59	53.59	62.37	66.81	69.53
(iii) Mari (754)	25.05	25.05	32.40	35.78	38.64	46.51	46.74	54.17	57.80	60.40
(iv) Sara/Suri Fields	—	—	—	—	—	—	—	—	—	—

Notes: *CNG = Compressed Natural Gas for automotive use; FFC = Fauji Fertiliser Company; SNGPL = Sui Northern Gas Pipelines Limited; SSGCL = Sui Southern Gas Company Limited; WAPDA = Water and Power Development Authority; — not applicable. Tariffs are in Rs per MMBtu except for residential consumers, for whom tariffs are expressed as Rs per thousand cubic feet.*

Source: *OGRA*

Table A1.2: Natural Gas Tariff between May 1996 and March 2001

Category	*16-05-1996*	*01-07-1996*	*01-01-1997*	*30-04-1997*	*01-01-1999*	*17-04-1999*	*13-07-1999*	*16-08-1999*	*01-07-2000*	*17-03-2001*
Domestic										
(i) Up to 3.55 Mcf/Month (Up to 3.3719 MMBtu)	42.69	42.69	49.09	49.09	49.09	49.09	49.09	55.23	63.51	63.51
(ii) 3.55 to 7.1 Mcf/Month (3.3719-6.7438 MMBtu)	50.76	50.76	58.38	58.38	58.38	58.38	58.38	65.58	75.53	88.72
(iii) 7.1 to 10.64 Mcf/Month (6.7438-10.1157 MMBtu)	69.30	69.30	79.70	79.70	79.70	79.70	79.70	89.66	103.11	131.98
(iv) 10.65 to 14.2 Mcf/Month (10.1157-13.4876 MMBtu)	83.16	83.16	95.63	95.63	95.63	95.63	95.63	107.58	123.72	159.69
(v) Above 14.2 Mcf/Month (Above 13.4876 MMBtu)	83.16	83.16	95.63	95.63	95.63	95.63	95.63	107.58	123.72	172.46
Average Price = 0.5*(i)+0.3*(ii)+ 0.1*(iii)+0.05*(iv)+0.05*(v)	51.82	51.82	59.59	59.59	59.59	59.59	59.59	67.01	77.10	88.18
Commercial	100.24	100.24	115.28	115.28	115.28	115.28	115.28	135.02	155.27	177.63
Industrial										
(i) General	89.09	89.09	102.46	102.46	102.46	102.46	102.46	120.00	138.00	157.87
(ii) Cement	89.09	89.09	102.46	102.46	102.46	102.46	102.46	120.00	138.00	173.66
CNG Station	70.50	70.50	70.50	80.58	102.46	102.46	102.46	120.00	138.00	157.87
Fertilizer										
SNGPL & SSGC Systems										
(i) For Feedstock										
Pak-American Fertiliser	29.57	29.57	34.01	34.01	34.01	34.01	34.01	34.01	34.01	34.01
FFC Jordan	—	—	—	—	—	34.93	34.93	34.93	34.93	34.93
Dawood/PakArab	29.57	29.57	34.01	34.01	34.01	34.01	51.23	55.20	55.59	55.59
Pak-China/Hazara	29.57	29.57	34.01	34.01	34.01	34.01	55.76	60.08	60.08	60.08
(ii) For Fuel	89.09	89.09	102.46	102.46	102.46	102.46	102.46	120.00	138.00	167.92
Mari System										
(i) For Feedstock										
FFC/Engro Chemical (New)	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75
FFC/Engro Chemical (Old)	12.82	20.34	23.39	23.39	23.39	23.39	40.81	43.76	43.76	43.76
Pak Saudi	12.82	20.34	23.39	23.39	23.39	23.39	31.96	34.43	34.43	34.43
(ii) For Fuel	70.62	70.62	81.21	81.21	81.21	81.21	81.21	95.05	109.31	125.05
Power										
SNGPL & SSGCL Systems	89.09	89.09	102.46	102.46	102.46	102.46	102.46	120.00	138.00	157.87
Liberty Power Limited	—	—	—	—	—	—	—	—	156.01	189.44
Raw gas sold to WAPDA's Gudu Power Station										
(i) Sui Field (917Btu)	78.10	80.07	92.08	92.08	92.08	92.08	92.08	107.84	124.02	141.88
(ii) Kandhkot (866Btu)	73.70	75.56	86.89	86.89	86.89	86.89	86.89	101.77	117.04	133.89
(iii) Mari (754)	64.02	65.65	75.50	75.50	75.50	75.50	75.50	88.42	101.68	116.32
(iv) Sara/Suri Fields	—	—	—	—	—	—	—	—	—	—

Notes: *CNG = Compressed Natural Gas for automotive use; FFC = Fauji Fertiliser Company; SNGPL = Sui Northern Gas Pipelines Limited; SSGCL = Sui Southern Gas Company Limited; WAPDA = Water and Power Development Authority; — not applicable. Tariffs are in Rs per MMBtu except for residential consumers, for whom tariffs are expressed as Rs per thousand cubic feet.*

Source: *OGRA*

Table A1.3: Natural Gas Tariff between January 2002 and January 2006

Category	*01-01-2002**	*01-03-2002*	*23-07-2002*	*20-08-2002*	*25-10-2002*	*26-03-2003*	*01-07-2003*	*01-07-2004*	*02-02-2005*	*01-07-2005*	*01-01-2006*
Domestic											
(i) Up to 3.55 Mcf/Month (Up to 3.3719 MMBtu)	66.86	66.86	66.86	66.86	67.95	67.95	69.31	73.95	73.95	73.95	80.98
(ii) 3.55 to 7.1 Mcf/Month (3.3719-6.7438 MMBtu)	93.39	100.73	100.73	100.73	102.37	102.37	104.42	111.42	120.61	127.62	147.41
(iii) 7.1 to 10.64 Mcf/Month (6.7438-10.1157 MMBtu)	138.93	161.16	161.16	161.16	163.78	163.78	167.06	178.25	192.96	204.17	235.84
(iv) 10.65 to 14.2 Mcf/Month (10.1157-13.4876 MMBtu)	168.10	201.45	201.45	201.45	213.06	213.06	217.32	231.88	251.01	265.59	306.79
(v) Above 14.2 Mcf/Month (Above 13.4876 MMBtu)	181.54	217.85	217.85	217.85	213.06	213.06	217.32	231.88	251.01	265.59	306.79
Average Price = 0.5*(i)+0.3*(ii)+ 0.1*(iii)+0.05*(iv)+0.05*(v)	92.82	100.73	100.73	100.73	102.37	102.37	104.42	111.41	117.56	122.24	138.98
Commercial	186.98	186.98	186.98	186.98	190.03	190.03	193.82	204.88	221.78	234.67	271.07
Industrial											
(i) General	166.18	166.18	166.18	166.18	168.88	168.88	172.26	182.09	197.11	208.56	240.91
(ii) Cement	194.68	194.68	194.68	222.32	222.32	222.32	209.78	209.78	227.09	240.28	277.55
CNG Station	166.18	166.18	166.18	166.18	168.88	168.88	172.26	182.09	197.11	208.56	240.91
Fertilizer											
SNGPL & SSGC Systems											
(i) For Feedstock											
Pak-American Fertiliser	34.01	36.77	36.77	36.77	36.77	36.77	36.77	36.77	36.77	36.77	36.77
FFC Jordan	34.93	36.77	36.77	36.77	36.77	36.77	36.77	36.77	36.77	36.77	36.77
Dawood/PakArab	55.59	59.59	59.59	62.57	62.57	62.57	67.26	73.99	73.99	83.24	83.24
Pak-China/Hazara	62.73	63.24	63.24	66.40	66.40	66.40	71.38	78.52	78.52	88.34	88.34
(ii) For Fuel	166.18	166.18	166.18	166.18	168.88	168.88	172.26	182.09	197.11	208.56	240.91
Mari System											
(i) For Feedstock											
FFC/Engro Chemical (New)	9.75	13.09	13.09	13.09	13.09	13.09	13.09	13.09	—	—	—
FFC/Engro Chemical (Old)	43.76	58.74	61.68	61.68	61.68	61.68	66.31	72.94	72.94	82.06	82.06
Pak Saudi	34.43	58.74	61.68	61.68	61.68	61.68	66.31	72.94	72.94	82.06	82.06
(ii) For Fuel	166.18	166.18	166.18	166.18	168.88	168.88	172.26	182.09	197.11	208.56	240.91
Power											
SNGPL & SSGCL Systems	166.18	166.18	166.18	166.18	168.88	168.88	172.26	182.09	197.11	208.56	240.91
Liberty Power Limited	202.98	202.98	202.98	190.80	190.80	222.89	235.77	234.33	262.03	262.03	303.25
Raw gas sold to WAPDA's Gudu Power Station											
(i) Sui Field (917Btu)	142.66	145.51	145.51	145.51	—	—	—	—	—	—	—
(ii) Kandhkot (866Btu)	134.62	160.54	160.54	160.54	163.15	163.15	166.41	175.9	190.41	201.47	232.72
(iii) Mari (754)	116.96	156.14	156.14	156.14	158.68	158.68	161.85	171.08	185.19	195.95	226.34
(iv) Sara/Suri Fields	156.14	156.14	156.14	156.14	158.68	158.68	161.85	171.08	185.19	195.95	—

Notes: *CNG = Compressed Natural Gas for automotive use; FFC = Fauji Fertiliser Company; SNGPL = Sui Northern Gas Pipelines Limited; SSGCL = Sui Southern Gas Company Limited; WAPDA = Water and Power Development Authority; — not applicable. Tariffs are in Rs per MMBtu except for residential consumers, for whom tariffs are expressed as Rs per thousand cubic feet.*

Source: *OGRA*

Table A1.4: Electricity Tariff between August 1993 and March 2001

Tariff Category	*10-8-1993*	*07-11-1994*	*09-07-1995*	*01-08-1996*	*01-01-1997*	*09-03-1998*	*01-04-1999*	*07-09-2000*	*30-12-2000*	*27-03-2001*
Residential (A-1)										
Up to 50 kWh	0.76	0.80	0.89	0.90	1.04	1.34	1.34	1.34	1.34	1.34
0–100 kWh	0.95	1.02	1.21	1.23	1.41	1.97	1.64	1.77	1.86	2.06
101–300 kWh	1.17	1.30	1.72	1.75	1.93	2.85	2.52	2.65	2.74	2.94
301–1,000 kWh	2.10	2.38	3.28	3.33	3.67	4.88	4.71	4.84	4.93	5.13
Above 1,000 kWh	2.47	2.88	4.14	4.20	4.56	6.02	6.07	6.07	6.29	6.37
Commercial (A-2)										
Up to 100 kWh	3.17	4.19	4.80	4.87	5.29	6.38	6.38	6.38	6.38	6.46
Above 100 kWh	3.41	4.51	5.17	5.25	5.69	6.84	6.72	6.72	6.72	6.80
Industrial (B)										
B-1: Up to 40 kW, 400 V	2.19	2.89	3.29	3.35	3.68	4.46	4.40	4.53	4.53	4.61
B-2 (Normal): 41–500 kW, 400 V	1.68	2.48	2.94	3.00	3.33	4.17	3.63	3.76	3.76	3.84
B-2 (TOD): 41–500 kW, 400 V	—	—	—	—	—	—	3.16–3.38	3.51–4.29	3.51–4.29	3.59–4.37
B-3 (Normal): Up to 5000 kW, 11/33 kV	1.67	2.31	2.56	2.60	2.87	3.55	2.86	2.99	2.99	3.07
B-3 (TOD): Up to 5000 kW, 11/33 kV	1.52–2.46	2.09–3.03	2.15–3.09	2.19–3.13	2.44–3.26	3.02–3.84	2.97–3.79	3.10–3.92	3.10–3.92	3.18–4.00
B-4 (Normal): All Loads, 66/132/220 kV	1.62	2.23	2.47	2.51	2.75	3.40	2.70	2.83	2.83	2.91
B-4 (TOD): All Loads, 66/132/220 kV	1.48–2.35	2.05–2.92	2.07–2.94	2.11–2.98	2.34–3.10	2.88–3.64	2.91–3.67	3.04–3.80	3.04–3.80	3.12–3.88
Bulk Supply (C)										
C-1(a): Up to 20 kW, 400 V	1.83	2.42	2.81	2.89	3.11	4.10	4.10	4.23	4.32	4.52
C-1(b): 21–500 kW, 400 V	1.68	2.31	2.73	2.83	3.05	4.11	3.94	3.89	4.16	4.36
C-2(a): Up to 5000 kW, 11/33 kV	1.69	2.23	2.59	2.67	2.89	3.82	3.82	3.95	4.04	4.24
C-2(b): All Loads, 66/132/220 kV	1.95	2.58	3.07	3.17	3.39	4.44	4.44	4.57	4.66	4.86
C-2(c): All Loads, 66/132/220 kV	1.65	2.28	2.70	2.80	3.02	3.02	3.88	4.01	4.10	4.30
C-3: All Loads, 66/132/220 kV	1.63	2.24	2.73	2.83	2.96	3.95	3.62	3.75	3.84	4.04
Agricultural Tubewells (D)										
D-1: SCARP	1.85	2.44	2.83	2.87	3.11	3.73	3.73	3.86	3.95	4.15
D-2(i): Punjab & Sindh	1.49	2.13	2.55	2.60	2.90	3.58	2.64	2.00	2.09	2.29
D-2(ii): NWFP & Balochistan	1.34	1.87	2.23	2.27	2.53	3.10	2.24	1.68	1.77	1.97
Temporary Supply (E)										
E-1(i): Residential Supply	2.70	2.94	4.08	3.67	4.13	5.44	5.44	5.44	5.66	5.86
E-1 (ii): Commercial Supply	4.19	5.54	5.45	6.44	6.98	8.40	8.40	8.40	8.40	8.48
E-2: Industrial Supply	2.74	3.62	4.12	4.18	4.56	5.52	5.52	5.52	5.52	5.60
Seasonal Industrial Supply (F)	2.74	3.61	4.11	4.19	4.60	5.58	5.50	5.66	5.66	5.76
Public Lighting (G)										
G-1(i): General	A-1*	A-1	A-1	A-1	A-1	A-1	A-1	A-1	A-1	A-1
G-1(ii): Without Line Charge	0.00	3.33	3.88	3.94	4.30	5.65	6.76	6.76	6.76	6.84
Housing with Industries (H)	2.04	2.70	3.15	3.20	3.54	4.63	4.81	4.94	5.03	5.23
Railway Traction (I)	1.61	2.13	2.48	2.52	2.56	3.70	3.86	3.99	4.08	4.28
Special Contract - AJK (K)	—	1.27	2.04	2.11	2.23	3.09	3.09	3.22	3.31	3.51

Notes: *SCARP = Salinity Control and Reclamation Program; TOD = time of day; AJK = Azad Jammu and Kashmir; — = not applicable. Tariffs are in Rs per kWh*
** Same schedule as A-1.*
Source: *WAPDA.*

Table A1.5: Electricity Tariff between August 2001 and November 2003

Tariff Category	*08-08-2001*	*06-11-2001*	*16-02-2002*	*15-05-2002*	*1308-2002*	*21-11-2002*	*10-12-2002*	*10-05-2003*	*19-08-2003*	*01-11-2003*
Residential (A-1)										
Up to 50 kWh	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34
0–100 kWh	2.06	2.16	2.08	2.21	2.40	2.47	2.36	2.49	2.52	2.48
101–300 kWh	2.94	3.04	2.96	3.09	3.28	3.35	3.24	3.37	3.40	3.36
301–1,000 kWh	5.13	5.23	5.15	5.28	5.47	5.54	5.43	5.56	5.59	5.55
Above 1,000 kWh	6.37	6.47	6.39	6.47	6.66	6.66	6.55	6.68	6.71	6.67
Commercial (A-2)										
Up to 100 kWh	6.46	6.56	6.48	6.56	6.76	6.76	6.59	6.59	6.62	6.52
Above 100 kWh	6.80	6.90	6.82	6.90	7.10	7.10	6.93	6.93	6.96	6.86
Industrial (B)										
B-1: Up to 40 kW, 400 V	4.61	4.71	4.63	4.76	5.08	5.14	4.99	5.08	5.11	5.01
B-2 (Normal): 41–500 kW, 400 V	3.12	3.22	3.14	3.27	3.59	3.65	3.50	3.59	3.62	3.52
B-2 (TOD): 41–500 kW, 400 V	3.71-4.49	3.81-4.59	3.73-4.51	3.86-4.64	4.18-4.96	4.24-5.02	4.09-4.87	4.33-5.11	4.27-5.05	4.14-4.92
B-3 (Normal): Up to 5000 kW, 11/33 kV	3.07	3.17	3.09	3.22	3.50	3.56	3.41	3.50	3.53	3.43
B-3 (TOD): Up to 5000 kW, 11/33 kV	3.18-4.00	3.28-4.10	3.20-4.02	3.33-4.15	3.61-4.43	3.67-4.49	3.52-4.34	3.76-4.58	3.70-4.52	3.57-4.39
B-4 (Normal): All Loads, 66/132/220 kV	2.91	3.01	2.93	3.06	3.30	3.36	3.21	3.30	3.33	3.23
B-4 (TOD): All Loads, 66/132/220 kV	3.12-3.88	3.22-3.98	3.14-3.90	3.27-4.03	3.51-4.27	3.57-4.33	3.42-4.18	3.66-4.42	3.60-4.36	3.47-4.23
Bulk Supply (C)										
C-1(a): Up to 20 kW, 400 V	4.52	4.62	4.54	4.67	5.07	5.13	4.98	5.07	5.10	5.00
C-1(b): 21–500 kW, 400 V	4.36	4.46	4.38	4.51	4.71	4.77	4.62	4.71	4.74	4.64
C-2(a): Up to 5000 kW, 11/33 kV	3.70	4.20	4.12	4.25	4.43	4.49	4.34	4.43	4.46	4.36
C-2(b): All Loads, 66/132/220 kV										
C-2(c): All Loads, 66/132/220 kV										
C-3: All Loads, 66/132/220 kV	4.04	4.14	4.06	4.19	4.35	4.41	4.26	4.35	4.38	4.28
Agricultural Tubewells (D)										
D-1: SCARP	4.15	4.25	4.17	4.30	4.80	4.87	4.76	4.89	4.92	4.88
D-2(i): Punjab & Sindh	2.29	2.39	2.31	2.44	2.90	2.97	2.86	2.99	3.02	2.98
D-2(ii): NWFP & Balochistan	1.97	2.07	1.99	2.12	2.54	2.61	2.50	2.63	2.66	2.62
Temporary Supply (E)										
E-1(i): Residential Supply	5.86	5.86	5.88	6.01	6.20	6.27	6.16	6.29	6.32	6.28
E-1 (ii): Commercial Supply	8.48	8.58	8.50	8.58	8.70	8.70	8.53	8.53	8.56	8.46
E-2: Industrial Supply	5.60	5.70	5.62	5.75	6.07	6.13	5.98	6.07	6.10	6.00
Seasonal Industrial Supply (F)	5.76	5.89	5.79	5.95	6.35	6.43	6.24	6.35	6.39	6.26
Public Lighting (G)										
G-1(i): General	A-1*	A-1	A-1	A-1	A-1	A-1	A-1	A-1	A-1	A-1
G-1(ii): Without Line Charge	6.84	6.60	6.86	6.94	6.88	6.88	6.73	6.86	6.89	6.89
Housing with Industries (H)	5.23	5.12	5.25	5.38	5.88	5.95	5.84	5.97	6.00	5.96
Railway Traction (I)	4.28	4.38	4.30	4.43	4.93	5.00	4.85	4.98	5.01	5.01
Special Contract - AJK (K)	3.51	3.61	3.53	3.66	4.04	4.11	3.96	4.05	4.08	4.04

Notes: *SCARP = Salinity Control and Reclamation Program; TOD = time of day; AJK = Azad Jammu and Kashmir; — = not applicable. Tariffs are in Rs per kWh*
* Same schedule as A-1.
Source: *WAPDA.*

Table A1.6: Price Structure of Regular Gasoline

Date	*Ex-refinery*	*Excise Duty*	*Petroleum Levy*	*PDC*	*Inland Freight*	*OMC Margin*	*Dealer Margin*	*Sales Tax*	*Sale Price*
February 16, 2006	26.12	0.88	15.59	0.00	2.14	1.97	2.25	7.34	56.29
February 01, 2006	26.48	0.88	15.23	0.00	2.14	1.97	2.25	7.34	56.29
January 16, 2006	25.26	0.88	16.45	0.00	2.14	1.97	2.25	7.34	56.29
January 01, 2006	24.53	0.88	17.18	0.00	2.14	1.97	2.25	7.34	56.29
December 16, 2005	24.74	0.88	16.97	0.00	2.14	1.97	2.25	7.34	56.29
December 01, 2005	24.00	0.88	17.71	0.00	2.14	1.97	2.25	7.34	56.29
November 16, 2005	24.54	0.88	17.17	0.00	2.14	1.97	2.25	7.34	56.29
November 01, 2005	25.75	0.88	9.64	6.32	2.14	1.97	2.25	7.34	56.29
October 16, 2005	26.28	0.88	0.00	15.43	2.14	1.97	2.25	7.34	56.29
October 01, 2005	27.03	0.88	0.00	14.68	2.14	1.97	2.25	7.34	56.29
September 16, 2005	27.94	0.88	0.00	10.85	2.14	1.84	2.10	6.86	52.61
September 01, 2005	26.29	0.88	0.00	12.50	2.14	1.84	2.10	6.86	52.61
August 16, 2005	24.83	0.88	0.00	11.05	2.14	1.71	1.95	6.38	48.94
August 01, 2005	22.91	0.88	0.00	12.97	2.14	1.71	1.95	6.38	48.94
July 16, 2005	22.61	0.88	0.00	13.27	2.14	1.71	1.95	6.38	48.94
July 01, 2005	22.33	0.88	0.00	13.55	2.14	1.71	1.95	6.38	48.94
June 16, 2005	21.17	0.88	0.00	12.04	2.09	1.59	1.82	5.94	45.53
June 01, 2005	20.95	0.88	0.00	12.26	2.09	1.59	1.82	5.94	45.53
May 17, 2005	21.53	0.88	0.00	10.82	2.95	1.59	1.82	5.94	45.53
May 01, 2005	22.87	0.88	0.00	9.48	2.95	1.59	1.82	5.94	45.53
April 17, 2005	24.01	0.88	0.00	8.34	2.95	1.59	1.82	5.94	45.53
April 01, 2005	24.04	0.88	0.00	8.77	2.49	1.59	1.82	5.94	45.53
March 16, 2005	23.00	0.88	0.00	6.89	5.41	1.59	1.82	5.94	45.53
March 01, 2005	21.77	0.88	6.89	0.00	5.41	1.53	1.75	5.73	43.96
February 16, 2005	20.51	0.88	6.89	0.00	5.41	1.48	1.69	5.53	42.39
February 02, 2005	19.99	0.88	9.30	0.00	3.52	1.48	1.69	5.53	42.39
January 16, 2005	18.50	0.88	8.11	0.00	4.61	1.41	1.61	5.27	40.39
January 01, 2005	19.22	0.88	2.30	0.00	9.70	1.41	1.61	5.27	40.39
December 16, 2004	19.89	0.88	0.92	0.00	9.70	1.38	1.58	5.15	39.50
December 01, 2004	20.88	0.88	0.00	-1.12	8.70	1.29	1.47	4.82	36.92
November 16, 2004	20.88	0.88	0.00	-1.12	8.70	1.29	1.47	4.82	36.92
November 01, 2004	20.88	0.88	0.00	-1.12	8.70	1.29	1.47	4.82	36.92
October 16, 2004	20.88	0.88	0.00	-1.12	8.70	1.29	1.47	4.82	36.92
October 01, 2004	20.88	0.88	0.00	-1.12	8.70	1.29	1.47	4.82	36.92
September 16, 2004	19.76	0.88	0.00	0.00	8.70	1.29	1.47	4.82	36.92
September 01, 2004	20.79	0.88	0.00	-0.73	8.40	1.29	1.47	4.82	36.92
August 16, 2004	20.06	0.88	0.00	0.00	8.40	1.29	1.47	4.82	36.92
August 01, 2004	18.13	0.88	8.34	0.00	1.99	1.29	1.47	4.82	36.92
July 16, 2004	17.28	0.88	9.19	0.00	1.99	1.29	1.47	4.82	36.92
July 01, 2004	17.18	0.88	9.27	0.00	2.01	1.29	1.47	4.82	36.92
June 16, 2004	17.85	0.88	8.46	0.00	2.15	1.29	1.47	4.82	36.92
June 01, 2004	18.72	0.88	7.59	0.00	2.15	1.29	1.47	4.82	36.92
May 16, 2004	18.04	0.88	8.41	0.00	2.01	1.29	1.47	4.82	36.92

Date	*Ex-refinery*	*Excise Duty*	*Petroleum Levy*	*PDC*	*Inland Freight*	*OMC Margin*	*Dealer Margin*	*Sales Tax*	*Sale Price*
May 01, 2004	17.32	0.88	9.50	0.00	1.64	1.29	1.47	4.82	36.92
April 16, 2004	16.68	0.88	9.50	0.00	1.06	1.23	1.41	4.61	35.37
April 01, 2004	16.24	0.88	9.50	0.00	0.85	1.21	1.38	4.51	34.57
March 16, 2004	16.30	0.88	9.50	0.00	0.94	1.21	1.39	4.53	34.75
March 01, 2004	15.97	0.88	9.50	0.00	1.31	1.21	1.39	4.54	34.80
February 16, 2004	15.43	0.88	9.50	0.00	1.59	1.20	1.37	4.50	34.47
February 01, 2004	16.98	0.88	8.63	0.00	1.59	1.23	1.41	4.61	35.33
January 16, 2004	17.10	0.88	8.63	0.00	1.59	1.24	1.41	4.63	35.48
January 10, 2004	20.88	0.88	0.00	0.00	8.70	1.29	1.47	4.82	36.92
January 01, 2004	15.74	0.88	8.63	0.00	1.59	1.18	1.35	4.41	33.78
December 16, 2003	15.31	0.88	9.50	0.00	1.15	1.18	1.35	4.41	33.78
December 01, 2003	15.37	0.88	9.50	0.00	0.94	1.17	1.34	4.38	33.58
November 16, 2003	14.83	0.88	9.50	0.00	0.94	1.15	1.31	4.29	32.90
November 01, 2003	14.64	0.88	9.50	0.00	0.88	1.14	1.30	4.25	32.59
October 16, 2003	14.19	0.88	9.50	0.00	0.88	1.12	1.28	4.18	32.03
October 01, 2003	13.22	0.88	9.50	0.00	0.83	1.07	1.22	4.01	30.73
September 16, 2003	13.69	0.88	9.50	0.00	0.83	1.09	1.25	4.09	31.33
September 01, 2003	14.02	0.88	9.50	0.00	0.88	1.11	1.27	4.15	31.81
August 16, 2003	13.92	0.88	9.50	0.00	0.83	1.10	1.26	4.12	31.61
August 01, 2003	13.62	0.88	9.50	0.00	1.05	1.10	1.26	4.11	31.52
July 16, 2003	13.62	0.88	9.50	0.00	1.05	1.10	1.26	4.11	31.52
July 01, 2003	13.31	0.88	9.50	0.00	1.10	1.09	1.24	4.07	31.19
June 30, 2003	13.03	0.88	9.50	0.00	1.10	1.08	1.22	4.02	30.83

Notes: *Prices in Rs per liter. OMC = oil marketing company.*
Source: *www.ocac.org.pk/price.asp*.

Table A1.7: Price Structure of Kerosene

Date	*Ex-refinery*	*Excise Duty*	*Petroleum Levy*	*PDC*	*Inland Freight*	*OMC Margin*	*Dealer Margin*	*Sales Tax*	*Sale Price*
February 16, 2006	25.84	0.00	0.00	0.00	1.59	1.15	0.00	4.29	32.87
February 01, 2006	25.84	0.00	0.00	0.00	1.59	1.15	0.00	4.29	32.87
January 16, 2006	25.84	0.00	0.00	0.00	1.59	1.15	0.00	4.29	32.87
January 01, 2006	25.84	0.00	0.00	0.00	1.59	1.15	0.00	4.29	32.87
December 16, 2005	25.84	0.00	0.00	0.00	1.59	1.15	0.00	4.29	32.87
December 01, 2005	25.84	0.00	0.00	0.00	1.59	1.15	0.00	4.29	32.87
November 16, 2005	25.84	0.00	0.00	0.00	1.59	1.15	0.00	4.29	32.87
November 01, 2005	28.88	0.00	0.00	-3.04	1.59	1.15	0.00	4.29	32.87
October 16, 2005	32.03	0.00	0.00	-6.19	1.59	1.15	0.00	4.29	32.87
October 01, 2005	31.17	0.00	0.00	-5.33	1.59	1.15	0.00	4.29	32.87
September 16, 2005	31.91	0.00	0.00	-7.62	1.59	1.08	0.00	4.04	31.00
September 01, 2005	30.88	0.00	0.00	-6.59	1.59	1.08	0.00	4.04	31.00
August 16, 2005	29.34	0.00	0.00	-6.28	1.59	1.03	0.00	3.85	29.53
August 01, 2005	27.85	0.00	0.00	-4.79	1.59	1.03	0.00	3.85	29.53
July 16, 2005	28.75	0.00	0.00	-5.69	1.59	1.03	0.00	3.85	29.53
July 01, 2005	28.58	0.00	0.00	-5.52	1.59	1.03	0.00	3.85	29.53
June 16, 2005	26.86	0.00	0.00	-5.06	1.56	0.97	0.00	3.65	27.98
June 01, 2005	24.82	0.00	0.00	-3.02	1.56	0.97	0.00	3.65	27.98
May 17, 2005	26.63	0.00	0.00	-5.44	2.17	0.97	0.00	3.65	27.98
May 01, 2005	28.36	0.00	0.00	-7.17	2.17	0.97	0.00	3.65	27.98
April 17, 2005	29.09	0.00	0.00	-7.90	2.17	0.97	0.00	3.65	27.98
April 01, 2005	27.49	0.00	0.00	-5.67	1.54	0.97	0.00	3.65	27.98
March 16, 2005	25.71	0.00	0.00	-3.12	0.77	0.97	0.00	3.65	27.98
March 01, 2005	22.59	0.00	0.00	0.00	0.77	0.97	0.00	3.65	27.98
February 16, 2005	21.12	0.00	0.55	0.00	0.90	0.94	0.00	3.53	27.04
February 02, 2005	21.14	0.00	0.53	0.00	0.90	0.94	0.00	3.53	27.04
January 16, 2005	19.00	0.00	1.53	0.00	1.20	0.91	0.00	3.40	26.04
January 01, 2005	19.74	0.00	1.30	0.00	0.69	0.91	0.00	3.40	26.04
December 16, 2004	19.88	0.00	0.70	0.00	0.70	0.89	0.00	3.33	25.50
December 01, 2004	22.10	0.00	0.00	-2.07	0.00	0.84	0.00	3.13	24.00
November 16, 2004	22.68	0.00	0.00	-2.65	0.00	0.84	0.00	3.13	24.00
November 01, 2004	22.68	0.00	0.00	-2.65	0.00	0.84	0.00	3.13	24.00
October 16, 2004	22.68	0.00	0.00	-2.65	0.00	0.84	0.00	3.13	24.00
October 01, 2004	22.68	0.00	0.00	-2.65	0.00	0.84	0.00	3.13	24.00
September 16, 2004	20.74	0.00	0.00	-0.71	0.00	0.84	0.00	3.13	24.00
September 01, 2004	21.23	0.00	0.00	-1.20	0.00	0.84	0.00	3.13	24.00
August 16, 2004	20.22	0.00	0.00	-0.19	0.00	0.84	0.00	3.13	24.00
August 01, 2004	18.98	0.00	0.00	0.00	1.05	0.84	0.00	3.13	24.00
July 16, 2004	17.83	0.00	0.78	0.00	1.42	0.84	0.00	3.13	24.00
July 01, 2004	16.72	0.00	1.93	0.00	1.38	0.84	0.00	3.13	24.00
June 16, 2004	16.79	0.00	1.82	0.00	1.42	0.84	0.00	3.13	24.00
June 01, 2004	17.88	0.00	0.73	0.00	1.42	0.84	0.00	3.13	24.00
May 16, 2004	17.94	0.00	0.80	0.00	1.29	0.84	0.00	3.13	24.00

Date	*Ex-refinery*	*Excise Duty*	*Petroleum Levy*	*PDC*	*Inland Freight*	*OMC Margin*	*Dealer Margin*	*Sales Tax*	*Sale Price*
May 01, 2004	16.56	0.00	2.91	0.00	0.56	0.84	0.00	3.13	24.00
April 16, 2004	14.67	0.00	3.35	0.00	1.18	0.80	0.00	3.00	23.00
April 01, 2004	14.40	0.00	3.35	0.00	0.60	0.76	0.00	2.87	21.98
March 16, 2004	13.97	0.00	3.35	0.00	1.03	0.76	0.00	2.87	21.98
March 01, 2004	14.22	0.00	3.35	0.00	1.14	0.78	0.00	2.92	22.41
February 16, 2004	13.87	0.00	3.35	0.00	1.30	0.77	0.00	2.89	22.18
February 01, 2004	15.45	0.00	2.91	0.00	1.30	0.82	0.00	3.07	23.55
January 16, 2004	15.17	0.00	2.91	0.00	1.30	0.81	0.00	3.03	23.22
January 10, 2004	14.47	0.00	2.91	0.00	1.30	0.78	0.00	2.92	22.38
January 01, 2004	14.31	0.00	3.35	0.00	1.02	0.78	0.00	2.92	22.38
December 16, 2003	14.13	0.00	3.35	0.00	1.02	0.77	0.00	2.89	22.16
December 01, 2003	13.55	0.00	3.35	0.00	1.02	0.75	0.00	2.80	21.47
November 16, 2003	13.49	0.00	3.35	0.00	1.04	0.74	0.00	2.79	21.41
November 01, 2003	12.78	0.00	3.35	0.00	1.02	0.71	0.00	2.68	20.54
October 16, 2003	11.88	0.00	3.35	0.00	1.06	0.68	0.00	2.55	19.52
October 01, 2003	12.34	0.00	3.35	0.00	1.06	0.70	0.00	2.62	20.07
September 16, 2003	12.92	0.00	3.35	0.00	1.02	0.72	0.00	2.70	20.71
September 01, 2003	12.49	0.00	3.35	0.00	0.98	0.70	0.00	2.63	20.15
August 16, 2003	11.76	0.00	3.35	0.00	1.20	0.68	0.00	2.55	19.54
August 01, 2003	11.20	0.00	3.35	0.00	1.20	0.66	0.00	2.46	18.87
July 16, 2003	11.14	0.00	3.35	0.00	1.17	0.65	0.00	2.45	18.76
July 01, 2003	11.19	0.00	3.35	0.00	1.17	0.66	0.00	2.46	18.83
June 30, 2003	25.84	0.00	0.00	0.00	1.59	1.15	0.00	4.29	32.87

Notes: *Prices in Rs per liter. OMC = oil marketing company.*
Source*: www.ocac.org.pk/price.asp.*

Table A1.8: Price Structure of Light Diesel Oil

Date	*Ex-refinery*	*Excise Duty*	*Petroleum Levy*	*PDC*	*Inland Freight*	*OMC Margin*	*Dealer Margin*	*Sales Tax*	*Sale Price*
February 16, 2006	24.24	0.00	0.00	0.00	1.61	1.08	0.00	4.04	30.97
February 01, 2006	24.24	0.00	0.00	0.00	1.61	1.08	0.00	4.04	30.97
January 16, 2006	24.24	0.00	0.00	0.00	1.61	1.08	0.00	4.04	30.97
January 01, 2006	24.24	0.00	0.00	0.00	1.61	1.08	0.00	4.04	30.97
December 16, 2005	23.85	0.00	0.39	0.00	1.61	1.08	0.00	4.04	30.97
December 01, 2005	23.75	0.00	0.49	0.00	1.61	1.08	0.00	4.04	30.97
November 16, 2005	23.83	0.00	0.41	0.00	1.61	1.08	0.00	4.04	30.97
November 01, 2005	26.48	0.00	0.00	-2.24	1.61	1.08	0.00	4.04	30.97
October 16, 2005	28.51	0.00	0.00	-4.27	1.61	1.08	0.00	4.04	30.97
October 01, 2005	28.32	0.00	0.00	-4.08	1.61	1.08	0.00	4.04	30.97
September 16, 2005	28.78	0.00	0.00	-6.00	1.61	1.02	0.00	3.81	29.22
September 01, 2005	27.30	0.00	0.00	-4.52	1.61	1.02	0.00	3.81	29.22
August 16, 2005	26.45	0.00	0.00	-4.82	1.61	0.97	0.00	3.63	27.84
August 01, 2005	25.92	0.00	0.00	-4.29	1.61	0.97	0.00	3.63	27.84
July 16, 2005	27.44	0.00	0.00	-5.81	1.61	0.97	0.00	3.63	27.84
July 01, 2005	26.79	0.00	0.00	-5.16	1.61	0.97	0.00	3.63	27.84
June 16, 2005	24.99	0.00	0.00	-4.55	1.59	0.92	0.00	3.44	26.39
June 01, 2005	22.55	0.00	0.00	-2.11	1.59	0.92	0.00	3.44	26.39
May 17, 2005	23.25	0.00	0.00	-3.25	2.03	0.92	0.00	3.44	26.39
May 01, 2005	24.01	0.00	0.00	-4.01	2.03	0.92	0.00	3.44	26.39
April 17, 2005	24.87	0.00	0.00	-4.87	2.03	0.92	0.00	3.44	26.39
April 01, 2005	24.16	0.00	0.00	-3.35	1.22	0.92	0.00	3.44	26.39
March 16, 2005	22.86	0.00	0.00	-1.62	0.79	0.92	0.00	3.44	26.39
March 01, 2005	20.39	0.00	0.00	0.00	0.79	0.88	0.00	3.31	25.37
February 16, 2005	19.52	0.00	0.00	0.00	0.79	0.85	0.00	3.17	24.33
February 02, 2005	18.97	0.00	0.25	0.00	1.09	0.85	0.00	3.17	24.33
January 16, 2005	17.55	0.00	0.25	0.00	1.33	0.80	0.00	2.99	22.92
January 01, 2005	18.35	0.00	0.25	0.00	0.53	0.80	0.00	2.99	22.92
December 16, 2004	18.18	0.00	0.00	0.00	0.53	0.78	0.00	2.92	22.41
December 01, 2004	19.93	0.00	0.00	-2.49	0.13	0.73	0.00	2.75	21.05
November 16, 2004	20.00	0.00	0.00	-2.56	0.13	0.73	0.00	2.75	21.05
November 01, 2004	20.00	0.00	0.00	-2.56	0.13	0.73	0.00	2.75	21.05
October 16, 2004	20.00	0.00	0.00	-2.56	0.13	0.73	0.00	2.75	21.05
October 01, 2004	20.00	0.00	0.00	-2.56	0.13	0.73	0.00	2.75	21.05
September 16, 2004	18.79	0.00	0.00	-1.35	0.13	0.73	0.00	2.75	21.05
September 01, 2004	19.19	0.00	0.00	-1.75	0.13	0.73	0.00	2.75	21.05
August 16, 2004	18.44	0.00	0.00	-1.00	0.13	0.73	0.00	2.75	21.05
August 01, 2004	17.24	0.00	0.00	0.00	0.33	0.73	0.00	2.75	21.05
July 16, 2004	16.05	0.00	0.00	0.00	1.52	0.73	0.00	2.75	21.05
July 01, 2004	15.51	0.00	0.49	0.00	1.57	0.73	0.00	2.75	21.05
June 16, 2004	15.69	0.00	0.32	0.00	1.56	0.73	0.00	2.75	21.05
June 01, 2004	16.01	0.00	0.00	0.00	1.56	0.73	0.00	2.75	21.05
May 16, 2004	15.94	0.00	0.00	0.00	1.63	0.73	0.00	2.75	21.05

Date	*Ex-refinery*	*Excise Duty*	*Petroleum Levy*	*PDC*	*Inland Freight*	*OMC Margin*	*Dealer Margin*	*Sales Tax*	*Sale Price*
May 01, 2004	14.73	0.00	1.20	0.00	1.64	0.73	0.00	2.75	21.05
April 16, 2004	13.96	0.00	1.20	0.00	1.55	0.70	0.00	2.61	20.02
April 01, 2004	13.64	0.00	1.20	0.00	1.39	0.68	0.00	2.54	19.45
March 16, 2004	13.74	0.00	1.20	0.00	1.54	0.69	0.00	2.58	19.75
March 01, 2004	13.88	0.00	1.20	0.00	1.54	0.69	0.00	2.60	19.91
February 16, 2004	13.61	0.00	1.20	0.00	1.75	0.69	0.00	2.59	19.84
February 01, 2004	14.74	0.00	0.44	0.00	1.75	0.71	0.00	2.65	20.29
January 16, 2004	14.19	0.00	0.44	0.00	1.75	0.68	0.00	2.56	19.62
January 10, 2004	13.36	0.00	0.44	0.00	1.75	0.65	0.00	2.43	18.63
January 01, 2004	12.67	0.00	1.20	0.00	1.68	0.65	0.00	2.43	18.63
December 16, 2003	12.87	0.00	1.20	0.00	1.26	0.64	0.00	2.40	18.37
December 01, 2003	12.46	0.00	1.20	0.00	1.26	0.62	0.00	2.33	17.87
November 16, 2003	12.58	0.00	1.20	0.00	1.16	0.62	0.00	2.33	17.89
November 01, 2003	12.13	0.00	1.20	0.00	1.15	0.60	0.00	2.26	17.34
October 16, 2003	11.58	0.00	1.20	0.00	0.95	0.57	0.00	2.15	16.45
October 01, 2003	12.13	0.00	1.20	0.00	0.95	0.59	0.00	2.23	17.10
September 16, 2003	12.12	0.00	1.20	0.00	0.86	0.59	0.00	2.22	16.99
September 01, 2003	11.94	0.00	1.20	0.00	0.80	0.58	0.00	2.18	16.70
August 16, 2003	11.34	0.00	1.20	0.00	1.00	0.56	0.00	2.12	16.22
August 01, 2003	11.23	0.00	1.20	0.00	1.00	0.56	0.00	2.10	16.09
July 16, 2003	11.21	0.00	1.20	0.00	1.32	0.57	0.00	2.15	16.45
July 01, 2003	11.05	0.00	1.20	0.00	1.32	0.57	0.00	2.12	16.26
June 30, 2003	23.83	0.00	0.41	0.00	1.61	1.08	0.00	4.04	30.97

Notes: *Prices in Rs per liter. OMC = oil marketing company.*
Source*: www.ocac.org.pk/price.asp.*

Table A1.9: Price Structure of High Speed Diesel

Date	Ex-refinery	Excise Duty	Petroleum Levy	PDC[1]	Inland Freight	OMC Margin	Dealer Margin	Sales Tax	Sale Price
June 16, 2005	26.20	0.00	0.00	-4.46	1.35	1.02	1.16	3.79	29.06
June 01, 2005	23.77	0.00	0.00	-2.03	1.35	1.02	1.16	3.79	29.06
May 17, 2005	25.02	0.00	0.00	-3.59	1.66	1.02	1.16	3.79	29.06
May 01, 2005	25.68	0.00	0.00	-4.25	1.66	1.02	1.16	3.79	29.06
April 17, 2005	27.00	0.00	0.00	-5.57	1.66	1.02	1.16	3.79	29.06
April 01, 2005	26.07	0.00	0.00	-4.17	1.19	1.02	1.16	3.79	29.06
March 16, 2005	24.62	0.00	0.00	-1.92	0.39	1.02	1.16	3.79	29.06
March 01, 2005	21.60	0.00	0.44	0.00	0.39	0.98	1.12	3.68	28.21
February 16, 2005	21.20	0.00	0.00	0.00	0.39	0.95	1.08	3.54	27.16
February 02, 2005	19.96	0.00	0.38	0.00	1.25	0.95	1.08	3.54	27.16
January 16, 2005	18.85	0.00	0.65	0.00	1.33	0.91	1.05	3.42	26.21
January 01, 2005	20.05	0.00	0.65	0.00	0.13	0.91	1.05	3.42	26.21
December 16, 2004	20.50	0.00	0.00	0.00	0.12	0.91	1.04	3.39	25.96
December 01, 2004	21.91	0.00	0.00	-2.54	0.00	0.85	0.97	3.18	24.37
November 16, 2004	22.81	0.00	0.00	-3.44	0.00	0.85	0.97	3.18	24.37
November 01, 2004	23.15	0.00	0.00	-3.78	0.00	0.85	0.97	3.18	24.37
October 16, 2004	22.25	0.00	0.00	-2.88	0.00	0.85	0.97	3.18	24.37
October 01, 2004	21.75	0.00	0.00	-2.38	0.00	0.85	0.97	3.18	24.37
September 16, 2004	20.54	0.00	0.00	-1.17	0.00	0.85	0.97	3.18	24.37
September 01, 2004	20.60	0.00	0.00	-1.23	0.00	0.85	0.97	3.18	24.37
August 16, 2004	19.94	0.00	0.00	-0.57	0.00	0.85	0.97	3.18	24.37
August 01, 2004	18.13	0.00	0.00	0.00	1.24	0.85	0.97	3.18	24.37
July 16, 2004	16.71	0.00	1.01	0.00	1.65	0.85	0.97	3.18	24.37
July 01, 2004	16.57	0.00	1.24	0.00	1.56	0.85	0.97	3.18	24.37
June 16, 2004	16.80	0.00	0.94	0.00	1.63	0.85	0.97	3.18	24.37
June 01, 2004	17.16	0.00	0.58	0.00	1.63	0.85	0.97	3.18	24.37
May 16, 2004	16.84	0.00	1.02	0.00	1.51	0.85	0.97	3.18	24.37
May 01, 2004	15.42	0.00	2.62	0.00	1.33	0.85	0.97	3.18	24.37
April 16, 2004	14.86	0.00	3.00	0.00	1.23	0.84	0.96	3.13	24.02
April 01, 2004	14.52	0.00	2.98	0.00	1.12	0.82	0.94	3.06	23.44
March 16, 2004	14.69	0.00	2.98	0.00	1.22	0.83	0.95	3.10	23.77
March 01, 2004	14.65	0.00	2.98	0.00	1.26	0.83	0.95	3.10	23.77
February 16, 2004	14.91	0.00	2.50	0.00	1.48	0.83	0.95	3.10	23.77
February 7, 2004	15.80	0.00	1.68	0.00	1.48	0.83	0.95	3.11	23.85
February 1, 2004	14.75	0.00	2.73	0.00	1.48	0.83	0.95	3.11	23.85
January 16, 2004	14.75	0.00	2.73	0.00	1.48	0.83	0.95	3.11	23.85
January 1, 2004	13.90	0.00	2.73	0.00	1.48	0.79	0.91	2.97	22.78
December 16, 2003	13.30	0.00	3.50	0.00	1.31	0.79	0.91	2.97	22.78
December 1, 2003	13.57	0.00	3.50	0.00	1.13	0.80	0.91	2.99	22.90
November 16, 2003	13.03	0.00	3.50	0.00	1.13	0.77	0.88	2.90	22.21
November 1, 2003	13.00	0.00	3.50	0.00	0.96	0.77	0.88	2.87	21.98
October 16, 2003	12.31	0.00	3.50	0.00	0.96	0.73	0.84	2.75	21.09
October 1, 2003	12.27	0.00	3.50	0.00	0.92	0.73	0.84	2.74	21.00
September 16, 2003	12.85	0.00	3.50	0.00	0.92	0.76	0.87	2.84	21.74
September 1, 2003	12.56	0.00	3.50	0.00	0.88	0.75	0.85	2.78	21.32

Date	*Ex-refinery*	*Excise Duty*	*Petroleum Levy*	*PDC*[1]	*Inland Freight*	*OMC Margin*	*Dealer Margin*	*Sales Tax*	*Sale Price*
August 16, 2003	12.01	0.00	3.50	0.00	0.82	0.72	0.82	2.68	20.55
August 1, 2003	11.41	0.00	3.50	0.00	1.02	0.70	0.80	2.61	20.04
July 16, 2003	11.32	0.00	3.50	0.00	1.02	0.69	0.79	2.60	19.92
July 1, 2003	11.47	0.00	3.50	0.00	1.17	0.71	0.81	2.65	20.31
June 16, 2003	11.24	0.00	3.50	0.00	1.17	0.70	0.80	2.61	20.02
June 1, 2003	11.08	0.00	3.50	0.00	1.25	0.69	0.79	2.60	19.91
May 16, 2003	11.08	0.00	3.50	0.00	1.25	0.69	0.79	2.60	19.91
May 1, 2003	11.22	0.00	3.50	0.00	1.35	0.71	0.81	2.64	20.23
April 16, 2003	12.06	0.00	3.50	0.00	1.35	0.74	0.85	2.78	21.28
April 1, 2003	14.66	0.00	3.50	0.00	1.33	0.86	0.98	3.20	24.53
March 16, 2003	15.90	0.00	3.50	0.00	1.20	0.91	1.04	3.38	25.93
March 1, 2003	15.27	0.00	3.50	0.00	1.14	0.88	1.00	3.27	25.06
February 16, 2003	13.93	0.00	3.50	0.00	1.14	0.82	0.93	3.05	23.37
February 1, 2003	12.62	0.00	3.50	0.00	1.14	0.76	0.87	2.83	21.72
January 16, 2003	12.63	0.00	3.50	0.00	1.13	0.76	0.87	2.83	21.72
January 1, 2003	12.16	0.00	3.50	0.00	1.13	0.74	0.85	2.76	21.14
December 16, 2002	11.43	0.00	3.50	0.00	1.13	0.71	0.81	2.64	20.22
December 1, 2002	11.28	0.00	3.50	0.00	1.12	0.70	0.80	2.61	20.01
November 16, 2002	12.59	0.00	3.28	0.00	1.12	0.75	0.85	2.79	21.38
November 1, 2002	13.27	0.00	3.07	0.00	1.12	0.77	0.88	2.87	21.98
October 16, 2002	13.03	0.00	2.52	0.00	1.12	0.73	0.84	2.74	20.98
October 1, 2002	12.53	0.00	2.05	0.00	1.12	0.69	0.79	2.58	19.76
September 16, 2002	12.09	0.00	2.49	0.00	1.12	0.69	0.79	2.58	19.76
September 1, 2002	10.47	1.05	2.89	0.00	1.07	0.68	0.78	2.54	19.48
August 16, 2002	10.26	1.03	2.89	-0.05	1.04	0.66	0.76	2.49	19.08
August 1, 2002	10.34	1.03	2.76	0.00	1.04	0.66	0.76	2.49	19.08
July 16, 2002	10.43	1.04	2.76	0.12	1.04	0.67	0.77	2.52	19.35
July 1, 2002	11.50	0.00	2.76	0.12	1.04	0.68	0.78	2.53	19.41
June 16, 2002	10.57	0.00	3.01	0.67	1.04	0.57	0.67	2.48	19.01
June 1, 2002	10.84	0.25	3.15	0.13	1.01	0.57	0.67	2.49	19.11
May 16, 2002	10.79	0.25	2.41	0.28	0.98	0.55	0.64	2.39	18.29
May 1, 2002	10.40	0.25	0.99	-0.05	0.98	0.47	0.55	2.04	15.63
April 16, 2002	10.48	0.25	0.00	0.96	0.88	0.47	0.55	2.04	15.63
April 1, 2002	9.95	0.25	1.05	0.44	0.88	0.47	0.55	2.04	15.63
March 16, 2002	8.84	0.25	2.81	-0.21	0.88	0.47	0.55	2.04	15.63
March 1, 2002	8.75	0.25	2.81	0.14	0.87	0.30	0.47	2.04	15.63
February 16, 2002	8.47	0.25	2.81	0.14	0.87	0.29	0.46	1.99	15.28
February 1, 2002	8.29	0.25	2.81	-0.13	0.88	0.28	0.44	1.92	14.74
January 16, 2002	8.25	0.25	2.81	0.19	0.90	0.29	0.45	1.97	15.11
January 1, 2002	7.97	0.25	2.81	-0.06	0.90	0.28	0.43	1.89	14.47
December 16, 2001	8.04	0.25	2.06	-0.73	0.90	0.24	0.38	1.67	12.81
December 1, 2001	9.29	0.25	2.06	-0.38	0.93	0.28	0.44	1.93	14.80
November 16, 2001	9.72	0.25	2.06	-0.66	1.01	0.29	0.45	1.97	15.09
November 1, 2001	10.29	0.25	2.06	0.00	1.01	0.32	0.50	2.16	16.59
October 16, 2001	10.87	0.25	2.06	0.00	1.04	0.33	0.52	2.26	17.33
October 1, 2001	12.39	0.25	2.06	0.00	1.04	0.37	0.58	2.50	19.19
September 16, 2001	11.74	0.25	2.06	-0.02	0.89	0.35	0.55	2.37	18.19

Date	*Ex-refinery*	*Excise Duty*	*Petroleum Levy*	*PDC*[1]	*Inland Freight*	*OMC Margin*	*Dealer Margin*	*Sales Tax*	*Sale Price*
September 1, 2001	11.38	0.25	2.06	0.01	0.88	0.34	0.53	2.32	17.77
August 16, 2001	11.32	0.25	1.56	-0.35	0.95	0.32	0.50	2.18	16.73
August 1, 2001	11.80	0.25	1.56	-0.19	0.95	0.34	0.53	2.29	17.53
July 16, 2001	11.93	0.25	1.56	-0.08	0.95	0.34	0.53	2.32	17.80
July 1, 2001	12.22	0.25	1.56	0.00	0.95	0.35	0.55	2.38	18.26

Notes*: Prices in Rs per liter. OMC =oil marketing company.*
[1] Prior to 2004, this adjustment figure was not termed a PDC, but simply a differential.
Source*: HDIP and MPNR* (2005).

Annex 2

Household Survey Description

A2.1 This annex describes the 1993–94 and 1996–97 Household Integrated Economic Survey (HIES), and 1998–99 and 2001–02 Pakistan Integrated Household Survey (PIHS). In 1998, the HIES and PIHS were merged, and, as a result, minor modifications were made to the data collection methods and questionnaire to reflect the integration. The 2001–02 survey was the second survey after the merger.

A2.2 Data from the four provinces—Balochistan, the Northwest Frontier Province (NWFP), Punjab, and Sindh—were available in all four surveys. For the data outside of the four provinces, availability varied across surveys. The most comprehensive was the 1998–99 PIHS, which contained data from Azad Jammu and Kashmir (3.2 million people, 490,000 households), the Federally Administered Tribal Areas (2.1 million people, 250,000 households), and the Northern Areas (1.2 million people, 150,000 households). The total sample size in the three areas was 1,482. These areas accounted for about 5 percent of the total population and households in the country. The 2001–02 PIHS had data from Azad Jammu and Kashmir (3.0 million people, 440,000 households) and the Northern Areas (0.9 million people, 110,000 households), with a combined sample size of 1,091 and accounting for 3 percent of the total population and households. The 1996–97 HIES had only Azad Jammu and Kashmir (2.0 million people, 330,000 households, sample size of 639, 2 percent of the total population and households); while the 1993–94 HIES had no comparable data. As annex 4 shows, these areas reported virtually no consumption of natural gas and much higher consumption of kerosene than the rest of the country. The differences caused by the varied sampling areas are small but should be borne in mind in interpreting the data.

A2.3 The information collected by the HIES is shown in Table A2.1. Energy sources are divided into those that have been paid for in cash and those that have been given to, or produced or collected by, the household. Quantities consumed were not requested for natural gas and electricity. The monetary values of cash-free fuels are likely to contain large uncertainties, especially if there is no active market in the vicinity (which could be the case with biomass). The PIHS collected nearly identical information, but bagasse was combined with other agricultural wastes into a single category, reducing the number of categories from 10 in Table A2.1 to 9. Biomass is defined in this report to comprise fuelwood, dung, bagasse, and agricultural residues. There was little use of coal and peat, and they are not included in this report. For the first three surveys, the unit for

the quantity of liquefied petroleum gas (LPG) consumed was the number of cylinders. The most common cylinder size in Pakistan for use by households has been 11.8 kilograms (kg). In the 2001–02 PIHS, the unit for the quantity of LPG consumed was changed to kg. This change in unit appears to have resulted in several cases of misrecording, with some enumerators apparently continuing to write down the number of cylinders instead of kilograms of LPG.

Table A2.1: HIES Questions on Fuel and Lighting

		Paid and Consumed		*Unpaid and Consumed*					
				In Kind		*Own Produced*		*Gifts*	
Energy Source	*Unit*	*Q*	*V*	*Q*	*V*	*Q*	*V*	*Q*	*V*
Fuelwood	Kg								
Kerosene	Liter								
Charcoal	Kg								
Coal and Peat	Kg								
Dungcakes (Dry)	Kg								
Natural Gas	—	N.R.		N.R.		N.R.		N.R.	
LPG	Number								
Electricity	—	N.R.		N.R.		N.R.		N.R.	
Bagasse	Kg								
Agricultural Wastes	Kg								

Notes: — = *not applicable; N.R. = response not requested; Q = quantity; V = value in whole Rs. In kind = given as wages and salaries in kind and consumed; own produced = produced by the household and consumed; gifts = received as assistance, gifts, dowry, inheritance, or from other sources. Agricultural wastes are those used for fuel purposes, such as cotton stick, sawdust, shrubs, weeds, and tobacco sticks.*

A2.4 Because the government had pan-territorial pricing policies for kerosene, natural gas, and electricity during the survey periods, and for natural gas until 2000, nominal, and not adjusted, expenditures and prices were examined for these energy sources. Prices were calculated for all fuels (except natural gas) by dividing expenditures by quantities. Households reporting exceptionally high computed prices for kerosene or LPG were considered outliers and were not used in the analysis. This exclusion resulted in 45 and 17 observations deleted from the 1993–94 and 1996–97 HIES, respectively. In addition, 4 observations for which the respondent appeared to report kilograms of LPG purchased rather than number of cylinders were accordingly adjusted in the 1996–97 HIES survey data.

A2.5 The total population was divided into 10 deciles on the basis of expenditure per capita (excluding expenditures on durable goods). Each expenditure decile contained the same number of *individuals*. Expenditures were adjusted for geographical differences in the cost of living, with the adjustment factor representing the average for the country. Decile 1 represents the lowest expenditure per capita and decile 10 the highest.

Annex 3

Household Survey Findings, National Analysis

A3.1 This annex supplements chapter 2 and provides additional results from the analysis of the four surveys, looking at the entire survey without subdividing results by province. The number of people in each decile, split into urban and rural areas, is shown in Table A3.1. For 2001, the table shows, in addition to the number of individuals in each decile and location, the number of households in each category as well as the average household size. The number of households was fairly constant in rural areas across the 10 deciles, but in urban areas the number increased sixfold from decile 1 to decile 10. In all four surveys, there were more individuals in rural areas in each decile except the top decile; in that decile, the number of people in urban areas exceeded that in rural. Of the 51.5 million people who were in the bottom four deciles in 2001, 81 percent resided in rural areas.

Table A3.1: Population and Household Breakdown as a Function of per Capita Expenditure Decile

	1994		*1997*		*1999*		*2001*					
Decile	*Urban Pop*	*Rural Pop*	*Urban Pop*	*Rural Pop*	*Urban Pop*	*Rural Pop*	*Urban Pop*	*# of HH*	*Average HH Size*	*Rural Pop*	*# HHs*	*of Average HH Size*
1	1.3	7.8	1.5	8.5	2.1	10.1	2.1	0.22	9.6	10.8	1.2	9.3
2	1.6	7.5	2.0	8.0	2.4	9.6	2.6	0.29	8.8	10.3	1.2	8.5
3	1.7	7.3	2.2	7.8	2.5	9.6	2.5	0.28	8.8	10.4	1.3	8.1
4	2.2	6.9	2.5	7.5	2.7	9.4	2.7	0.32	8.3	10.2	1.3	7.9
5	2.4	6.7	2.7	7.2	2.8	9.2	3.3	0.40	8.2	9.6	1.3	7.2
6	2.9	6.2	3.0	6.9	3.2	8.8	3.4	0.45	7.5	9.5	1.4	6.9
7	2.8	6.3	2.9	7.0	3.4	8.6	4.0	0.53	7.4	8.9	1.4	6.5
8	3.3	5.8	3.6	6.4	3.6	8.5	4.4	0.65	6.9	8.4	1.4	6.1
9	3.7	5.4	4.1	5.8	4.5	7.6	4.7	0.77	6.2	8.2	1.5	5.5
10	5.1	4.0	5.6	4.3	6.7	5.4	6.8	1.4	4.9	6.1	1.3	4.7
Total	26.9	63.8	30.2	69.5	34.0	86.8	36.5	5.3	6.9	92.3	13.2	7.0

Notes: *Pop = population in millions; # of HH = number of households in millions.*

A3.2 Monthly expenditures per capita in 2001 rupees as a function of expenditure decile are shown in Table A3.2. They represent the same data as those in Table 2.3 but have been adjusted using the 2001 consumer price index (CPI) as the reference point. Nationally and in urban areas, the highest per capita expenditure was observed in 1999. For the bottom seven deciles in both urban and rural areas, the highest occurred in 1997. For the top three deciles, the highest expenditure per capita was in 1999 except for the seventh urban and top rural deciles, for which the highest was in 1997.

Table A3.2: Monthly Expenditure per Capita in 2001 Rupees

	1994			*1997*			*1999*			*2001*		
Decile	*National*	*Urban*	*Rural*	*National*	*Urban*	*Rural*	*National*	*Urban*	*Rural*	*National*	*Urban*	*Rural*
1	415	421	414	435	447	433	402	406	401	402	409	401
2	527	527	527	556	559	556	528	534	527	516	518	515
3	602	602	602	634	637	634	609	610	609	589	587	590
4	675	674	675	710	709	710	690	689	690	659	660	659
5	747	747	747	783	781	783	768	771	768	730	729	730
6	831	830	831	864	863	865	854	855	854	813	813	813
7	935	939	933	968	971	967	965	965	965	917	918	917
8	1,078	1,080	1,076	1,115	1,119	1,113	1,117	1,118	1,116	1,058	1,057	1,059
9	1,330	1,341	1,324	1,350	1,352	1,349	1,390	1,401	1,384	1,294	1,298	1,293
10	2,654	2,797	2,505	2,492	2,562	2,413	2,754	3,113	2,352	2,413	2,735	2,069
Total	1,105	1,415	980	1,094	1,348	988	1,135	1,515	982	1,046	1,365	918

A3.3 Because the number of households is rising from year to year, electricity and natural gas connections can continue to expand and still show a drop in percentage coverage. Table A3.3 shows the number of households using the various energy sources, and Table A3.4 gives the additional number of households using each energy source from one survey year to the next. In absolute terms, there was an increase in the number of households using each energy source, with the exceptions of kerosene, for which there was a steady decline, and fuelwood between 1999 and 2001. Electricity and natural gas both registered the smallest increase between 1997 and 1999. As Table 2.4 shows, in percentage terms, electricity use showed a temporary drop in 1999 and remained essentially unchanged between 1997 and 2001. The number of LPG users fell in urban areas in 2001, but the decrease was much smaller than the increase in the number of new natural gas connections. Because natural gas is much cheaper than LPG on the basis of unit of usable energy delivered, it is likely that this indicates that some urban users switched from LPG to natural gas. The number of LPG-using households decreased more in urban areas than in rural areas, resulting in a net loss between 1999 and 2001 when the LPG market was increasingly deregulated and international prices of LPG rose. The government imposed an implicit price cap on LPG in 2001, resulting on occasion in supply shortage.

Table A3.3: Number of Households in Millions Using Different Energy Sources

Area and Survey Year	*Biomass*	*Wood*	*Dung*	*Agr Resid*	*Electricity*	*Kerosene*	*Natural Gas*	*LPG*
National								
1994	11.0	8.9	4.0	3.0	9.6	9.1	2.1	0.6
1997	12.4	10.1	4.3	3.5	12.6	8.3	2.8	0.9
1999	13.6	11.1	5.4	3.6	13.1	8.1	3.1	1.5
2001	14.2	10.7	5.7	4.8	14.2	7.2	3.7	1.5
Urban								
1994	1.4	1.3	0.4	0.1	3.8	1.4	2.1	0.3
1997	1.5	1.4	0.3	0.2	4.6	1.2	2.7	0.3
1999	1.6	1.4	0.5	0.2	4.8	1.2	2.9	0.5
2001	1.6	1.3	0.5	0.3	5.1	0.7	3.3	0.4
Rural								
1994	9.6	7.6	3.7	2.8	5.8	7.7	0.1	0.3
1997	11.0	8.7	4.0	3.3	8.0	7.1	0.1	0.5
1999	12.1	9.8	5.0	3.4	8.3	6.9	0.2	1.0
2001	12.5	9.4	5.2	4.5	9.1	6.5	0.4	1.1

Note: *Agr resid = bagasse, cotton sticks, sawdust, shrubs, weeds, tobacco sticks, and so on for fuel purposes.*

Table A3.4: Additional Number of Households Using Different Energy Sources

Area and Beginning and End Years	*Biomass*	*Wood*	*Dung*	*Agr Resid*	*Electricity*	*Kerosene*	*Natural Gas*	*LPG*
National								
1994–1997	1.4	1.2	0.3	0.5	2.9	-0.8	0.7	0.3
1997–1999	1.2	1.0	1.1	0.1	0.5	-0.2	0.3	0.7
1999–2001	0.5	-0.4	0.2	1.2	1.2	-0.9	0.6	0.0
1994–2001	3.1	1.8	1.6	1.8	4.6	-1.9	1.6	0.9
Urban								
1994–1997	0.0	0.1	0.0	0.0	0.7	-0.1	0.6	0.1
1997–1999	0.1	0.0	0.1	0.0	0.2	0.0	0.2	0.2
1999–2001	0.1	0.0	0.0	0.1	0.3	-0.5	0.4	-0.1
1994–2001	0.2	0.0	0.1	0.1	1.2	-0.6	1.2	0.2
Rural								
1994–1997	1.4	1.1	0.3	0.5	2.2	-0.6	0.1	0.2
1997–1999	1.1	1.0	1.0	0.1	0.3	-0.2	0.1	0.5
1999–2001	0.5	-0.4	0.2	1.1	0.9	-0.4	0.2	0.1
1994–2001	2.9	1.8	1.5	1.7	3.3	-1.2	0.4	0.8

Note: *Agr resid = bagasse, cotton sticks, sawdust, shrubs, weeds, tobacco sticks, and so on for fuel purposes.*

A3.4 As discussed in chapter 2, the percentage of households using free biomass increased steadily from 1994 to 2001. Figure A3.1 and Figure A3.2 show the statistics for each expenditure decile in the four survey years for urban and rural households, respectively. The increase in the percentage of urban households among the bottom four deciles using free biomass is striking. Even the highest decile did not drop in its use of free biomass between 1994 and 2001.

Figure A3.1: Percentage of Urban Households Using Free Biomass

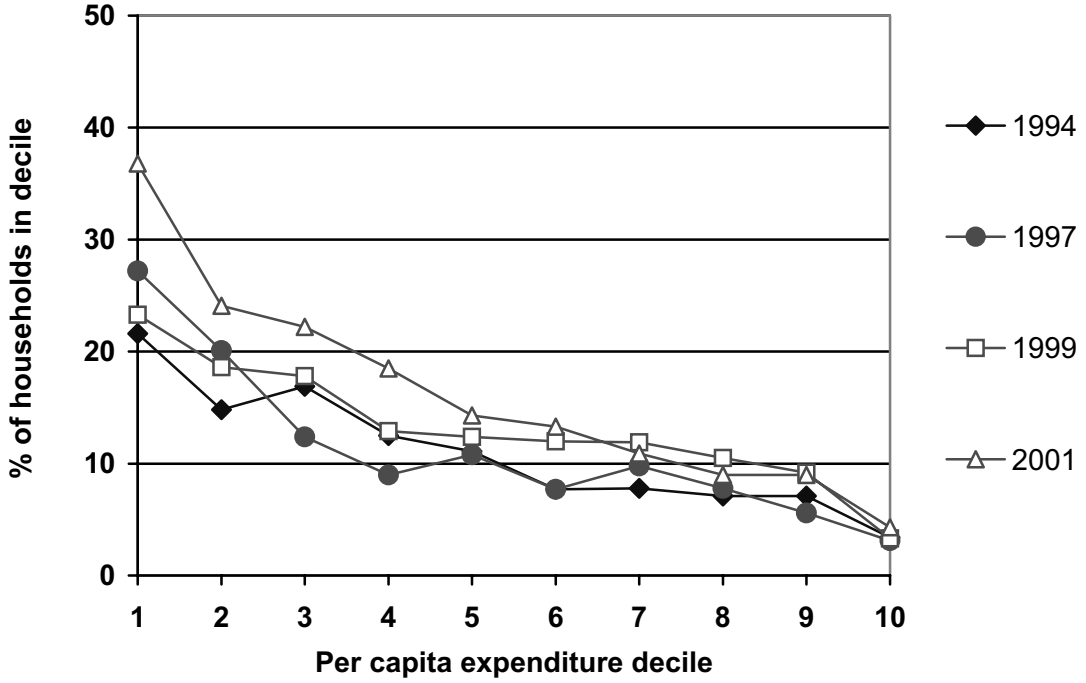
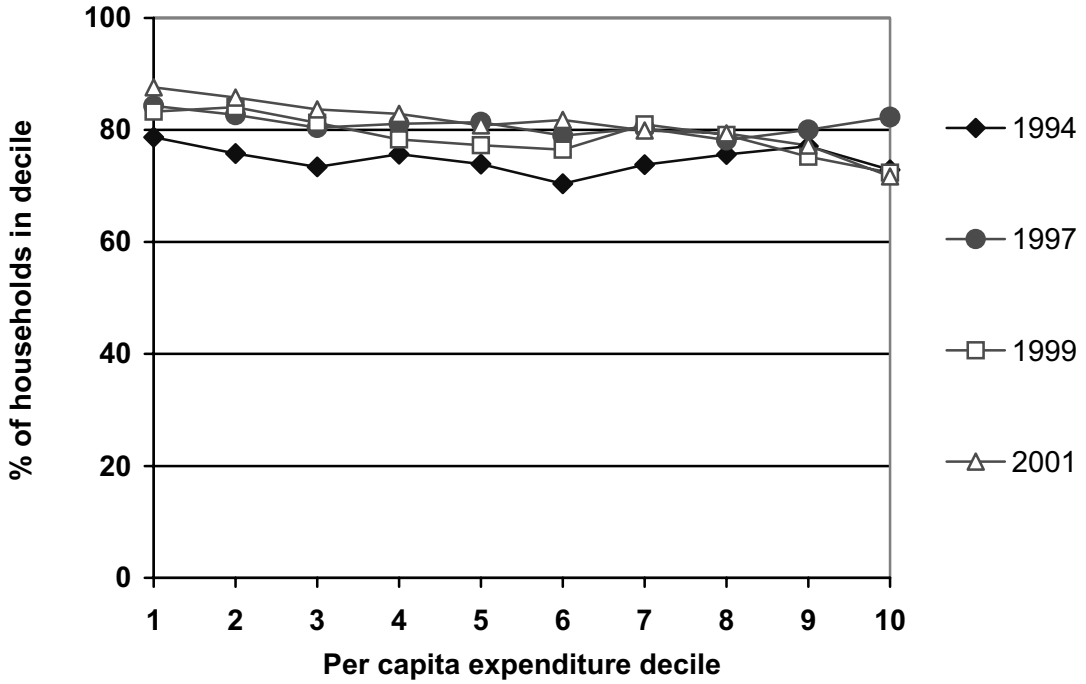


Figure A3.2: Percentage of Rural Households Using Free Biomass



A3.5 A breakdown of biomass into fuelwood, dung, and agricultural residues shows that, nationally, the percentage of households using free fuelwood remained unchanged between 1994 and 2001, although there were interim increases, particularly in 1999, as Figure A3.3 shows.

A3.6 The percentage of households using free dung increased markedly between 1997 and 1999 among the bottom four deciles, while the percentage of households using free dung remained nearly constant between the second and ninth deciles. This is shown in Figure A3.4. As expected, nearly all agricultural residues consumed were obtained free by households. Figure A3.5 shows the historical evolution of household use of agricultural residues as a function of expenditure decile. There was little change between 1994 and 1999, and a marked increase in 2001. The percentage of households using agricultural residues more than doubled from the top to the bottom decile in 2001.

Figure A3.3: Percentage of Households Using Free Fuelwood

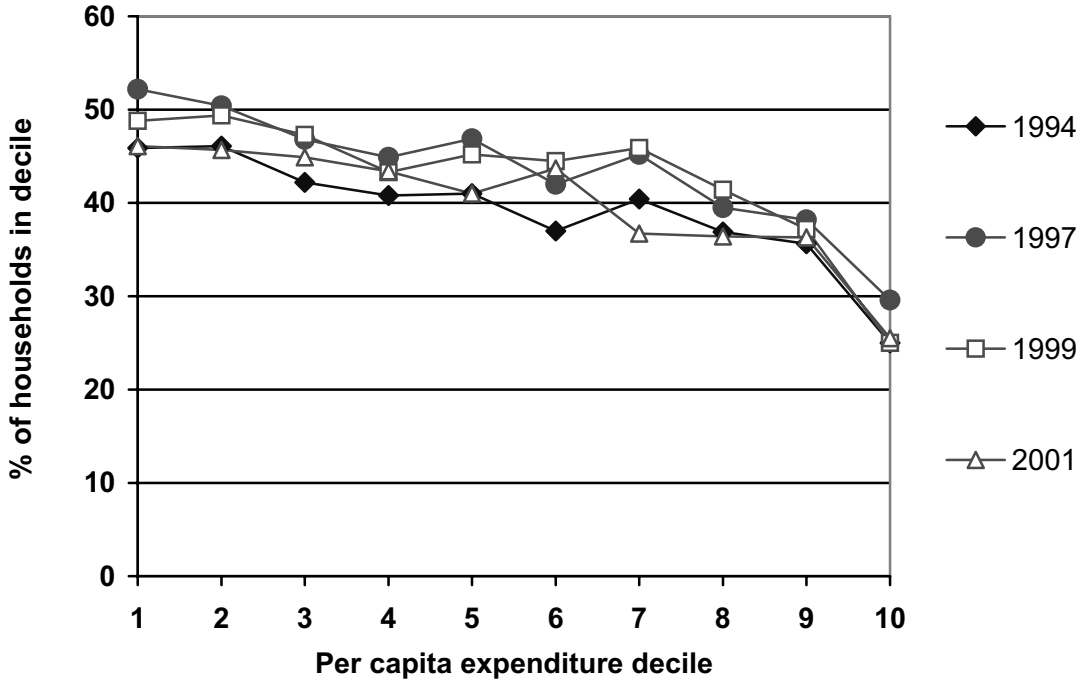


Figure A3.4: Percentage of Households Using Free Dung

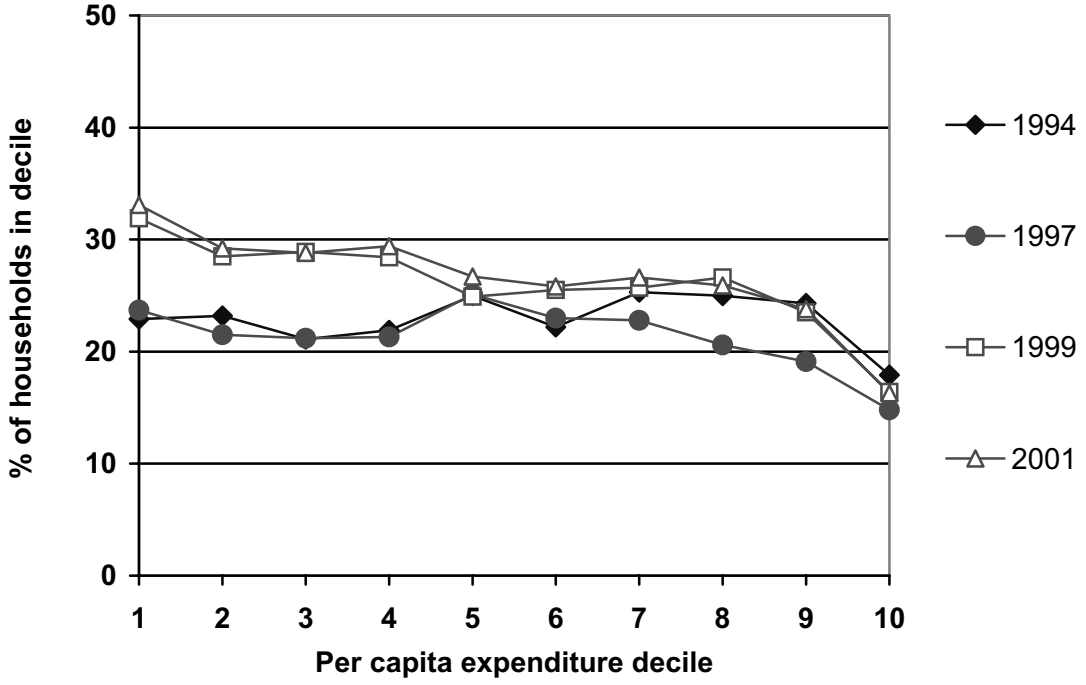
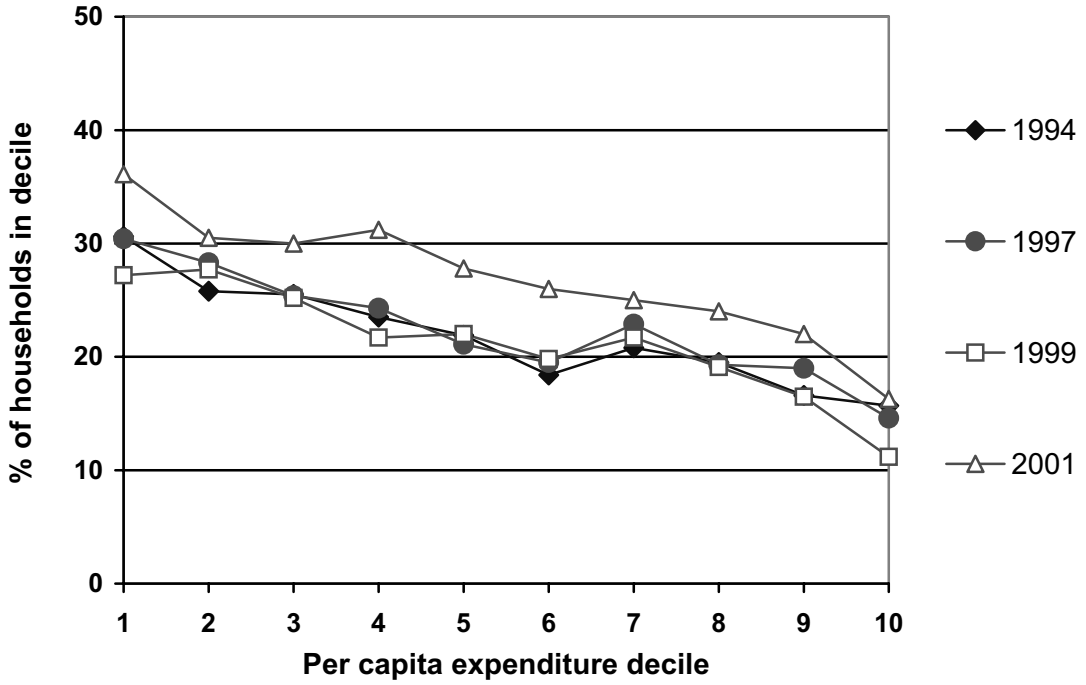
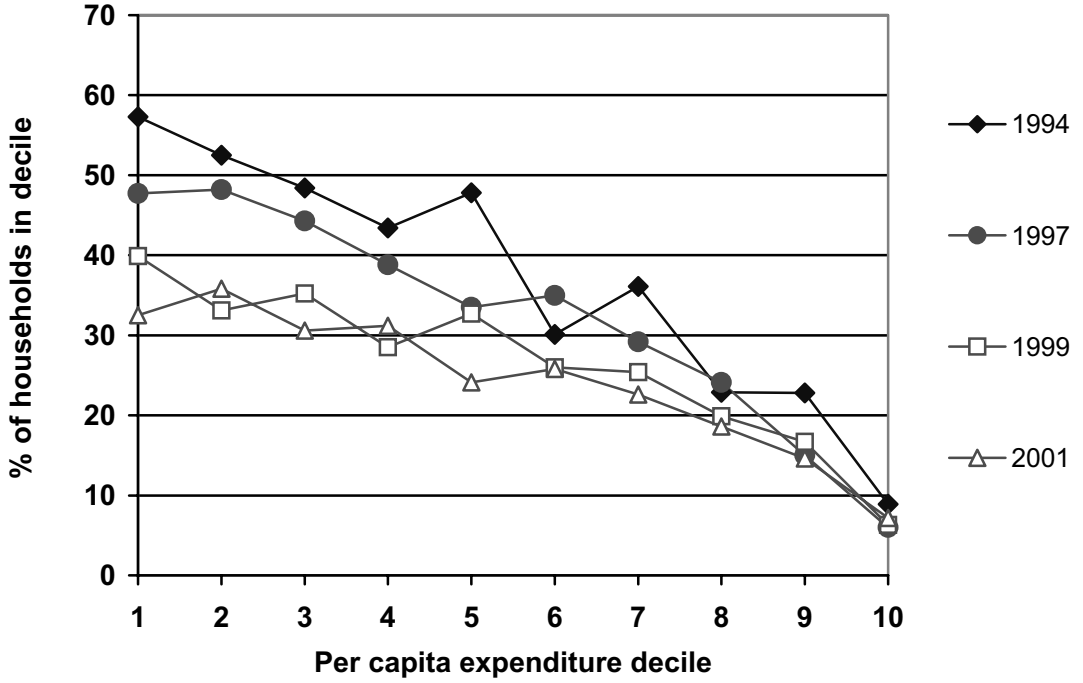


Figure A3.5: Percentage of Households Using Agricultural Residues



A3.7 The proportion of households purchasing fuelwood declined between 1994 and 2001. Figure A3.6 and Figure A3.7 show the percentage of households buying fuelwood by decile in urban and rural areas, respectively. Nationally, the percentage fell from 27 percent in 1994 to 21 percent in 2001; this decline was largest for the bottom decile, and there was no change for the top decile. In urban areas, the proportion of households purchasing fuelwood fell in every decile, but the proportion for the top two deciles in rural areas increased.

Figure A3.6: Percentage of Urban Households Buying Wood



A3.8 The number of households in the top four energy-choice combinations is presented in Table 2.5 in chapter 2. Table A3.5 to Table A3.8 show energy-choice combinations by decile. In each table, the percentage of households in each decile that were consuming a given set of energy sources—for example, kerosene, biomass, and electricity—is shown for the top five energy-choice combinations. The percentage of all households for each combination is shown under "aggregate." In 2001, about one-third of all households were using only biomass and electricity, followed by nearly one-quarter that were using natural gas and electricity only.

Figure A3.7: Percentage of Rural Households Buying Wood

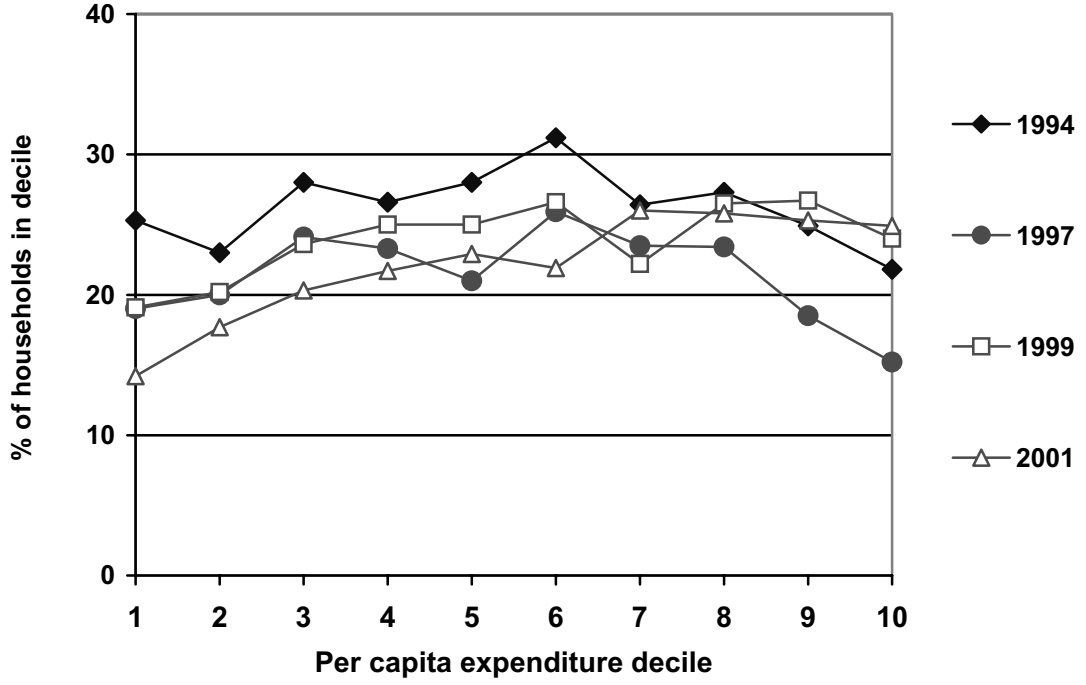


Table A3.5: Percentage of Households for Top Five Energy-Choice Combinations by Decile, 1994

Expenditure Decile	*Kerosene-biomass-electricity*	*Biomass-kerosene*	*Biomass-electricity*	*Gas-electricity*	*Kerosene-electricity*
1	29.8	39.5	18.8	2.7	0.8
2	32.3	35.7	19.4	4.2	2.1
3	30.4	34.8	21.3	4.8	1.3
4	33.6	32.6	18.1	7.3	2.5
5	35.2	31.4	18.2	6.4	1.4
6	29.8	26.0	18.4	14.0	2.1
7	29.1	30.7	18.0	12.6	2.3
8	29.0	26.2	15.6	18.4	2.7
9	30.0	21.5	14.0	18.9	5.3
10	20.4	14.8	11.5	36.6	4.4
Aggregate	29.3	27.9	16.8	14.6	2.7

Table A3.6: Percentage of Households for Top Five Energy-Choice Combinations by Decile, 1997

Expenditure Decile	*Biomass-electricity*	*Kerosene-biomass-electricity*	*Biomass-kerosene*	*Gas-electricity*	*Kerosene-electricity*
1	29.8	27.2	32.4	3.7	1.0
2	29.6	33.2	25.4	6.3	1.1
3	27.3	30.7	26.0	8.9	0.7
4	29.5	29.2	23.6	10.2	1.5
5	31.7	26.2	21.7	12.1	2.0
6	27.7	28.4	21.9	14.0	2.2
7	28.7	28.6	19.0	13.6	2.1
8	27.8	26.1	16.7	19.2	2.2
9	23.9	22.9	15.3	25.2	2.7
10	17.3	17.0	9.3	40.2	3.5
Aggregate	26.7	26.2	20.0	17.3	2.1

Table A3.7: Percentage of Households for Top Five Energy-Choice Combinations by Decile, 1999

Expenditure Decile	*Biomass-electricity*	*Kerosene-biomass-electricity*	*Biomass-kerosene*	*Gas-electricity*	*Biomass*
1	26.7	14.7	31.5	4.7	14.6
2	30.3	19.1	26.0	7.3	9.4
3	30.8	22.9	24.1	8.6	6.2
4	32.1	20.9	21.1	11.9	5.2
5	29.9	20.8	21.9	11.7	5.6
6	28.8	23.9	17.7	14.0	4.8
7	26.9	24.3	18.0	14.2	4.2
8	26.1	22.0	16.8	16.1	4.3
9	20.8	20.1	14.6	21.7	3.9
10	16.3	13.2	7.6	38.1	1.3
Aggregate	26.0	20.0	18.7	16.6	5.4

Table A3.8: Percentage of Households for Top Five Energy-Choice Combinations by Decile, 2001

Expenditure Decile	*Biomass-electricity*	*Gas-electricity*	*Biomass-kerosene*	*Kerosene-biomass-electricity*	*Biomass*
1	36.3	6.3	30.8	14.1	9.6
2	37.7	8.5	26.8	16.6	4.9
3	38.1	8.8	24.7	18.2	4.1
4	41.3	11.1	21.3	15.9	2.9
5	36.3	15.6	21.4	15.8	3.5
6	32.9	15.6	19.9	18.0	4.2
7	33.6	18.7	15.9	17.5	3.4
8	31.3	22.9	16.1	15.8	2.2
9	27.8	25.0	11.7	17.7	2.9
10	19.6	41.1	6.6	10.2	1.5
Aggregate	32.4	19.3	18.2	15.8	3.6

Annex 4

Household Survey Findings: Regional Analysis

A4.9 This annex summarizes the analysis carried out for the four provinces in Pakistan: Punjab, Sindh, the Northwest Frontier Province (NWFP), and Balochistan. Compared to the analysis of the nationwide survey, analysis by province suffers from smaller sample sizes. For example, in the 2001–2002 PIHS, the total sample size was 16,000 but 2,000 in Balochistan. The manifestations of these limitations are noted in this annex. A brief description of findings from other areas, where data are available, is also given.

Punjab

A4.10 Punjab is the largest province in Pakistan, and expenditure per capita shows that the inhabitants were slightly better off than the national average (shown in Table 2.1). As in the rest of the provinces, the expenditure per capita of the top decile was markedly higher than those of lower deciles. Between 1994 and 2001, expenditures per capita declined in real terms, especially for the top decile. Household expenditures were lower than the national average in 1999 and 2001. Urban household expenditures declined in real terms between 1994 and 2001.

A4.11 The distribution of individuals in nationally defined per capita expenditure deciles is shown in Table A4.2. The distribution of urban residents was close to the national average, but there was a higher concentration of rural households in upper deciles. The largest concentration of urban residents was in the top decile, and of rural residents in the ninth decile (against the bottom decile for the national statistics). Household sizes were smaller than the national average in both urban and rural areas.

A4.12 The percentages of households using various sources of energy in Punjab are shown in Table A4.3. The uptake of dung, agricultural residues, and biomass was higher, and of natural gas and LPG lower, than the national average in each survey year. Fuelwood uptake was markedly lower than the national average in rural areas, especially in 2001. Kerosene and LPG uptake was lower in rural areas but higher in urban areas compared to the national average. Electricity uptake among rural households was somewhat higher than the national average in rural areas, but not enough to explain the lower uptake of kerosene in 1999 and 2001. Much higher uptake of dung and agricultural residues in rural areas seemed to compensate for lower use of fuelwood.

Table A4.1: Population Statistics in Punjab, by Survey Year

Parameter	*1994*	*1997*	*1999*	*2001*
Total Population	52,400,000	57,500,000	64,300,000	70,100,000
Urban Population	14,500,000	16,500,000	18,600,000	20,200,000
Percent Urban	28	29	29	29
Rural Population	37,900,000	41,000,000	45,800,000	49,900,000
Percent Rural	72	71	71	71
Total Number of Households	8,300,000	9,400,000	9,900,000	10,700,000
Urban Households	2,300,000	2,600,000	2,800,000	3,000,000
Rural Households	6,000,000	6,800,000	7,100,000	7,700,000
Per Capita Expenditure [1]	697	947	1,069	1,063
Urban per Capita Expenditure [1]	865	1,132	1,417	1,295
Rural per Capita Expenditure [1]	634	876	929	971
Household Expenditure [2]	3,753	5,202	6,174	6,247
Urban Household Expenditure [2]	4,634	6,359	7,950	7,468
Rural Household Expenditure [2]	3,423	4,762	5,462	5,764
Adjusted per Capita Expenditure [3]	1,147	1,127	1,151	1,063
Urban per Capita Expenditure [3]	1,422	1,348	1,525	1,295
Rural per Capita Expenditure [3]	1,043	1,043	1,000	971
Household Expenditure [3]	6,173	6,196	6,647	6,247
Urban Household Expenditure [3]	7,622	7,574	8,558	7,468
Rural Household Expenditure [3]	5,630	5,671	5,880	5,764

[1] Nominal per capita expenditures in rupees per month, inclusive of imputed and cash outlays.
[2] Nominal total household expenditures in rupees per month, inclusive of imputed and cash outlays.
[3] Monthly expenditures adjusted for the CPI with 2001 as the base year.

Table A4.2: Population and Household Statistics as Function of per Capita Expenditure Decile in Punjab

	1994		*1997*		*1999*		*2001*					
Decile	*Urban Pop*	*Rural Pop*	*Urban Pop*	*Rural Pop*	*Urban Pop*	*Rural Pop*	*Urban Pop*	*# of HHs*	*Average HH Size*	*Rural Pop*	*# of HHs*	*Average HH Size*
1	0.8	4.7	0.9	4.3	1.3	5.0	1.3	0.1	9.0	5.1	0.6	8.4
2	0.9	4.1	1.1	4.1	1.5	4.9	1.5	0.2	8.2	4.8	0.6	7.9
3	1.0	3.8	1.2	4.4	1.4	4.9	1.2	0.2	8.1	5.0	0.7	7.6
4	1.1	3.6	1.4	4.1	1.4	4.9	1.4	0.2	7.8	5.0	0.7	7.3
5	1.3	3.7	1.5	4.1	1.5	4.6	1.7	0.2	7.7	5.2	0.7	7.0
6	1.5	3.4	1.6	4.0	1.7	4.5	1.9	0.3	7.1	4.7	0.7	6.5
7	1.6	4.0	1.6	4.4	1.8	4.6	2.2	0.3	7.0	5.2	0.9	6.1
8	1.6	3.7	2.1	4.4	1.8	4.5	2.5	0.4	6.6	5.1	0.9	5.9
9	2.0	3.7	2.2	4.1	2.4	4.3	2.5	0.4	6.1	5.5	1.0	5.4
10	2.7	3.1	3.1	3.2	3.8	3.4	3.8	0.8	4.9	4.3	0.9	4.6
Total	14.5	37.9	16.5	41.0	18.6	45.8	20.2	3.0	6.6	49.9	7.7	6.5

Notes: *Pop = population in millions; # of HH = number of households in millions.*

Table A4.3: Percentage of Households in Punjab Using Different Energy Sources

Area and Survey Year	*Biomass*	*Wood*	*Dung*	*Agr Resid*	*Electricity*	*Kerosene*	*Natural Gas*	*LPG*
Punjab								
1994	81	60	35	29	70	65	12	3.9
1997	80	59	34	30	77	52	14	3.9
1999	79	56	42	30	77	41	14	6.7
2001	78	48	38	40	79	30	18	6.2
Urban								
1994	43	38	11	4.4	94	39	43	8.1
1997	36	33	10	4.6	96	32	48	7.6
1999	37	31	13	5.7	94	30	46	11.5
2001	34	26	12	8.2	96	13	56	8.6
Rural								
1994	95	68	44	39	61	75	0.3	2.3
1997	97	69	44	40	70	60	1.3	2.5
1999	96	66	54	40	70	45	1.1	4.7
2001	95	56	49	52	72	37	2.5	5.2

Note: *Agr resid = bagasse, cotton sticks, sawdust, shrubs, weeds, tobacco sticks, and so on for fuel purposes.*

A4.13 In terms of numbers of households, those using biomass, agricultural residues, electricity, and natural gas steadily increased between 1994 and 2001 in the province. The largest decrease was in the number of kerosene consumers. Table A4.4 shows the results. The number of LPG users increased steadily in rural areas but fell slightly between 1999 and 2001 in urban areas. The decrease of 63,000 in the number of LPG-consuming urban households was much smaller than the increase of 400,000 in the number of natural-gas consuming households, indicating that most new natural gas users were not previously using LPG.

Table A4.4: Number of Households in Punjab Using Different Energy

Number of Households in Millions

Area and Survey Year	*Biomass*	*Wood*	*Dung*	*Agr Resid*	*Electricity*	*Kerosene*	*Natural Gas*	*LPG*
Punjab								
1994	6.7	5.0	2.9	2.4	5.8	5.4	1.0	0.32
1997	7.5	5.6	3.2	2.8	7.2	4.9	1.3	0.36
1999	7.8	5.5	4.2	3.0	7.6	4.1	1.4	0.66
2001	8.4	5.1	4.1	4.3	8.5	3.2	1.9	0.66
Urban								
1994	1.0	0.9	0.3	0.1	2.1	0.9	1.0	0.18
1997	0.9	0.9	0.3	0.1	2.5	0.8	1.2	0.20
1999	1.1	0.9	0.4	0.2	2.7	0.8	1.3	0.33
2001	1.0	0.8	0.4	0.2	2.9	0.4	1.7	0.26
Rural								
1994	5.8	4.1	2.7	2.3	3.7	4.6	0.0	0.14
1997	6.6	4.7	3.0	2.7	4.8	4.1	0.1	0.17
1999	6.7	4.6	3.8	2.8	5.0	3.2	0.1	0.33
2001	7.3	4.3	3.7	4.0	5.6	2.8	0.2	0.40

Note: *Agr resid = bagasse, cotton sticks, sawdust, shrubs, weeds, tobacco sticks, and so on for fuel purposes.*

A4.14 Table A4.5 shows the top four energy-choice combinations used by households. The ranking was similar to the national average.

Table A4.5: Number of Households in Punjab in the Top Four Energy-Choice Combinations

	Top Choice	*Second Choice*	*Third Choice*	*Fourth Choice*
Punjab				
1994	Kero-bio-elec	Bio-kero	Bio-elec	Gas-elec
# of Households	2,700,000	2,200,000	1,600,000	940,000
1997	Bio-elec	Kero-bio-elec	Bio-kero	Gas-elec
# of Households	2,800,000	2,500,000	1,900,000	1,300,000
1999	Bio-elec	Kero-bio-elec	Bio-kero	Gas-elec
# of Households	3,200,000	2,100,000	1,500,000	1,300,000
2001	Bio-elec	Gas-elec	Bio-kero	Kero-bio-elec
# of Households	4,500,000	1,800,000	1,600,000	1,300,000
Urban				
1994	Gas-elec	Kero-bio-elec	Bio-elec	Kero-elec
# of Households	930,000	510,000	290,000	160,000
1997	Gas-elec	Kero-bio-elec	Bio-elec	Kero-elec
# of Households	1,200,000	470,000	350,000	200,000
1999	Gas-elec	Kero-bio-elec	Bio-elec	LPG-elec
# of Households	1,300,000	460,000	360,000	190,000
2001	Gas-elec	Bio-elec	Kero-bio-elec	LPG-elec
# of Households	1,700,000	640,000	200,000	130,000
Rural				
1994	Kero-bio-elec	Bio-kero	Bio-elec	Kero
# of Households	2,200,000	2,100,000	1,300,000	100,000
1997	Bio-elec	Kero-bio-elec	Bio-kero	Biomass
# of Households	2,400,000	2,000,000	1,900,000	85,000
1999	Bio-elec	Kero-bio-elec	Bio-kero	Biomass
# of Households	2,800,000	1,600,000	1,400,000	620,000
2001	Bio-elec	Bio-kero	Kero-bio-elec	Biomass
# of Households	3,800,000	1,600,000	1,100,000	460,000

A4.15 The historical progression of the uptake of different energy sources is shown in Figure A4.1 to Figure A4.4. Fuelwood showed an unusual pattern of increasing uptake with increasing expenditure for the bottom six deciles in 2001.

Figure A4.1: Natural Gas, LPG, and Electricity Uptake in Punjab

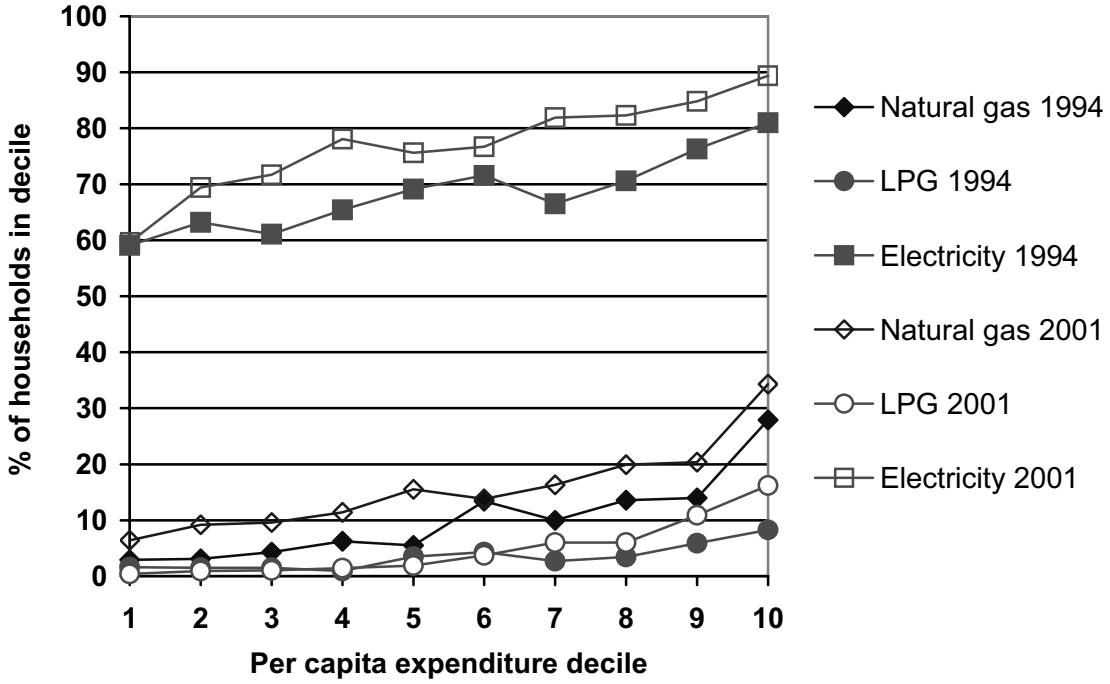


Figure A4.2: Wood, Biomass, and Kerosene Uptake in Punjab

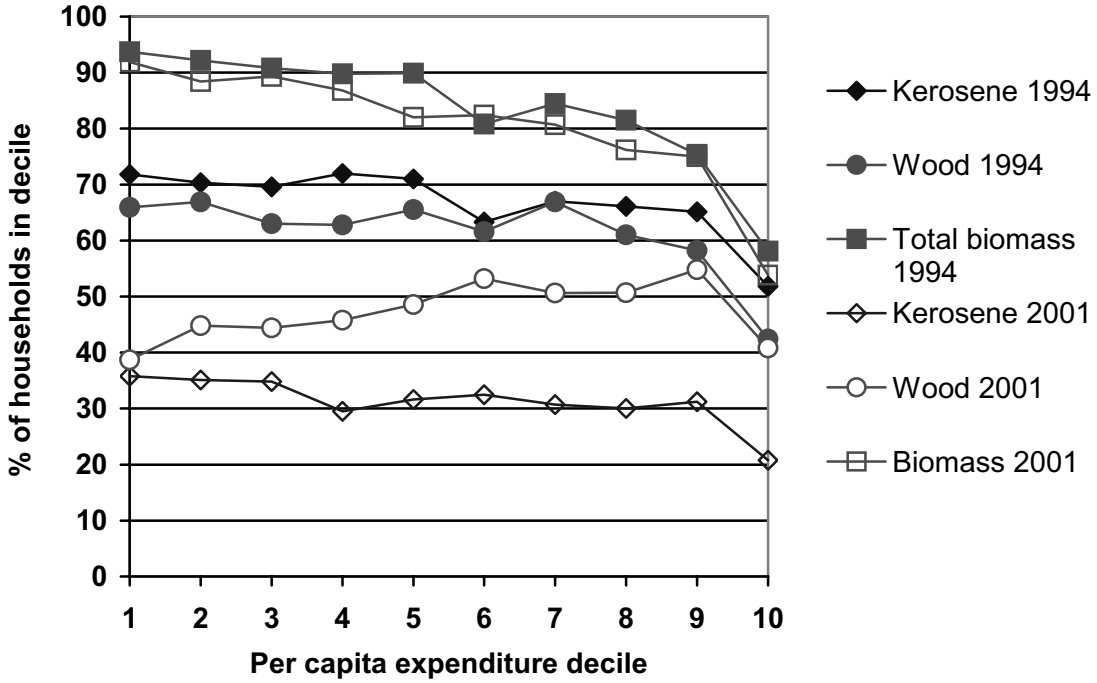


Figure A4.3: Natural Gas, LPG, and Electricity Uptake in Urban Punjab

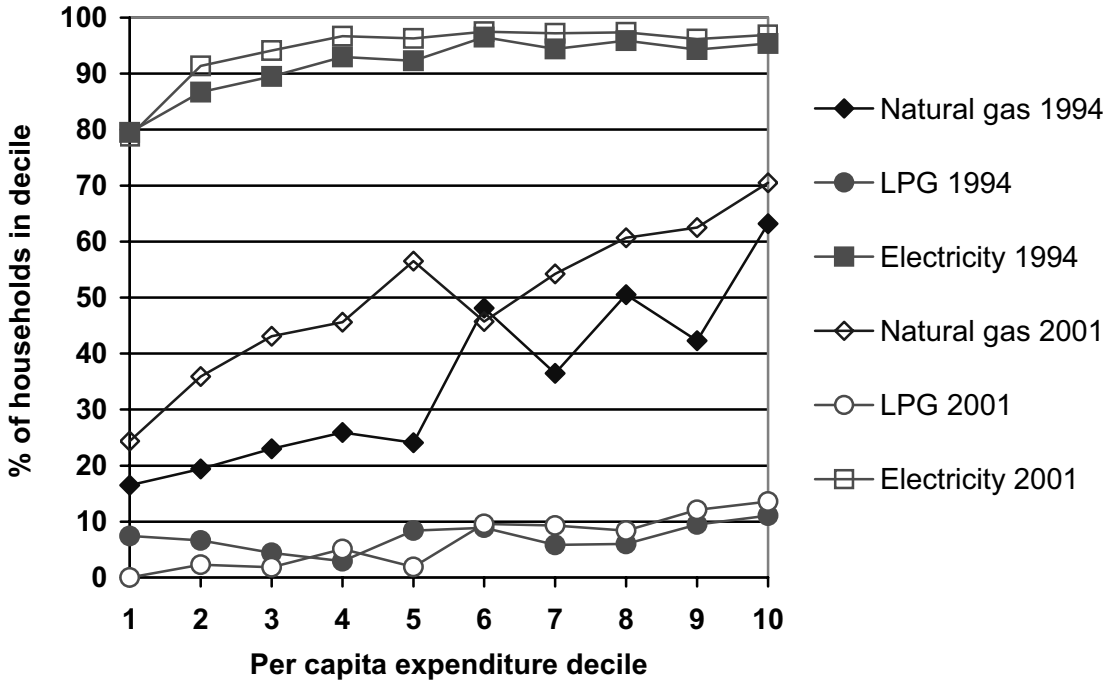
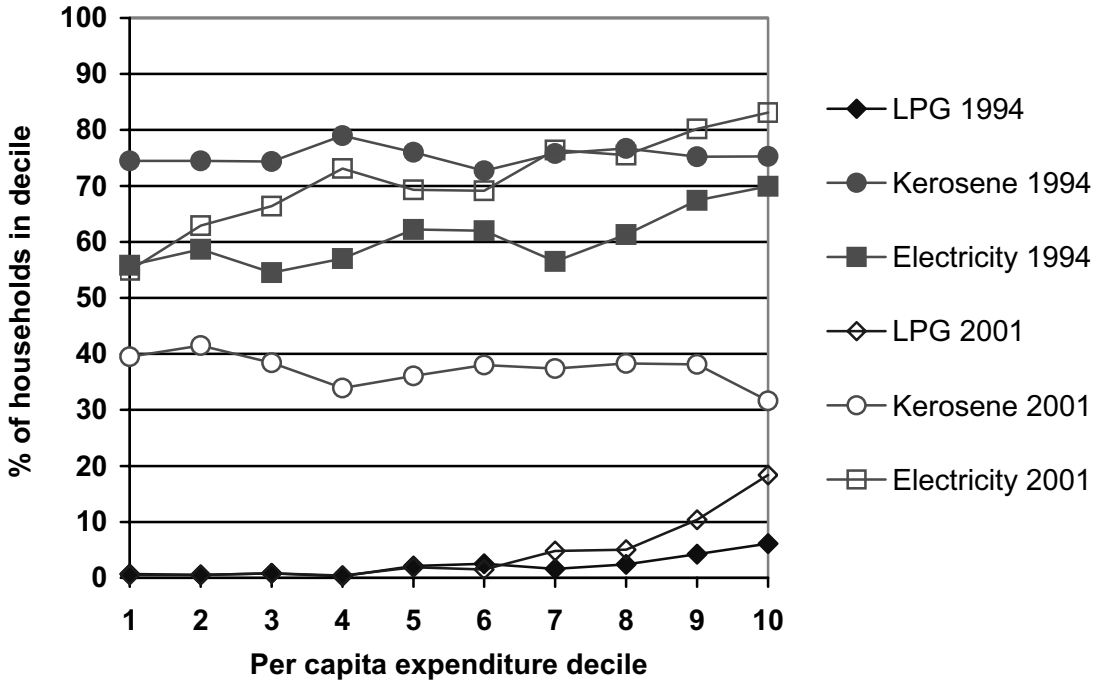


Figure A4.4: LPG, Kerosene, and Electricity Uptake in Rural Punjab



A4.16 Table A4.6 shows how much LPG, kerosene, and fuelwood were consumed by households in a month in Punjab. The sudden drop in the amount of LPG consumed by purchasers in 2001 mirrors a similar trend in the national statistics. Among the purchasers, LPG consumption in 2001 was higher than the national average, as was kerosene consumption in urban areas, whereas fuelwood consumption was lower. Prices paid for kerosene were broadly consistent with pan-territorial pricing. The price of LPG in 1999 was markedly higher in Punjab than the national average.

Table A4.6: Monthly Household Purchase or Consumption in Punjab

Area and Survey Year	*LPG Cylinder Buyers*	*Rs/Cylinder*	*Liters Kerosene Buyers*	*Rs/Liter Kerosene Buyers*	*Kg Wood, all Households*	*Kg Wood Users*	*Kg Wood Buyers*
Punjab							
1994	1.2	109	4.3	7.0	63	106	85
1997	1.3	185	3.8	10.5	74	124	93
1999	1.7	183	4.0	11.8	53	94	93
2001	0.8	387	3.0	18.7	49	103	98
Urban							
1994	1.2	153	8.0	6.8	37	95	89
1997	1.4	246	8.5	10.4	36	109	105
1999	1.8	187	8.7	11.7	32	104	103
2001	0.8	373	7.1	18.5	25	96	94
Rural							
1994	1.3	146	3.6	7.1	73	108	82
1997	1.2	218	2.9	10.6	88	126	87
1999	1.6	180	2.7	11.9	61	92	89
2001	0.8	397	2.4	18.8	58	104	100

Notes: *LPG cylinder buyers = number of LPG cylinders purchased per month; Rs/cylinder = nominal rupees paid per cylinder; all households = averaged across all households; users = averaged across all users; buyers = averaged across purchasers only.*

A4.17 Table A4.7 and Table A4.8 show the expenditure statistics averaged across purchasers only. By considering only purchasers, the effect of varying uptake is factored out, so that only the effects of energy prices and amounts consumed are reflected. With the exception of biomass, households in Punjab devoted more of their total expenditures toward purchasing energy in 1999 and 2001 than did the nation as a whole. In rupees, they also spent more on electricity, natural gas, and LPG. Because electricity and natural gas tariffs were uniform across the country, if these findings are correct, an immediate implication is that households in Punjab consumed more electricity and natural gas. Expenditures in rupees on electricity, natural gas, kerosene, and LPG increased faster than the CPI. The greatest increase was observed with electricity—twice the increase in the CPI—followed by LPG, natural gas, and kerosene. The rate of

increase in expenditures in rupees on natural gas was about the same as the national average, and somewhat less than the rate of tariff increases; this suggests that consumption, if anything, declined per household.

Table A4.7: Monthly Expenditure on Purchased Energy in Punjab

Nominal Rupees Averaged across Purchasers

Area and Survey Year	*Electricity*	*Natural Gas*	*Kerosene*	*LPG*	*Wood*
Punjab					
1994	104	134	30	150	95
1997	177	183	40	233	135
1999	282	239	47	280	142
2001	344	257	56	302	155
Urban					
1994	147	134	54	153	106
1997	231	189	88	246	149
1999	388	241	102	304	163
2001	460	258	131	305	153
Rural					
1994	80	103	25	146	90
1997	148	83	30	218	128
1999	227	195	33	257	134
2001	283	243	46	300	156

Table A4.8: Purchased Energy in Punjab

In Percentage of Total Household Spending, Averaged across Purchasers

Area and Survey Year	*Electricity*	*Natural Gas*	*Kerosene*	*LPG*	*Biomass*	*Total Energy*
Punjab						
1994	2.6	2.4	1.0	3.4	3.5	4.0
1997	3.4	2.6	1.0	3.8	3.4	4.6
1999	4.5	3.0	1.0	3.7	3.3	5.9
2001	5.5	3.5	1.2	3.9	3.4	6.7
Urban						
1994	3.0	2.4	1.5	3.5	3.5	5.9
1997	3.7	2.7	1.9	3.7	3.7	6.8
1999	4.8	3.0	1.9	3.5	3.6	7.9
2001	6.0	3.4	2.3	4.0	3.3	9.2
Rural						
1994	2.4	1.2	0.9	3.4	3.4	3.3
1997	3.2	1.6	0.8	3.8	3.3	3.8
1999	4.3	3.4	0.8	3.9	3.2	5.0
2001	5.2	4.4	1.0	3.8	3.4	5.7

A4.18 Table A4.9 shows monthly cash expenditures on electricity, natural gas, kerosene, LPG, and all forms of energy (including purchased biomass, coal, and charcoal) averaged across all households. Increasing tariffs as well as increasing uptake contributed to sharp rises in amounts spent on electricity, natural gas, and LPG. The greatest deviation from the national average lies with electricity, on which more was spent in Punjab than nationally in 1999 and 2001. Kerosene registered a decline. In real terms, the amount of rupees spent on electricity increased by 125 percent between 1994 and 2001. This was followed by LPG at 93 percent and natural gas at 74 percent. The increase in expenditure was greater than the national average for electricity and natural gas.

Table A4.9: Nominal Monthly Household Expenditures on Purchased Energy in Punjab

In Rupees, Averaged across all Households

Area and Survey Year	*Electricity*	*Natural Gas*	*Kerosene*	*LPG*	*OGE*	*Non-OGE*	*% OGE*
Punjab							
1994	72	16	20	6	113	33	78
1997	134	25	21	9	190	39	83
1999	214	32	19	18	284	47	86
2001	267	45	17	18	347	46	88
Urban							
1994	135	57	21	12	225	40	85
1997	220	90	28	19	356	49	88
1999	356	108	30	35	529	51	91
2001	434	143	17	26	619	43	94
Rural							
1994	49	0.2	19	3	71	30	71
1997	102	1	18	5	127	35	78
1999	158	2	15	12	186	46	80
2001	201	6	17	15	239	47	83

Note*: OGE = oil products, gas, and electricity; non-OGE = biomass, coal, and charcoal; % OGE = percentage spent on oil products, gas, and electricity out of total expenditure on energy purchase.*

A4.19 Table A4.10 shows cash expenditures on various energy sources as a percentage share of the total household expenditure, averaged across all households. The trends shown mirror those discussed for Table A4.9.

Table A4.10: Purchased Energy as Share of Household Expenditures in Punjab

In Percentage of Total Spending, Averaged across all Households

Area and Survey Year	*Electricity*	*Natural Gas*	*Kerosene*	*LPG*	*Biomass*	*Total Energy*
Punjab						
1994	1.8	0.3	0.6	0.1	1.1	4.0
1997	2.6	0.4	0.5	0.1	0.9	4.5
1999	3.4	0.4	0.4	0.2	0.9	5.5
2001	4.3	0.6	0.4	0.2	0.9	6.4
Urban						
1994	2.7	1.0	0.6	0.3	1.3	5.9
1997	3.5	1.3	0.6	0.3	1.1	6.8
1999	4.4	1.3	0.5	0.4	1.0	7.7
2001	5.7	1.9	0.3	0.3	0.8	9.1
Rural						
1994	1.5	0.0	0.7	0.1	1.0	3.3
1997	2.2	0.0	0.5	0.1	0.8	3.7
1999	3.0	0.0	0.3	0.2	0.9	4.5
2001	3.7	0.1	0.4	0.2	0.9	5.3

A4.20 Figure A4.5 to Figure A4.8 show expenditures on energy, natural gas, and electricity as percentages of total household expenditures. Figure A4.5 shows both cash expenditures and total imputed and cash values. The patterns observed here are similar to those seen nationally, except the percentage figures are higher for electricity.

Figure A4.5: Energy as Share of Household Expenditures in Punjab

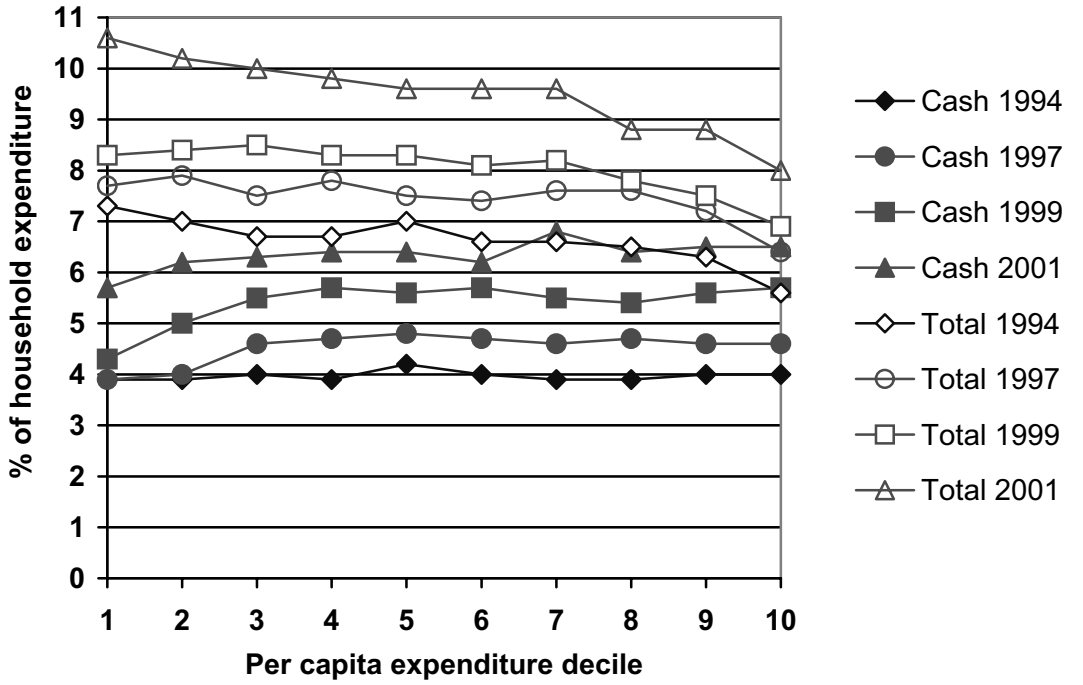


Figure A4.6: Expenditure on Natural Gas in Urban Punjab

In Percentage of Total Household Spending, Averaged across all Households

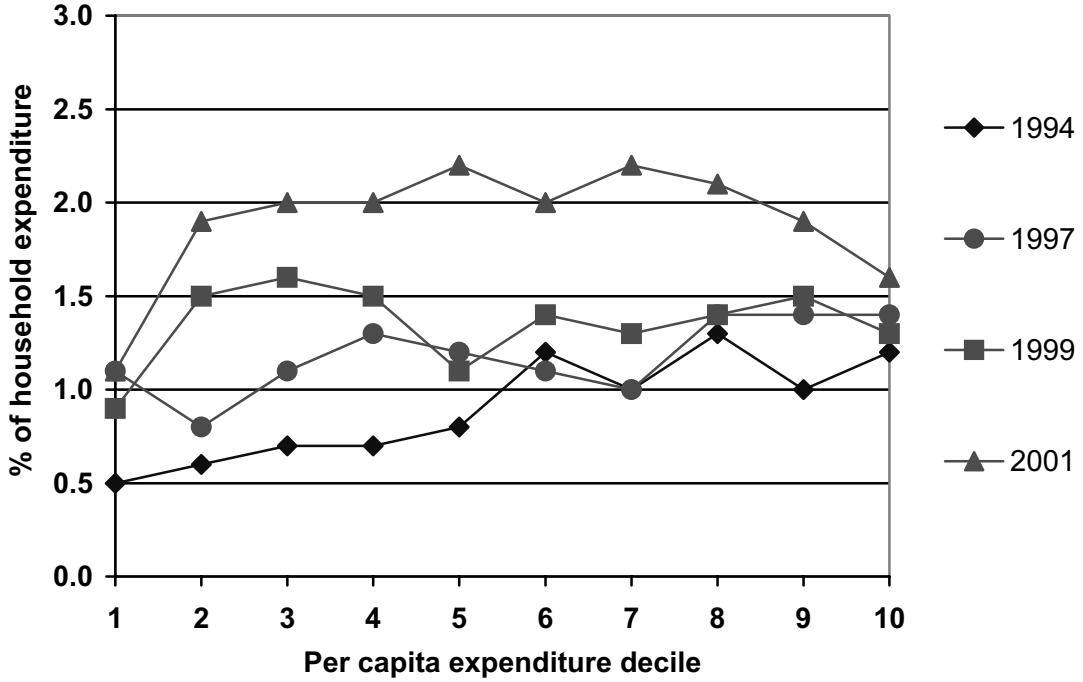


Figure A4.7: Expenditure on Electricity in Urban Punjab

In Percentage of Total Household Spending, Averaged across all Households

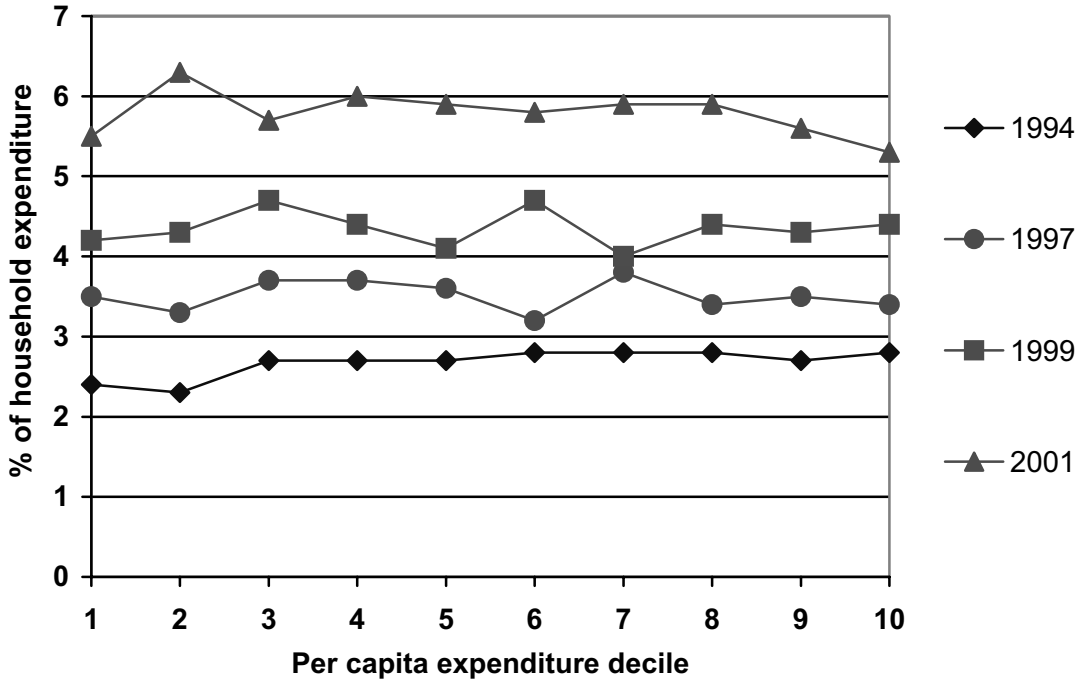
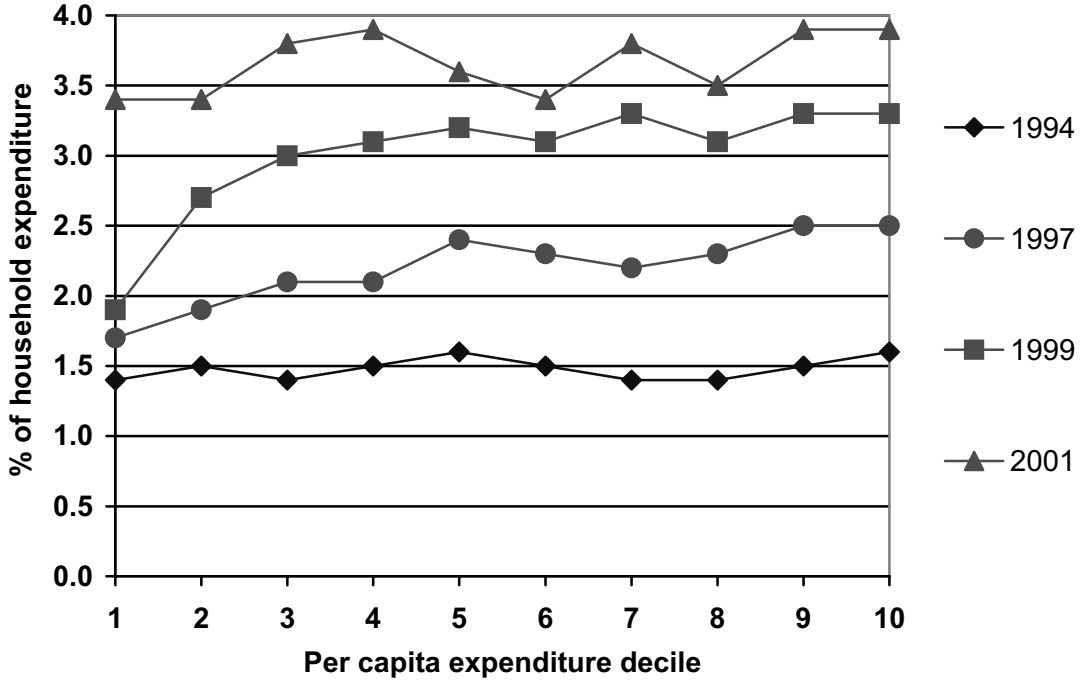


Figure A4.8: Expenditure on Electricity in Rural Punjab

In Percentage of Total Household Spending, Averaged across all Households



Sindh

A4.21 Sindh is the second largest province in Pakistan and has the highest percentage of urban residents in the country. Expenditures per capita show that urban inhabitants in Sindh were better off than the national average, but rural inhabitants were poorer (Table A4.11). Rural expenditure per capita fell steadily from 1997 to 2001 in real terms. Because of increasing household size, rural household expenditures rose between 1997 and 2001. The observed increase in household size, however, could be an artifact of survey data collection. The fall in the rural population between 1994 and 1997 appears to be a measurement error rather than a genuine drop, especially given the large reported increase between 1997 and 1999. As with Punjab, the expenditure per capita of the top decile was markedly higher than those of lower deciles. Between 1994 and 2001, the expenditure per capita declined slightly in real terms but increased for the top decile.

Table A4.11: Population Statistics in Sindh, by Survey Year

Parameter	*1994*	*1997*	*1999*	*2001*
Total Population	21,800,000	20,500,000	27,200,000	31,900,000
Urban Population	10,100,000	10,500,000	11,800,000	12,400,000
Percent Urban	46	51	43	39
Rural Population	11,700,000	10,000,000	15,400,000	19,500,000
Percent Rural	54	49	57	61
Total Number of Households	3,400,000	3,500,000	4,000,000	4,200,000
Number of Urban Households	1,500,000	1,700,000	1,800,000	1,800,000
Number of Rural Households	1,900,000	1,800,000	2,200,000	2,500,000
Per Capita Expenditure [1]	709	998	1,138	1,121
Urban per Capita Expenditure [1]	883	1,175	1,438	1,546
Rural per Capita Expenditure [1]	575	836	898	819
Household Expenditure [2]	3,938	5,224	6,541	7,094
Urban Household Expenditure [2]	5,019	6,430	7,894	8,960
Rural Household Expenditure [2]	3,102	4,114	5,457	5,769
Adjusted per Capita Expenditure [3]	1,166	1,189	1,225	1,121
Urban per Capita Expenditure [3]	1,452	1,399	1,548	1,546
Rural per Capita Expenditure [3]	945	995	966	819
Household Expenditure [3]	6,478	6,222	7,042	7,094
Urban Household Expenditure [3]	8,254	7,658	8,498	8,960
Rural Household Expenditure [3]	5,102	4,899	5,875	5,769

[1] Nominal per capita expenditures in rupees per month, inclusive of imputed and cash outlays.
[2] Nominal total household expenditures in rupees per month, inclusive of imputed and cash outlays.
[3] Monthly expenditures adjusted for the CPI with 2001 as the base year.

A4.22 The distribution of individuals in nationally defined per capita expenditure deciles is shown in Table A4.12. The distribution of urban residents was more skewed toward upper deciles than the national average, but rural residents were markedly concentrated in lower deciles. The largest concentration of urban residents was in the top decile; rural residents were concentrated in the bottom decile. Household sizes were larger than the national average in both urban and rural areas except for the top two deciles.

Table A4.12: Population and Household Statistics as Function of per Capita Expenditure Decile in Sindh

	1994		*1997*		*1999*		*2001*					
Decile	*Urban Pop*	*Rural Pop*	*Urban Pop*	*Rural Pop*	*Urban Pop*	*Rural Pop*	*Urban Pop*	*# of HHs*	*Average HH Size*	*Rural Pop*	*# of HHs*	*Average HH Size*
1	0.3	1.2	0.3	0.7	0.5	1.9	0.6	0.0	11.2	3.6	0.3	10.6
2	0.5	1.3	0.7	0.9	0.7	1.7	0.8	0.1	10.0	2.6	0.3	9.2
3	0.6	1.5	0.7	0.8	0.7	1.8	0.8	0.1	9.8	2.3	0.3	8.9
4	0.8	1.4	0.8	1.4	1.0	1.8	0.9	0.1	8.9	2.1	0.2	8.7
5	0.8	1.4	0.9	1.3	1.0	1.7	1.2	0.1	9.0	1.9	0.2	7.9
6	1.1	1.2	1.1	1.3	1.2	1.6	1.2	0.1	8.0	2.2	0.3	7.6
7	1.1	1.1	1.1	1.2	1.3	1.5	1.4	0.2	8.0	1.6	0.2	7.1
8	1.4	1.1	1.2	1.1	1.4	1.4	1.4	0.2	7.1	1.3	0.2	6.2
9	1.4	0.9	1.6	0.8	1.7	1.2	1.7	0.3	6.1	1.2	0.2	5.4
10	2.0	0.5	2.2	0.6	2.4	0.8	2.5	0.5	4.8	0.6	0.2	4.1
Total	10.1	11.7	10.5	10.0	11.8	15.4	12.4	1.8	7.1	19.5	2.5	7.9

Notes: *Pop = population in millions; # of HH = number of households in millions.*

A4.23 Table A4.13 and Table A4.14 show the percentages and numbers, respectively, of households in Sindh using various forms of energy. The uptake of all forms of biomass was markedly lower in urban areas. In rural areas, the uptake of fuelwood was considerably higher than nationally, but that of agricultural residues was an order of magnitude smaller. Averaged across the province, the uptake of every form of biomass was lower than nationally. The electrification rate was considerably lower in rural areas than the national average. Natural gas uptake was much higher than the national average; not surprisingly, the uptake of LPG—which is a substitute fuel for natural gas—was correspondingly lower, as was the uptake of kerosene, in urban areas. The numbers of households using electricity and natural gas increased steadily between 1994 and 2001, as did those using fuelwood, dung, biomass, and kerosene between 1997 and 2001, in the province.

Table A4.13: Percentage of Households in Sindh Using Different Energy Sources

Area and Survey Year	*Biomass*	*Wood*	*Dung*	*Agr Resid*	*Electricity*	*Kerosene*	*Natural Gas*	*LPG*
Sindh								
1994	63	59	19	1.7	68	48	30	0.9
1997	60	54	16	4.4	81	31	38	1.3
1999	59	56	14	4.9	70	33	36	2.2
2001	63	61	20	1.8	74	37	36	1.1
Urban								
1994	21	19	5.5	0.5	96	22	68	1.8
1997	18	18	3.1	0.1	98	11	77	2.6
1999	16	14	3.0	0.6	95	10	76	3.9
2001	18	17	3.3	0.1	96	8	78	1.3
Rural								
1994	96	90	29	2.6	46	69	0.9	0.2
1997	98	88	28	8.4	65	49	1.6	0.2
1999	94	90	23	8.4	51	52	3.4	0.9
2001	94	92	32	3.1	58	58	5.7	0.9

Note*: Agr resid = bagasse, cotton sticks, sawdust, shrubs, weeds, tobacco sticks, and so on for fuel purposes.*

Table A4.14: Number of Households in Sindh Using Different Energy Sources

Number of Households in Millions

Area and Survey Year	*Biomass*	*Wood*	*Dung*	*Agr Resid*	*Electricity*	*Kerosene*	*Natural Gas*	*LPG*
Sindh								
1994	2.1	2.0	0.6	0.1	2.3	1.6	1.0	0.03
1997	2.1	1.9	0.6	0.2	2.8	1.1	1.3	0.05
1999	2.4	2.3	0.6	0.2	2.8	1.3	1.4	0.09
2001	2.7	2.6	0.8	0.1	3.1	1.6	1.5	0.05
Urban								
1994	0.3	0.3	0.1	0.01	1.4	0.3	1.0	0.03
1997	0.3	0.3	0.1	0.00	1.6	0.2	1.3	0.04
1999	0.3	0.3	0.1	0.01	1.7	0.2	1.4	0.07
2001	0.3	0.3	0.1	0.00	1.7	0.1	1.4	0.02
Rural								
1994	1.8	1.7	0.6	0.05	0.9	1.3	0.02	0.00
1997	1.8	1.6	0.5	0.2	1.2	0.9	0.03	0.00
1999	2.1	2.0	0.5	0.2	1.1	1.2	0.08	0.02
2001	2.3	2.3	0.8	0.1	1.4	1.4	0.14	0.02

Note: *Agr resid = bagasse, cotton sticks, sawdust, shrubs, weeds, tobacco sticks, and so on for fuel purposes.*

A4.24 The top four energy-choice combinations are shown in Table A4.15. Consistent with the high uptake of natural gas and a larger urban population, the leading combination is the use of only natural gas and electricity province-wide. Consistent with a relatively low rate of electrification, the leading combination among rural households was the use of only biomass and kerosene and without use of electricity in three surveys out of four.

Table A4.15: Number of Households in Sindh in the Top Four Energy-Choice Combinations

	Top Choice	*Second Choice*	*Third Choice*	*Fourth Choice*
Sindh				
1994	Gas-elec	Bio kero	Bio-elec	Kero-bio-elec
# of Households	1,000,000	1,000,000	640,000	470,000
1997	Gas-elec	Bio-elec	Bio-kero	Kero-bio-elec
# of Households	1,300,000	1,000,000	640,000	400,000
1999	Gas-elec	Bio-elec	Bio-kero	Kero-bio-elec
# of Households	1,400,000	900,000	900,000	340,000
2001	Gas-elec	Bio-elec	Bio-kero	Kero-bio-elec
# of Households	1,500,000	1,000,000	950,000	550,000
Urban				
1994	Gas-elec	Kero-bio-elec	Bio-elec	Kero-elec
# of Households	986,473	160,000	120,000	100,000
1997	Gas-elec	Bio-elec	Kero-bio-elec	LPG-elec
# of Households	1,277,327	140,000	130,000	40,000
1999	Gas-elec	Bio-elec	Kero-bio-elec	LPG-elec
# of Households	1,336,519	140,000	80,000	60,000
2001	Gas-elec	Bio-elec	Kero-bio-elec	Bio-kero
# of Households	1,361,303	190,000	70,000	30,000
Rural				
1994	Bio-kero	Bio-elec	Kero-bio-elec	Kero
# of Households	950,000	530,000	300,000	50,000
1997	Bio-elec	Bio-kero	Kero-bio-elec	Gas-elec
# of Households	860,000	620,000	270,000	30,000
1999	Bio-kero	Bio-elec	Kero-bio-elec	Biomass
# of Households	860,000	760,000	260,000	190,000
2001	Bio-kero	Bio-elec	Kero-bio-elec	Gas-elec
# of Households	920,000	800,000	470,000	120,000

A4.25 The historical progression of different forms of energy as a function of per capita expenditure is illustrated in Figure A4.9 to Figure A4.12. The dependence of electricity uptake on per capita expenditure was stronger than the national average. The stronger dependence was also observed with natural gas, although this is in part because of greater penetration of gas in the province. The uptake of both fuelwood and total biomass was considerably lower among the upper deciles than nationally, but that of fuelwood was much higher among the lower deciles.

Figure A4.9: Natural Gas, LPG, and Electricity Uptake in Sindh

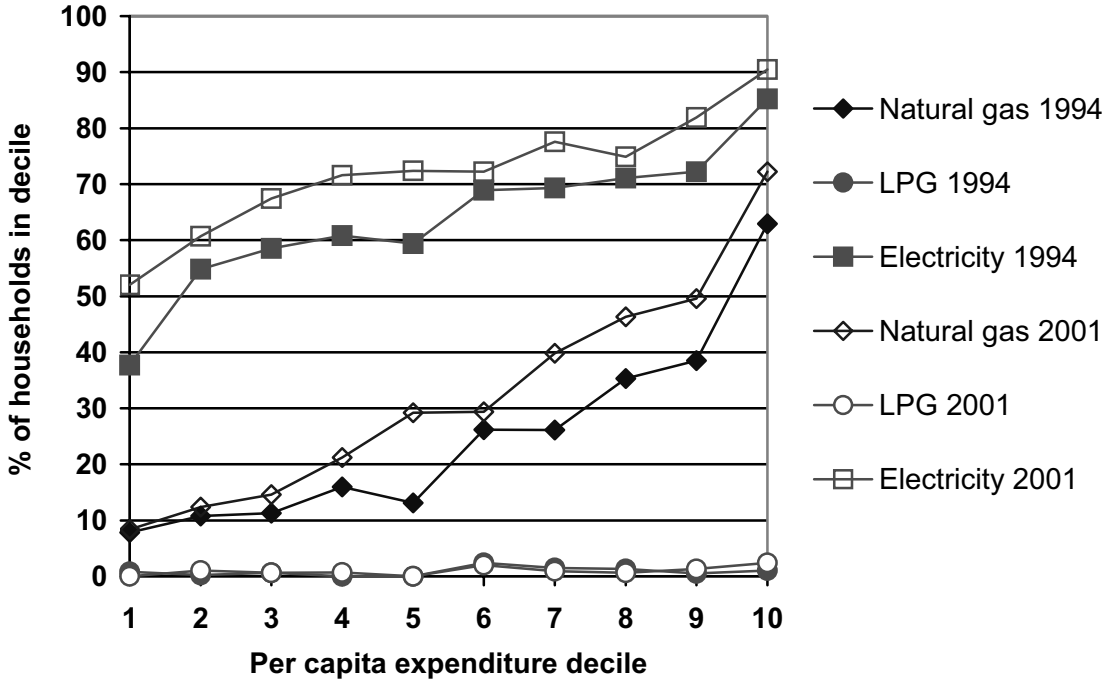


Figure A4.10: Wood, Biomass, and Kerosene Uptake in Sindh

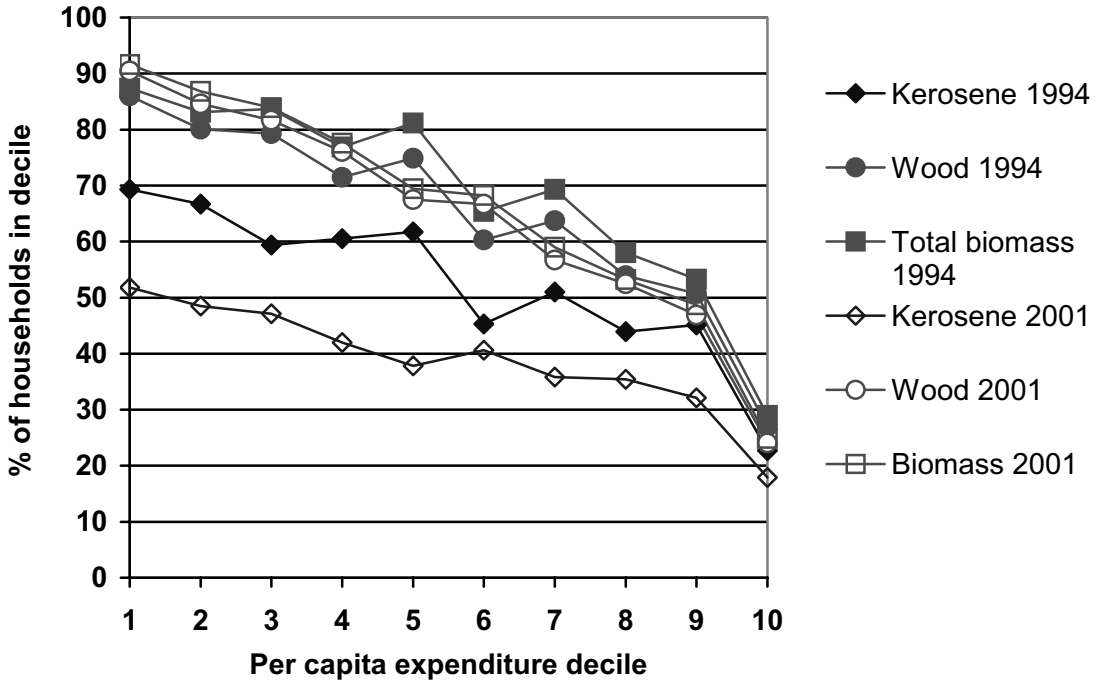


Figure A4.11: Natural Gas, LPG, and Electricity Uptake in Urban Sindh

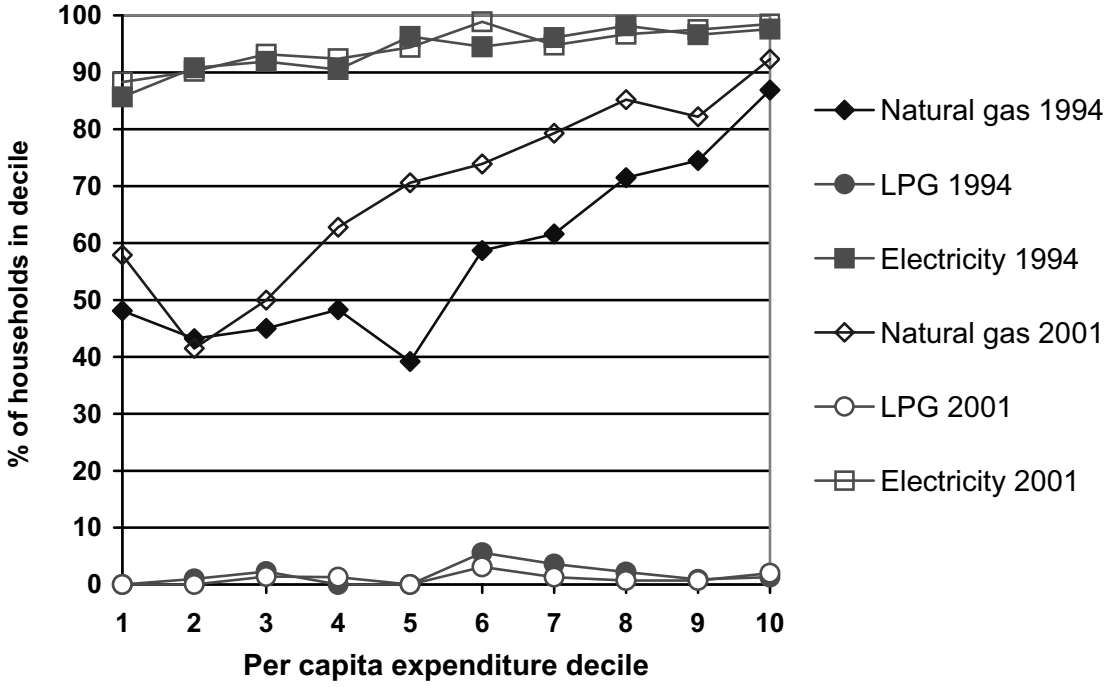
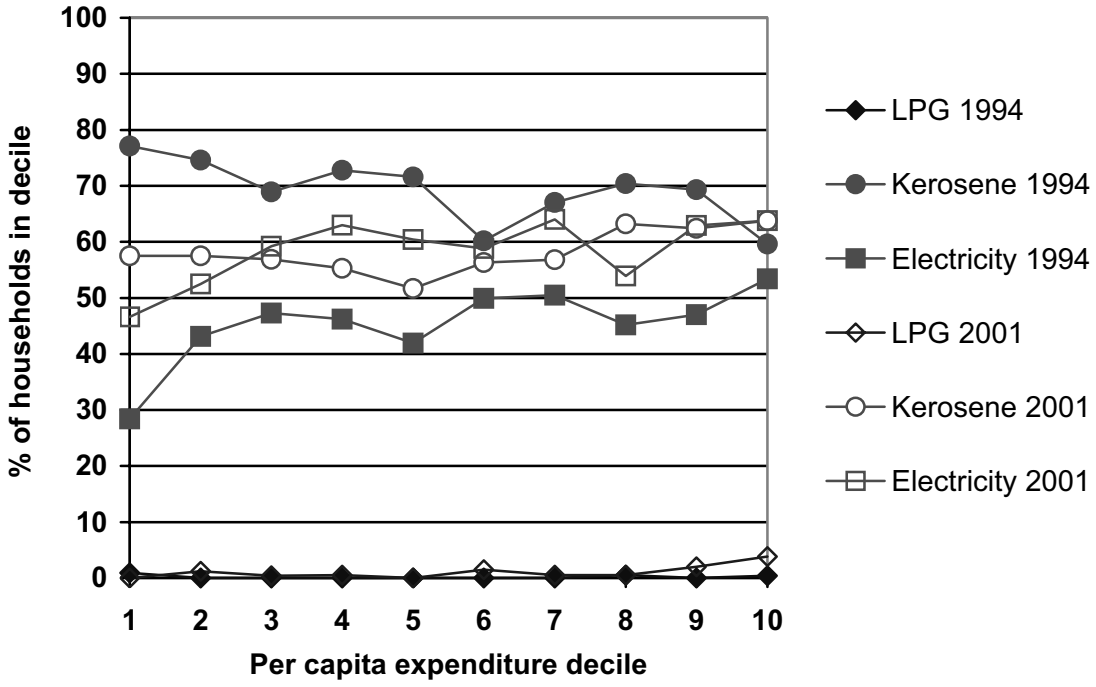


Figure A4.12: LPG, Kerosene, and Electricity Uptake in Rural Sindh



A4.26 Table A4.16 shows how much LPG, kerosene, and fuelwood households consume in a month in Sindh. There was much greater fuelwood consumption in Sindh across both urban and rural areas. The prices of LPG calculated from the data in the 1998–1999 PIHS may strongly suggest data problems. Fuelwood consumption exhibited a large increase between 1999 and 2001. This may represent measurement errors or sampling bias; only 400 households out of a total sample of 3,700 purchased fuelwood.

Table A4.16: Monthly Household Purchase or Consumption in Sindh

Area and Survey Year	*LPG Cylinder Buyers*	*Rs/Cylinder*	*Liters Kerosene Buyers*	*Rs/Liter Kerosene Buyers*	*Kg Wood, all Households*	*Kg Wood Users*	*Kg Wood Buyers*
Sindh							
1994	1.0	114	4.9	7.5	59	99	88
1997	1.7	170	3.6	11.3	67	123	95
1999	2.1	129	3.8	14.2	69	122	99
2001	0.6	383	3.0	19.6	117	191	150
Urban							
1994	1.0	134	11.9	6.9	18	95	92
1997	1.7	170	7.8	9.8	20	111	104
1999	1.7	137	7.8	13.3	14	96	95
2001	0.8	354	5.1	19.4	28	161	141
Rural							
1994	0.6	128	3.2	8.0	90	100	84
1997	1.8	162	2.7	12.3	110	126	87
1999	3.2	100	3.1	14.5	113	125	102
2001	0.5	413	2.8	19.6	180	195	157

Notes*: LPG cylinder buyers = number of LPG cylinders purchased per month; Rs/cylinder = nominal rupees paid per cylinder; all households = averaged across all households; users = averaged across all users; buyers = averaged across purchasers only.*

A4.27 Table A4.17 and Table A4.18 summarize expenditure statistics averaged over purchasers. These statistics factor out the impact of varying uptake rates. Expenditures in rupees on electricity and natural gas were lower than the national averages, suggesting that households in Sindh consumed less. Expenditures on kerosene and LPG were essentially the same. Expenditures in rupees on electricity, natural gas, LPG, and fuelwood rose faster than the CPI in 1994–2001, with the largest increase represented by electricity in rural areas (more than twice the CPI increase). The expenditures on kerosene fell in urban areas and increased in rural areas in real terms during the same period. Expenditures on electricity and natural gas made up a smaller percentage of total household spending than the national average.

Table A4.17: Monthly Expenditure on Purchased Energy in Sindh

Nominal Rupees Averaged across Purchasers

Area and Survey Year	*Electricity*	*Natural Gas*	*Kerosene*	*LPG*	*Wood*
Sindh					
1994	119	93	37	133	88
1997	161	120	40	291	113
1999	233	155	53	246	134
2001	305	204	59	236	180
Urban					
1994	159	93	82	134	94
1997	214	121	76	291	114
1999	278	154	104	233	150
2001	400	206	99	272	191
Rural					
1994	55	74	26	128	82
1997	88	115	33	288	111
1999	168	181	45	291	122
2001	193	180	55	197	172

Table A4.18: Purchased Energy in Sindh

In Percentage of Total Household Spending, Averaged across Purchasers

Area and Survey Year	*Electricity*	*Natural Gas*	*Kerosene*	*LPG*	*Biomass*	*Total Energy*
Sindh						
1994	2.4	1.6	1.2	2.7	2.7	3.2
1997	2.7	1.7	1.0	4.4	2.6	3.6
1999	3.0	1.8	1.1	3.1	2.3	3.7
2001	3.6	2.2	1.0	2.8	3.0	4.3
Urban						
1994	2.8	1.6	2.1	2.8	2.8	4.8
1997	3.0	1.7	1.7	4.5	2.6	4.9
1999	3.1	1.8	2.1	3.2	2.7	5.0
2001	3.9	2.2	1.7	3.5	3.5	6.0
Rural						
1994	1.8	1.7	1.0	1.6	2.6	1.9
1997	2.2	2.4	0.9	3.0	2.6	2.4
1999	2.9	2.4	1.0	2.8	2.0	2.5
2001	3.3	2.6	0.9	2.0	2.7	3.0

A4.28 Table A4.19 shows cash expenditures on various energy sources, averaged across all households. Consistent with the rate of uptake, expenditures on electricity in rural areas were much lower and expenditures on natural gas in urban areas were higher than the national average. Expenditures on LPG and biomass (indicated by non-OGE) were much lower in both urban and rural areas. Expenditures on kerosene in rural areas were higher in 1999 and 2001; this is consistent with the lower rate of electrification, since kerosene is often used for lighting in the absence of electricity.

Table A4.19: Nominal Monthly Household Expenditures on Purchased Energy in Sindh

In Rupees, Averaged across all Households

Area and Survey Year	*Electricity*	*Natural Gas*	*Kerosene*	*LPG*	*OGE*	*Non-OGE*	*% OGE*
Sindh							
1994	80	28	18	1	126	14	90
1997	127	45	13	4	189	18	91
1999	160	54	18	6	238	16	94
2001	219	72	22	2	315	22	93
Urban							
1994	150	63	18	2	233	19	93
1997	205	93	9	7	313	17	95
1999	255	115	10	9	389	18	96
2001	375	159	8	3	546	24	96
Rural							
1994	25	0.6	18	0.2	44	11	80
1997	56	2	16	1	74	19	79
1999	84	6	24	3	116	15	89
2001	108	10	32	1	151	21	88

Note*: OGE = oil products, gas, and electricity; non-OGE = biomass, coal, and charcoal; % OGE = percentage spent on oil products, gas, and electricity out of total expenditure on energy purchase.*

A4.29 Table A4.20 shows expenditures on various energy sources as a percentage share of total household expenditure, averaged across all households. Among urban households, the percentage spent on electricity in 1994 was the national average, but by 2001 it was markedly lower. Although the uptake rate of natural gas was higher, the percentage of expenditures spent on natural gas averaged across all urban households was the same as the national average. The percentage spent on biomass was less than half the national average.

Table A4.20: Purchased Energy as Share of Household Expenditures in Sindh

In Percentage of Total Spending, Averaged across all Households

Area and Survey Year	*Electricity*	*Natural Gas*	*Kerosene*	*LPG*	*Biomass*	*Total Energy*
Sindh						
1994	1.6	0.5	0.6	0.0	0.4	3.1
1997	2.1	0.7	0.3	0.1	0.4	3.6
1999	2.1	0.6	0.4	0.1	0.3	3.4
2001	2.6	0.8	0.4	0.0	0.4	4.1
Urban						
1994	2.6	1.1	0.4	0.1	0.5	4.8
1997	2.9	1.3	0.2	0.1	0.4	4.9
1999	2.8	1.4	0.2	0.1	0.3	4.9
2001	3.6	1.7	0.1	0.0	0.4	5.9
Rural						
1994	0.8	0.0	0.7	0.0	0.3	1.9
1997	1.4	0.0	0.4	0.0	0.5	2.4
1999	1.5	0.1	0.5	0.0	0.3	2.3
2001	1.8	0.1	0.5	0.0	0.3	2.9

A4.30 Figure A4.13 to Figure A4.16 show the expenditures on energy, natural gas, and electricity as percentages of total household expenditure for each expenditure decile. The percentages on total energy expenditures, including the imputed values of cash-free energy, were considerably lower than the national average.

Figure A4.13: Energy as Share of Household Expenditures in Sindh

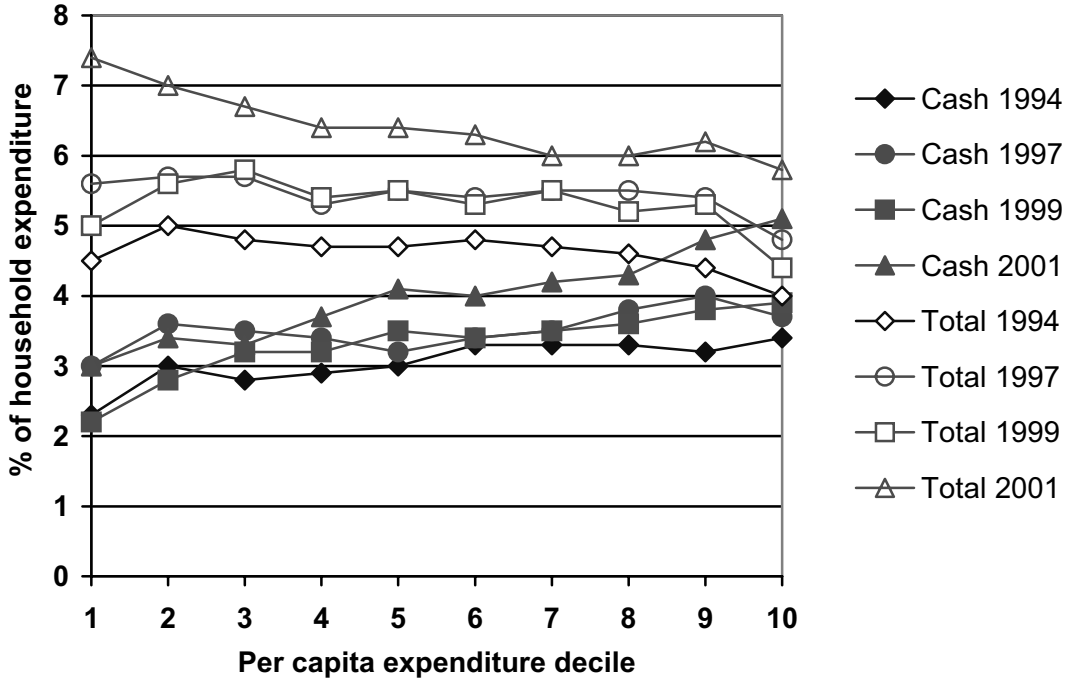


Figure A4.14: Expenditure on Natural Gas in Urban Sindh

In Percentage of Total Household Spending, Averaged across all Households

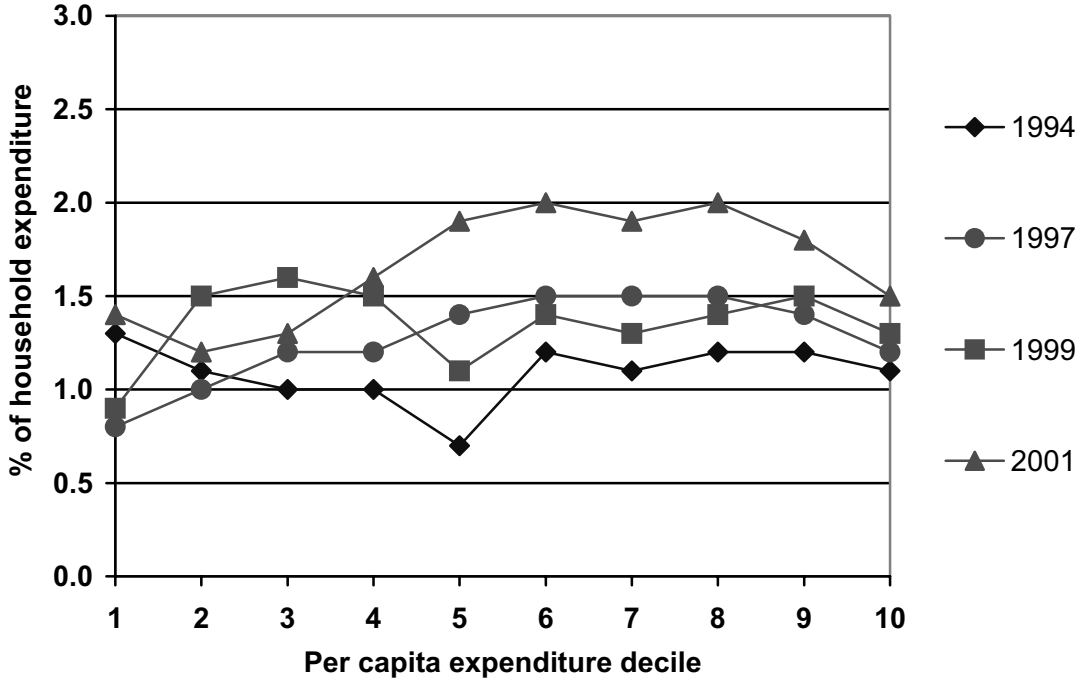


Figure A4.15: Expenditure on Electricity in Urban Sindh

In Percentage of Total Household Spending, Averaged across all Households

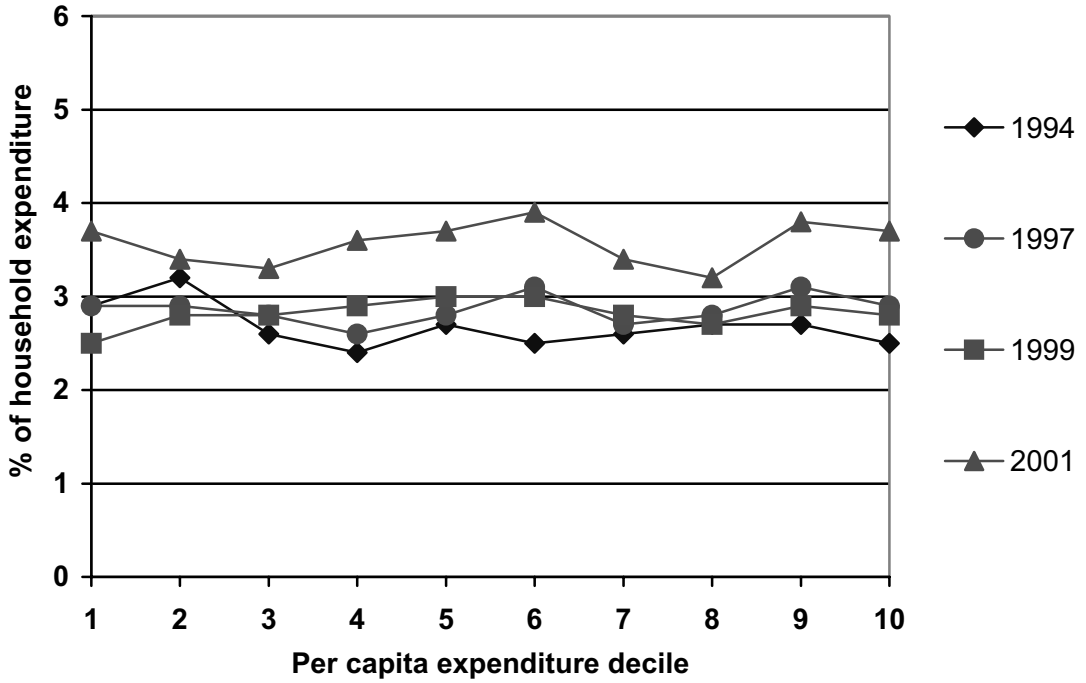
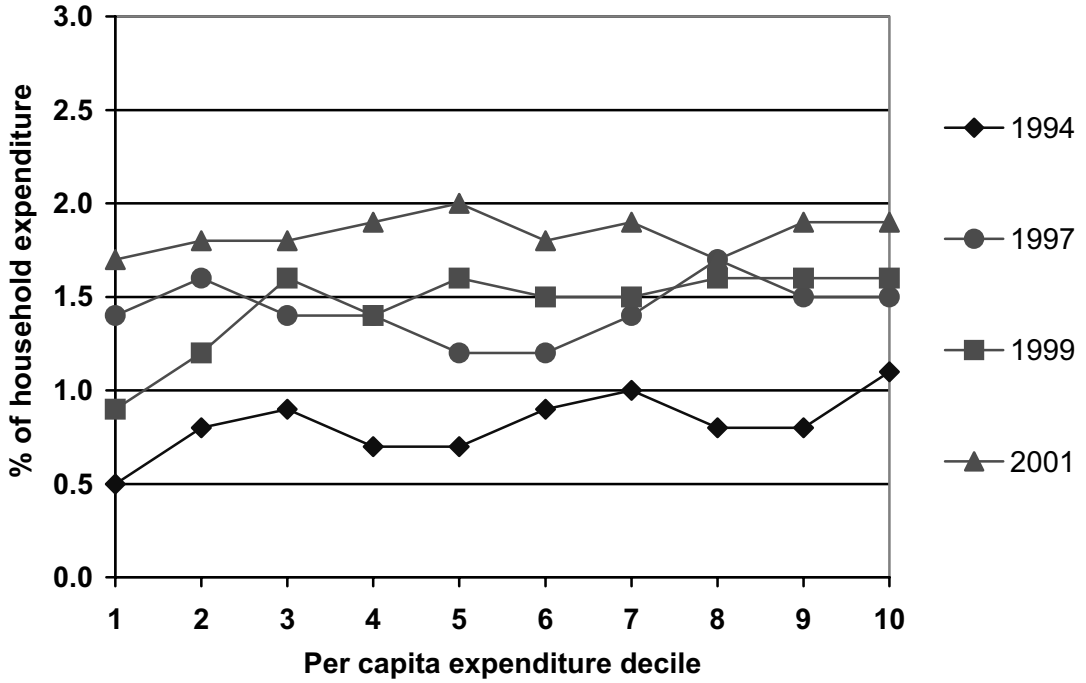


Figure A4.16: Expenditure on Electricity in Rural Sindh

In Percentage of Total Household Spending, Averaged across all Households



Northwest Frontier Province

A4.31 The NWFP is the third largest province in Pakistan, and more rural than Punjab or Sindh. Expenditures per capita were lower than the national averages in both urban and rural areas for every survey year (Table A4.21). Household expenditures were also lower, primarily as a result of urban household expenditures being lower (except in1999). Rural household expenditures were higher except in 1997. The large increase in the rural population between 1994 and 1997, followed by a fall in 1999, could be an artifact of survey data collection. In real terms, expenditures per capita and household expenditures fell between 1999 and 2001 in urban and rural areas. Expenditure per capita averaged across the province and among urban residents fell between 1994 and 2001.

Table A4.21: Population Statistics in NWFP, by Survey Year

Parameter	*1994*	*1997*	*1999*	*2001*
Total Population	12,300,000	16,500,000	16,200,000	17,500,000
Urban Population	1,800,000	2,300,000	2,400,000	2,600,000
Percent Urban	14	14	15	15
Rural Population	10,600,000	14,200,000	13,800,000	14,900,000
Percent Rural	86	86	85	85
Total Number of Households	1,700,000	2,300,000	2,100,000	2,300,000
Number of Urban Households	260,000	340,000	310,000	340,000
Number of Rural Households	1,500,000	2,000,000	1,800,000	1,900,000
Per Capita Expenditure [1]	541	734	881	879
Urban per Capita Expenditure [1]	745	991	1,266	1,136
Rural per Capita Expenditure [1]	504	690	813	834
Household Expenditure [2]	3,490	4,711	6,123	6,217
Urban Household Expenditure [2]	4,471	5,697	8,166	7,605
Rural Household Expenditure [2]	3,316	4,542	5,762	5,974
Adjusted per Capita Expenditure [3]	889	874	949	879
Urban per Capita Expenditure [3]	1,225	1,180	1,363	1,136
Rural per Capita Expenditure [3]	830	822	876	834
Household Expenditure [3]	5,740	5,611	6,592	6,217
Urban Household Eexpenditure [3]	7,354	6,785	8,790	7,605
Rural Household Expenditure [3]	5,453	5,410	6,203	5,974

[1] Nominal per capita expenditures in rupees per month, inclusive of imputed and cash outlays.
[2] Nominal total household expenditures in rupees per month, inclusive of imputed and cash outlays.
[3] Monthly expenditures adjusted for the CPI with 2001 as the base year.

A4.32 The number of people in each decile, split into urban and rural areas, is shown in Table A4.22. Compared to the national statistics, both urban and rural inhabitants were skewed toward lower deciles. Household sizes were larger.

Table A4.22: Population and Household Statistics as Function of per Capita Expenditure Decile in NWFP

	1994		*1997*		*1999*		*2001*					
Decile	*Urban Pop*	*Rural Pop*	*Urban Pop*	*Rural Pop*	*Urban Pop*	*Rural Pop*	*Urban Pop*	*# of HHs*	*Average HH Size*	*Rural Pop*	*# of HHs*	*Average HH Size*
1	0.15	1.4	0.23	2.9	0.20	2.3	0.17	0.02	9.9	1.5	0.16	9.6
2	0.17	1.5	0.21	2.4	0.18	1.9	0.22	0.03	8.5	2.1	0.23	9.1
3	0.15	1.6	0.22	2.1	0.25	1.9	0.28	0.03	9.5	2.3	0.26	8.6
4	0.16	1.3	0.27	1.5	0.22	1.4	0.24	0.03	9.4	2.1	0.25	8.4
5	0.19	1.3	0.23	1.4	0.21	1.5	0.24	0.03	7.8	1.5	0.21	7.3
6	0.15	1.1	0.21	1.2	0.23	1.3	0.21	0.03	7.6	1.5	0.21	7.0
7	0.13	0.8	0.18	1.1	0.28	1.2	0.21	0.03	7.5	1.1	0.17	6.7
8	0.19	0.7	0.19	0.6	0.19	1.0	0.31	0.04	7.3	1.2	0.18	6.6
9	0.19	0.5	0.25	0.6	0.24	0.8	0.33	0.05	6.6	0.9	0.15	5.8
10	0.30	0.3	0.29	0.4	0.39	0.6	0.34	0.06	5.5	0.7	0.11	6.0
Total	1.8	10.6	2.3	14.2	2.4	13.8	2.6	0.3	7.5	14.9	1.9	7.7

Notes*: Pop = population in millions; # of HH = number of households in millions.*

A4.33 The percentages and numbers of households using different energy sources are shown in Table A4.23 and Table A4.24, respectively. The uptake of fuelwood was much greater than nationally, as was the uptake of dung in urban areas in 1999 and 2001. The use of agricultural residues in rural areas was lower. The rate of electrification exceeded the national average in rural areas. This notwithstanding, the uptake of kerosene was much more extensive. The uptake of natural gas was markedly less, and predictably, that of LPG correspondingly more—in fact, the greatest of any province in the country. That the uptake of LPG should be markedly higher than in the rest of the country in rural NWFP is surprising, and may be indicative of data problems arising from sample size limitations, sampling bias, or both. The numbers of households using different forms of energy appear to be affected by data problems related to the odd population trend between 1997 and 1999. It is not likely, for example, that the number of households using electricity actually fell by 400,000 between 1997 and 1999.

Table A4.23: Percentage of Households in NWFP Using Different Energy Sources

Area and Survey Year	*Biomass*	*Wood*	*Dung*	*Agr Resid*	*Electricity*	*Kerosene*	*Natural Gas*	*LPG*
NWFP								
1994	88	75	24	28	76	84	6.2	12
1997	89	81	20	21	84	71	6.6	13
1999	88	83	26	16	74	62	9.0	18
2001	88	83	31	16	79	64	9.7	24
Urban								
1994	49	42	8.2	15	97	54	36	16
1997	45	42	8.3	10	96	40	42	18
1999	46	43	15	4.5	96	32	46	23
2001	48	45	16	6.2	97	34	43	25
Rural								
1994	95	80	27	30	72	89	1.0	11
1997	96	88	23	23	82	76	0.6	12
1999	95	90	28	18	71	68	2.4	17
2001	95	90	33	18	75	70	3.8	23

Note: *Agr resid = bagasse, cotton sticks, sawdust, shrubs, weeds, tobacco sticks, and so on for fuel purposes.*

Table A4.24: Number of Households in NWFP Using Different Energy Sources

Number of Households in Millions

Area and Survey Year	*Biomass*	*Wood*	*Dung*	*Agr Resid*	*Electricity*	*Kerosene*	*Natural Gas*	*LPG*
NWFP								
1994	6.7	5.0	2.9	2.4	5.8	5.4	1.0	0.3
1997	7.5	5.6	3.2	2.8	7.2	4.9	1.3	0.4
1999	7.8	5.5	4.2	3.0	7.6	4.1	1.4	0.7
2001	8.4	5.1	4.1	4.3	8.5	3.2	1.9	0.7
Urban								
1994	1.0	0.9	0.3	0.1	2.1	0.9	1.0	0.2
1997	0.9	0.9	0.3	0.1	2.5	0.8	1.2	0.2
1999	1.1	0.9	0.4	0.2	2.7	0.8	1.3	0.3
2001	1.0	0.8	0.4	0.2	2.9	0.4	1.7	0.3
Rural								
1994	5.8	4.1	2.7	2.3	3.7	4.6	0.0	0.1
1997	6.6	4.7	3.0	2.7	4.8	4.1	0.1	0.2
1999	6.7	4.6	3.8	2.8	5.0	3.2	0.1	0.3
2001	7.3	4.3	3.7	4.0	5.6	2.8	0.2	0.4

Note: *Agr resid = bagasse, cotton sticks, sawdust, shrubs, weeds, tobacco sticks, and so on for fuel purposes.*

A4.34 Table A4.35 shows the top four energy-choice combinations. Averaged across all surveyed households in the province, those using only kerosene, biomass, and electricity were most numerous.

Table A4.25: Number of Households in NWFP in the Top Four Energy-Choice Combinations

NWFP	*Top Choice*	*Second Choice*	*Third Choice*	*Fourth Choice*
1994	Kero-bio-elec	Bio-kero	Bio-elec	Gas-elec
# of Households	830,000	390,000	120,000	88,491
1997	Kero-bio-elec	Bio-elec	Bio-kero	L k b elec
# of Households	1,100,000	420,000	320,000	170,000
1999	Kero-bio-elec	Bio-kero	Bio-elec	Gas-elec
# of Households	640,000	420,000	350,000	170,000
2001	Kero-bio-elec	Bio-elec	Bio-kero	L k b elec
# of Households	680,000	390,000	390,000	280,000
Urban				
1994	Gas-elec	Kero-bio-elec	Kero-elec	L k b elec
# of Households	88,000	85,000	17,000	17,000
1997	Gas-elec	Kero-bio-elec	Bio-elec	L k b elec
# of Households	130,000	69,000	33,000	29,000
1999	Gas-elec	Kero-bio-elec	Bio-elec	L b elec
# of Households	130,000	52,000	28,000	25,000
2001	Gas-elec	Kero-bio-elec	Bio-elec	L k b elec
# of Households	130,000	60,000	35,000	30,000
Rural				
1994	Kero-bio-elec	Bio-kero	Bio-elec	L k b elec
# of Households	750,000	380,000	110,000	110,000
1997	Kero-bio-elec	Bio-elec	Bio-kero	L k b elec
	980,000	390,000	320,000	140,000
1999	Kero-bio-elec	Bio-kero	Bio-elec	L k b elec
# of Households	590,000	410,000	320,000	140,000
2001	Kero-bio-elec	Bio-kero	Bio-elec	L k b elec
# of Households	620,000	390,000	360,000	250,000

Note: *L k b elec* *LPG, kerosene, biomass and electricity.*

A4.35 Figure A4.17 to Figure A4.20 show the historical progression of the uptake of various forms of energy. Patterns are similar to those observed nationally except for the higher kerosene and LPG uptake and the lower natural gas uptake.

Figure A4.17: Natural Gas, LPG, and Electricity Uptake in NWFP

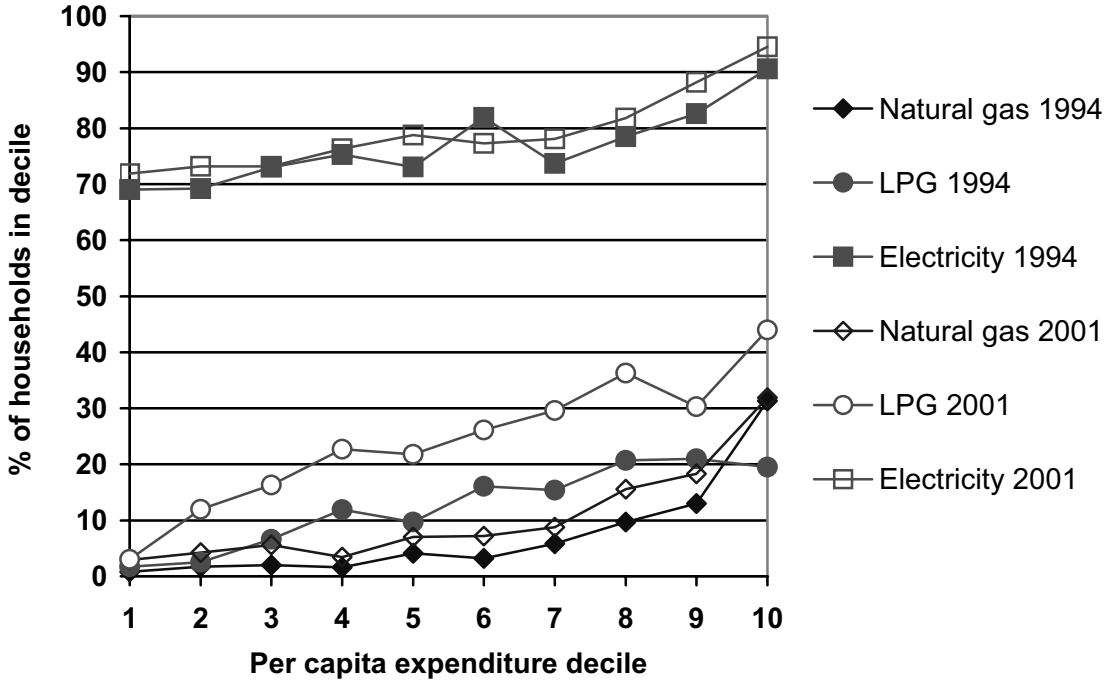


Figure A4.18: Wood, Biomass, and Kerosene Uptake in NWFP

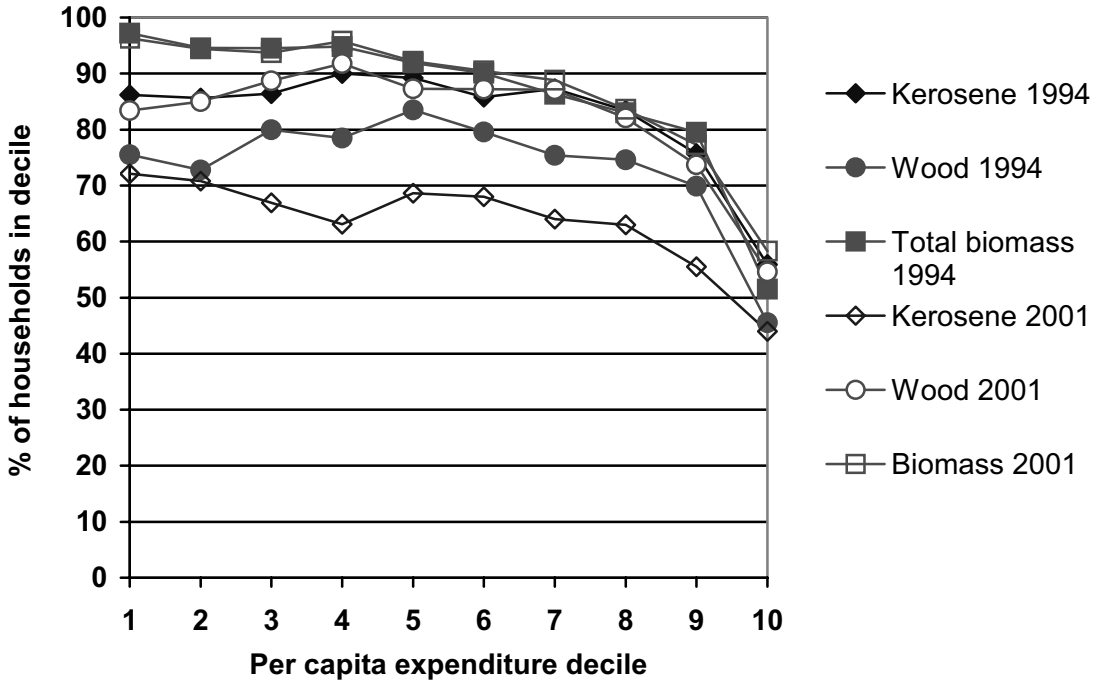


Figure A4.19: Natural Gas, LPG, and Electricity Uptake in Urban NWFP

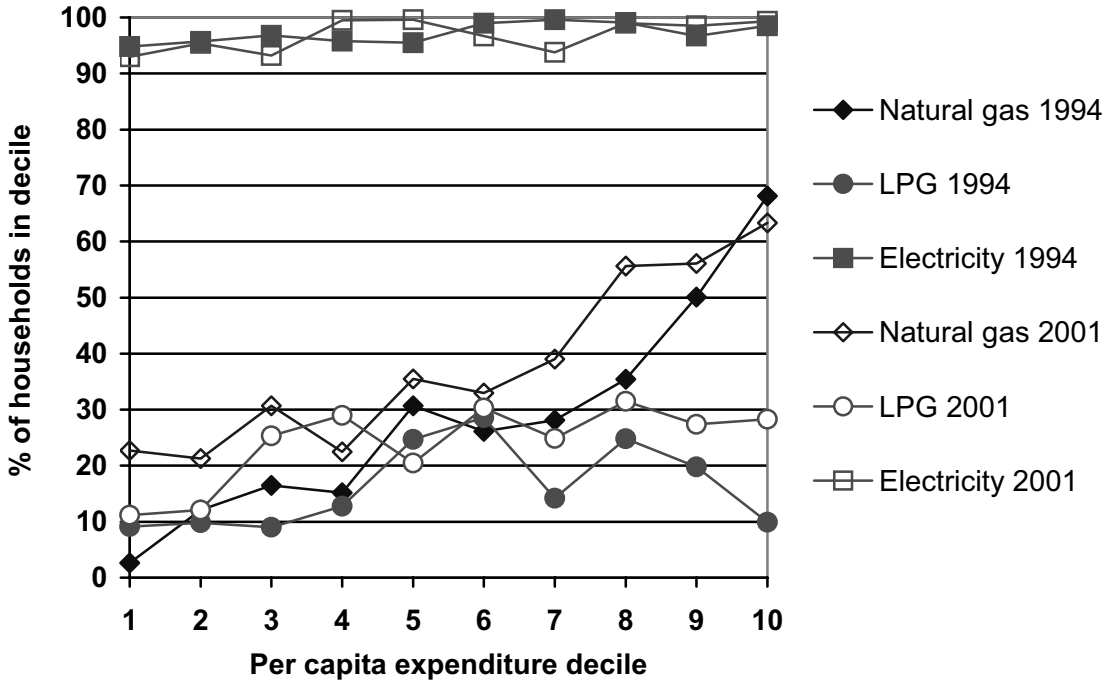
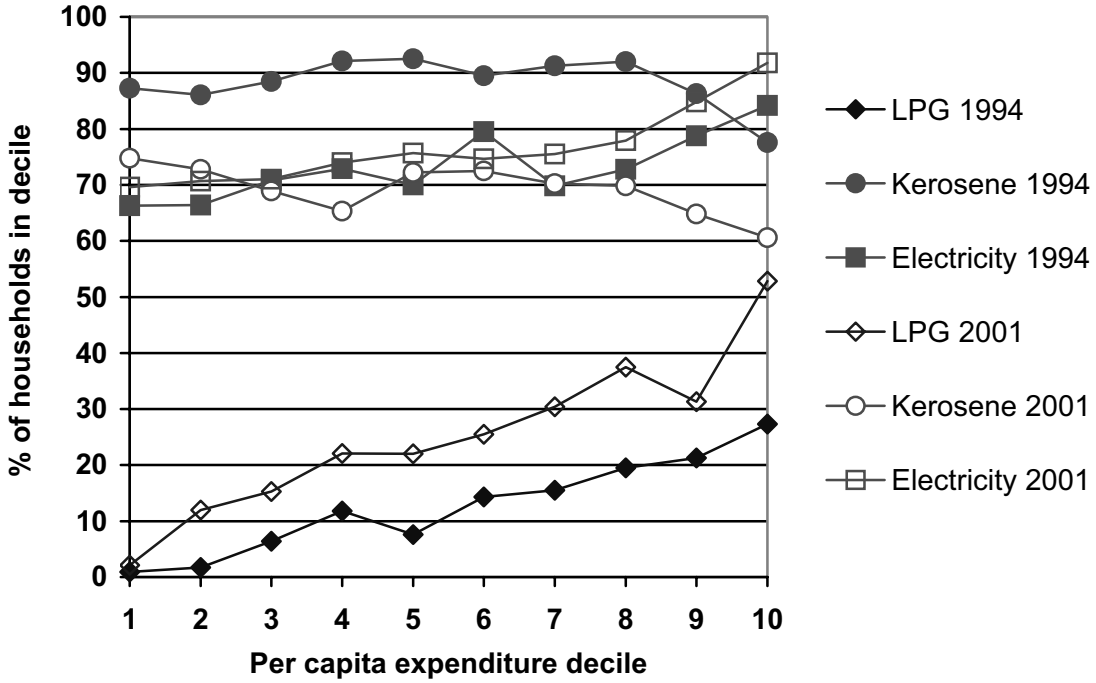


Figure A4.20: LPG, Kerosene, and Electricity Uptake in Rural NWFP



A4.36 Table A4.26 shows how much LPG, kerosene, and fuelwood households consume in a month. Data problems are evident, and there are some irregular patterns (for example, the amount of fuelwood consumed in urban areas in 1997). The drop in the

consumption of LPG in 2001 was more marked here than in other provinces. Although the percentage of households using kerosene was higher than nationally, the amounts purchased by kerosene-consuming urban households were considerably smaller. More fuelwood was consumed in the NWFP than nationally.

Table A4.26: Monthly Household Purchase or Consumption in NWFP

Area and Survey Year	*LPG Cylinder Buyers*	*Rs/Cylinder*	*Liters Kerosene Buyers*	*Rs/Liter Kerosene Buyers*	*Kg Wood, all Households*	*Kg Wood Users*	*Kg Wood Buyers*
NWFP							
1994	1.4	102	3.8	7.2	149	200	127
1997	1.4	119	3.2	10.8	187	230	146
1999	1.9	107	3.2	12.6	174	210	156
2001	0.4	365	1.9	19.3	141	169	125
Urban							
1994	1.4	142	6.4	6.8	56	131	125
1997	1.4	197	5.6	10.0	209	237	149
1999	2.2	98	3.5	11.8	65	151	128
2001	0.5	377	1.9	18.7	61	137	132
Rural							
1994	1.4	142	3.6	7.3	166	206	127
1997	1.3	146	3.0	10.9	209	237	149
1999	1.8	109	3.1	12.7	194	215	160
2001	0.2	363	1.9	19.4	155	172	124

Notes: *LPG cylinder buyers = number of LPG cylinders purchased per month; Rs/cylinder = nominal rupees paid per cylinder; all households = averaged across all households; users = averaged across all users; buyers = averaged across purchasers only.*

A4.37 Table A4.27 and Table A4.28 summarize expenditure statistics averaged over purchasers. Compared to the national statistics, households spent more on natural gas and fuelwood, and less on electricity, kerosene, and LPG. Expenditures in rupees on electricity rose much faster than the CPI, and nearly twice as much in rural areas. Expenditures on natural gas also rose faster. Expenditures on LPG, kerosene, and fuelwood fell when adjusted for the CPI, with LPG falling the most.

Table A4.27: Monthly Expenditure on Purchased Energy in NWFP

Nominal Rupees Averaged across Purchasers

Area and Survey Year	*Electricity*	*Natural Gas*	*Kerosene*	*LPG*	*Wood*
NWFP					
1994	89	145	28	142	149
1997	131	172	35	156	196
1999	227	276	40	182	221
2001	269	289	37	139	201
Urban					
1994	135	151	43	142	147
1997	196	170	57	197	199
1999	355	303	41	204	184
2001	384	290	36	191	200
Rural					
1994	78	111	26	142	150
1997	119	197	33	146	199
1999	197	180	40	177	226
2001	244	288	37	130	202

Table A4.28: Purchased Energy in NWFP

In Percentage of Total Household Spending, Averaged across Purchasers

Area and Survey Year	*Electricity*	*Natural Gas*	*Kerosene*	*LPG*	*Biomass*	*Total Energy*
NWFP						
1994	2.6	2.9	1.0	3.3	5.1	5.3
1997	2.9	3.1	1.0	2.7	4.8	5.1
1999	3.3	3.0	0.8	2.3	4.0	5.3
2001	4.1	3.9	0.7	1.9	3.5	5.6
Urban						
1994	3.1	2.9	1.5	3.4	5.0	7.5
1997	3.7	3.0	1.5	3.2	4.0	7.5
1999	4.1	3.1	0.8	2.5	3.3	7.2
2001	5.1	3.7	0.6	2.5	3.6	8.5
Rural						
1994	2.4	2.6	0.9	3.2	5.1	4.9
1997	2.8	3.6	0.9	2.6	5.0	4.7
1999	3.1	2.5	0.9	2.2	4.1	4.9
2001	3.9	4.2	0.7	1.8	3.5	5.1

A4.38 Table A4.29 shows cash expenditures on various energy sources, averaged across all households. Because of the much higher rate of electrification, the amount of rupees spent on electricity by rural households was higher than the national average. Similarly, the amounts spent on LPG were markedly higher than nationally. The opposite was true in the case of natural gas, because of the much lower uptake of this fuel. As for kerosene, the higher uptake rate was offset somewhat by lower consumption per kerosene-consuming household, but the amounts spent were still higher than the national average.

Table A4.29: Nominal Monthly Household Expenditures on Purchased Energy in NWFP

In Rupees, Averaged across all Households

Area and Survey Year	*Electricity*	*Natural Gas*	*Kerosene*	*LPG*	*OGE*	*Non-OGE*	*% OGE*
NWFP							
1994	67	8	23	16	114	59	66
1997	107	10	25	20	162	29	85
1999	167	24	25	33	248	87	74
2001	207	27	24	33	291	64	82
Urban							
1994	128	50	23	22	224	66	77
1997	178	64	23	35	300	66	82
1999	332	137	13	46	528	60	90
2001	360	122	12	48	542	69	89
Rural							
1994	56	1	23	15	95	57	62
1997	95	1	25	18	139	53	72
1999	138	4	27	30	199	92	68
2001	180	11	26	30	247	63	80

Note: *OGE = oil products, gas, and electricity; non-OGE = biomass, coal, and charcoal; % OGE = percentage spent on oil products, gas, and electricity out of total expenditure on energy purchase.*

A4.39 Table A4.30 shows expenditures on various energy sources as a percentage share of total household expenditure, averaged across all households. Despite lower percentages on electricity and natural gas, higher percentages on LPG and biomass contributed to overall shares on total energy being the same as or slightly higher than the national averages.

Table A4.30: Purchased Energy as Share of Household Expenditures in NWFP

In Percentage of Total Spending, Averaged across all Households

Area and Survey Year	*Electricity*	*Natural Gas*	*Kerosene*	*LPG*	*Biomass*	*Total Energy*
NWFP						
1994	1.9	0.2	0.8	0.4	1.7	5.3
1997	2.4	0.2	0.7	0.4	1.3	4.9
1999	2.4	0.3	0.5	0.4	1.5	5.1
2001	3.2	0.4	0.5	0.5	1.1	5.6
Urban						
1994	3.0	1.0	0.8	0.5	1.8	7.4
1997	3.4	1.1	0.6	0.6	1.4	7.2
1999	3.9	1.4	0.2	0.6	1.0	7.1
2001	4.8	1.6	0.2	0.6	1.2	8.4
Rural						
1994	1.7	0.0	0.8	0.4	1.7	4.9
1997	2.2	0.0	0.7	0.3	1.3	4.6
1999	2.2	0.1	0.6	0.4	1.6	4.8
2001	2.9	0.2	0.5	0.4	1.1	5.1

A4.40 Figure A4.21 and Figure A4.24 show expenditures on various forms of energy as percentages of total household expenditures for each decile group. The changes between 1994 and 2001 in Figure A4.21 were smaller than in other provinces.

Figure A4.21: Energy as Share of Household Expenditures in NWFP

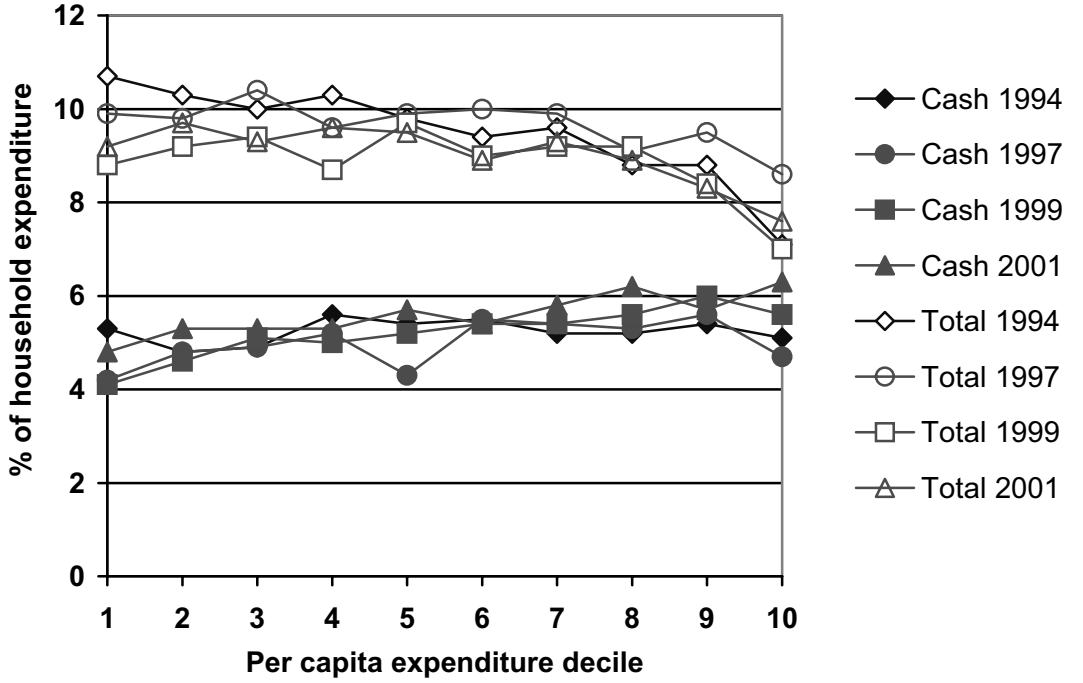


Figure A4.22: Expenditure on Natural Gas in Urban NWFP

In Percentage of Total Household Spending, Averaged across all Households

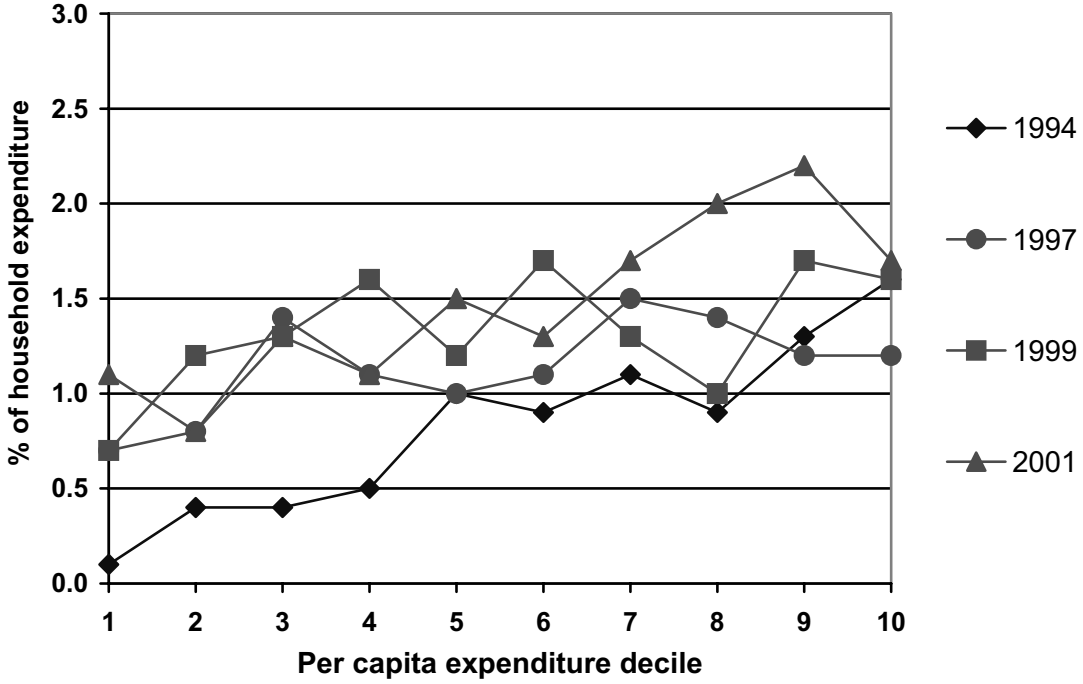


Figure A4.23: Expenditure on Electricity in Urban NWFP

In Percentage of Total Household Spending, Averaged across all Households

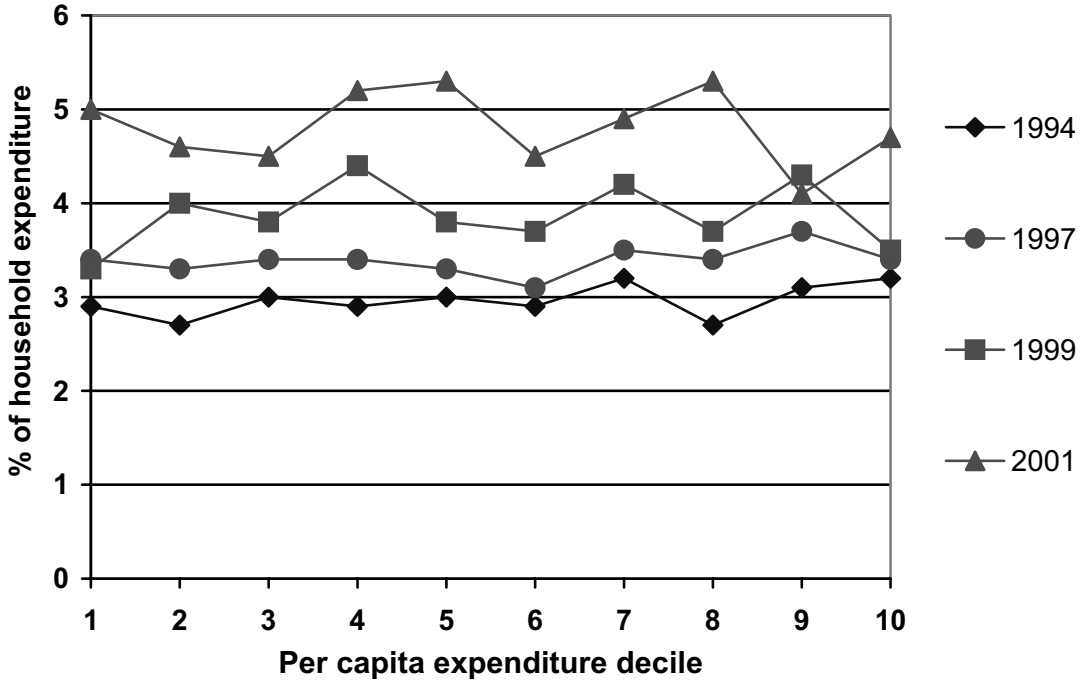
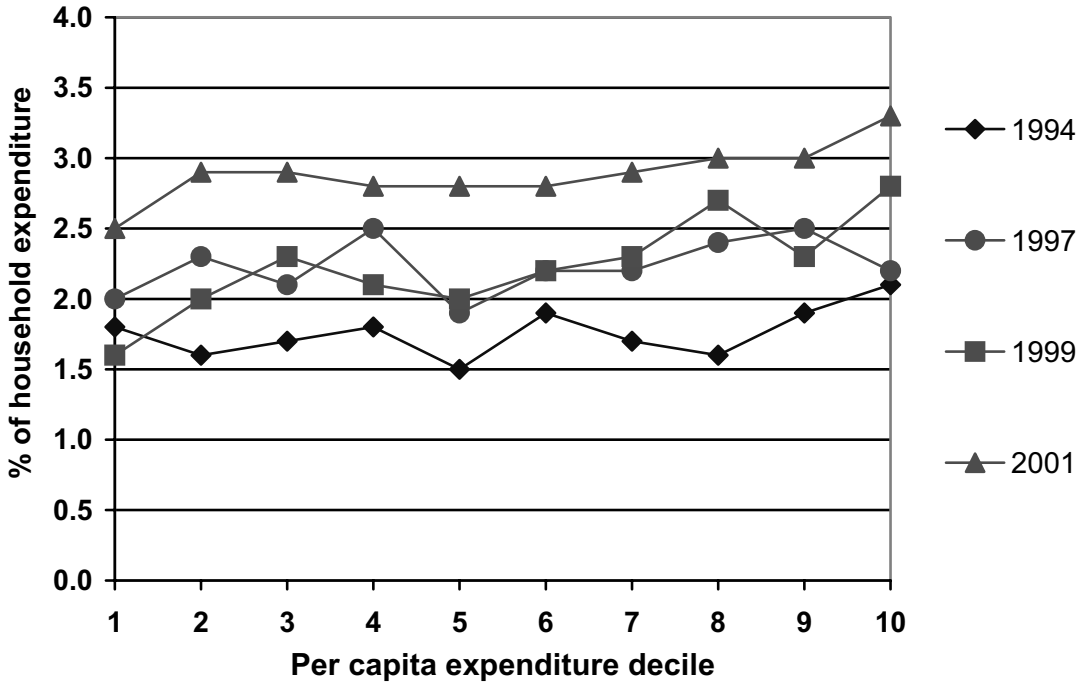


Figure A4.24: Expenditure on Electricity in Rural NWFP

In Percentage of Total Household Spending, Averaged across all Households



Balochistan

A4.41 Balochistan is the last of the four provinces analyzed in this study. Table A4.31 shows that Balochistan was more rural and poorer than the national average. There may have been a measurement error with rural households in 1999: the near doubling of the rural household expenditure and a greater than twofold increase in rural population between 1997 and 1999 suggest data problems. In real terms, expenditures per capita in rural areas were the lowest in 2001. Rural and urban household expenditures fell in real terms between 1999 and 2001 but were higher in 2001 than in 1997 or 1994.

Table A4.31: Population Statistics in Balochistan, by Survey Year

Parameter	*1994*	*1997*	*1999*	*2001*
Total Population	4,100,000	3,300,000	6,500,000	5,500,000
Urban Population	460,000	690,000	840,000	960,000
Percent Urban	11	21	13	17
Rural Population	3,600,000	2,600,000	5,700,000	4,600,000
Percent Rural	89	79	87	83
Total Number of Households	720,000	560,000	870,000	730,000
Number of Urban Households	71,000	110,000	100,000	120,000
Number of Rural Households	650,000	450,000	760,000	600,000
Per Capita Expenditure [1]	523	747	972	903
Urban per Capita Expenditure [1]	693	935	1,051	1,109
Rural per Capita Expenditure [1]	504	702	961	746
Household Expenditure [2]	2,721	3,887	6,580	6,190
Urban Household Expenditure [2]	3,915	5,139	7,464	7,609
Rural Household Expenditure [2]	2,592	3,592	6,459	5,906
Adjusted per Capita Expenditure [3]	860	889	1,046	903
Urban per Capita Expenditure [3]	1,139	1,113	1,132	1,109
Rural per Capita Expenditure [3]	829	836	1,034	746
Household Expenditure [3]	4,475	4,630	7,083	6,190
Urban Household Expenditure [3]	6,439	6,121	8,035	7,609
Rural Household Expenditure [3]	4,262	4,278	6,954	5,906

[1] Nominal per capita expenditures in rupees per month, inclusive of imputed and cash outlays.
[2] Nominal total household expenditures in rupees per month, inclusive of imputed and cash outlays.
[3] Monthly expenditures adjusted for the CPI with 2001 as the base year.

A4.42 The number of people in each decile, split into urban and rural areas, is shown in Table A4.22. The 2001–02 PIHS data show the unusual trend of the urban household size being larger than the rural household size, both of which were larger than the corresponding national averages. Balochistan was the only one of the four provinces in which there were more rural households in the top decile than in the bottom decile.

Table A4.32: Population and Household Statistics as Function of per Capita Expenditure Decile in Balochistan

	1994		*1997*		*1999*		*2001*					
Decile	*Urban Pop*	*Rural Pop*	*Urban Pop*	*Rural Pop*	*Urban Pop*	*Rural Pop*	*Urban Pop*	*# of HHs*	*Average HH Size*	*Rural Pop*	*# of HHs*	*Average HH Size*
1	12	485	53	486	42	317	52	5	11.0	348	35	10.0
2	24	447	71	361	79	431	92	9	10.6	607	67	9.1
3	43	509	73	366	74	527	91	9	9.9	552	66	8.4
4	66	493	68	291	85	597	71	7	9.7	658	75	8.8
5	51	340	42	240	100	800	112	12	9.2	549	74	7.4
6	60	506	91	293	94	739	86	10	8.5	524	69	7.6
7	54	308	78	253	82	607	130	16	8.1	536	70	7.6
8	59	240	72	129	91	735	99	13	7.9	354	59	6.0
9	44	227	79	78	111	575	132	20	6.7	300	52	5.8
10	50	82	58	72	83	348	98	20	4.8	143	38	3.8
Total	463	3,639	685	2,569	840	5,677	964	121	8.0	4,572	605	7.6

Notes: *Pop = population in millions; # of HH = number of households in millions.*

A4.43 Table A4.33 and Table A4.34 show the percentages and numbers of households using different sources of energy. Compared to the national statistics, there was a markedly higher percentage of households using fuelwood, twice the national average in urban areas by 2001. The use of dung and agricultural residues was much less than the national average. The rate of electrification was low, especially in rural areas. The rate of kerosene uptake was predictably much higher. The use of natural gas in urban areas was not as extensive as in other major provinces, and—again predictably—the uptake of LPG was correspondingly higher. The numbers of households using different forms of energy were affected by the reported doubling of population between 1997 and 1999, followed by a reduction of 1 million people between 1999 and 2001. As such, the results probably represent measurement errors.

Table A4.33: Percentage of Households in Balochistan Using Different Energy Sources

Area and Survey Year	*Biomass*	*Wood*	*Dung*	*Agr Resid*	*Electricity*	*Kerosene*	*Natural Gas*	*LPG*
Balochistan								
1994	94	91	8.7	2.3	36	77	4.5	3.1
1997	88	87	8.4	1.8	46	76	8.8	3.4
1999	87	86	2.8	4.4	54	78	8.7	20
2001	87	86	5.0	12	50	71	11	12
Urban								
1994	53	52	3.4	2.0	92	38	36	12
1997	47	47	2.4	0.0	95	38	41	13
1999	48	46	2.1	2.0	88	41	41	26
2001	53	51	2.5	2.4	87	37	40	20
Rural								
1994	98	95	9.2	2.4	30	81	1.0	2.2
1997	98	96	9.8	2.3	35	85	1.2	1.2
1999	92	91	2.9	4.7	49	84	4.3	20
2001	94	93	5.5	13.7	42	78	5.3	9.8

Note: *Agr resid = bagasse, cotton sticks, sawdust, shrubs, weeds, tobacco sticks, and so on for fuel purposes.*

Table A4.34: Number of Households in Balochistan Using Different Energy Sources

Number of Households in Thousands

Area and Survey Year	*Biomass*	*Wood*	*Dung*	*Agr Resid*	*Electricity*	*Kerosene*	*Natural Gas*	*LPG*
Balochistan								
1994	680	658	63	17	260	560	33	23
1997	490	480	46	10	260	420	49	19
1999	760	750	24	38	470	680	75	180
2001	630	620	37	85	360	520	81	84
Urban								
1994	37	37	2.3	1.4	65	27	26	8
1997	50	50	2.5	0	100	40	43	13
1999	50	48	2.2	2.1	91	43	42	27
2001	64	62	3.0	2.9	110	44	48	25
Rural								
1994	640	620	60	15	190	530	6.7	14
1997	440	430	44	10	160	380	5.6	5
1999	710	700	22	36	370	640	33	150
2001	570	560	34	83	250	470	32	59

Note: *Agr resid = bagasse, cotton sticks, sawdust, shrubs, weeds, tobacco sticks, and so on for fuel purposes.*

A4.44 Table A4.35 shows the top four energy-choice combinations. The most striking feature in Balochistan is that the top choice was the combination that is among the lowest on the "energy ladder": households that use only biomass and kerosene, most of whom live in rural areas.

Table A4.35: Number of Households in Balochistan in the Top Four Energy-Choice Combinations

Balochistan	*Top Choice*	*Second Choice*	*Third Choice*	*Fourth Choice*
1994	Bio-kero	Kero-bio-elec	bio	Bio-elec
# of Households	380,000	160,000	71,000	46,000
1997	Bio-kero	Kero-bio-elec	Bio-elec	Gas-elec
# of Households	270,000	130,000	52,000	48,000
1999	Bio-kero	Kero-bio-elec	L k b elec	Gas-elec
# of Households	310,000	200,000	110,000	70,000
2001	Bio-kero	Kero-bio-elec	Gas-elec	Bio-elec
	320,000	130,000	77,000	73,000
Urban				
1994	Gas-elec	Kero-bio-elec	Bio-elec	LPG-elec
# of Households	25,000	20,000	7,000	3,000
1997	Gas-elec	Kero-bio-elec	Bio-elec	LPG-elec
# of Households	43,000	30,000	13,000	7,000
1999	Gas-elec	Kero-bio-elec	L k b elec	Bio-elec
# of Households	40,000	19,000	12,000	7,000
2001	Gas-elec	Kero-bio-elec	Bio-elec	Bio-kero
# of Households	47,000	21,000	13,000	12,000
Rural				
1994	Bio-kero	Kero-bio-elec	bio	Bio-elec
# of Households	380,000	140,000	68,000	39,000
1997	Bio-kero	Kero-bio-elec	Bio-elec	bio
# of Households	270,000	100,000	40,000	17,000
1999	Bio-kero	Kero-bio-elec	L k b elec	Bio-elec
# of Households	310,000	180,000	94,000	54,000
2001	Bio-kero	Kero-bio-elec	Bio-elec	L k b elec
# of Households	300,000	110,000	61,000	33,000

Note: *L k b elec* □ *LPG, kerosene, biomass, and electricity.*

A4.45 Figure A4.25 to Figure A4.28 show the historical progression of uptake of various forms of energy in Balochistan for each expenditure decile. The patterns are more irregular than in other provinces, reflecting the smaller sample size.

Figure A4.25: Natural Gas, LPG, and Electricity Uptake in Balochistan

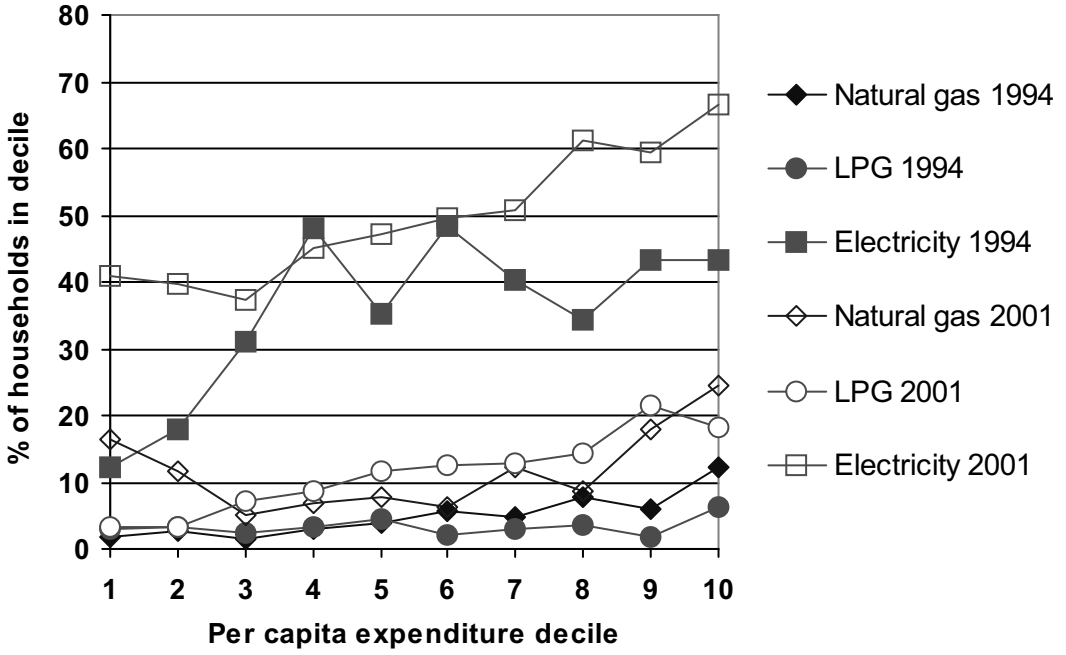


Figure A4.26: Wood, Biomass, and Kerosene Uptake in Balochistan

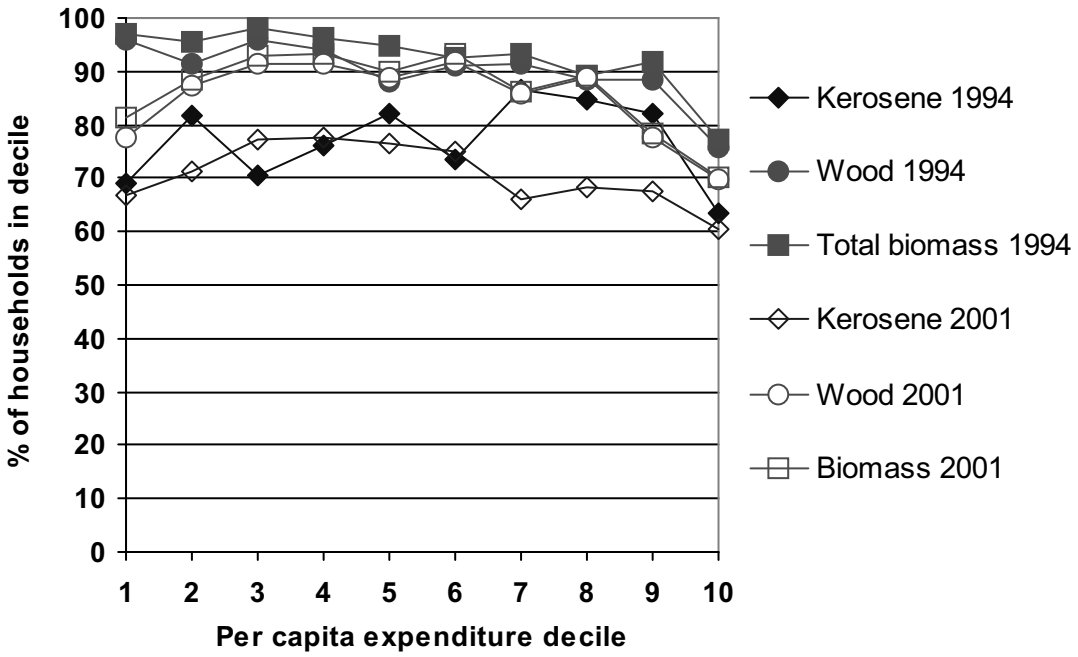


Figure A4.27: Natural Gas, LPG, and Electricity Uptake in Urban Balochistan

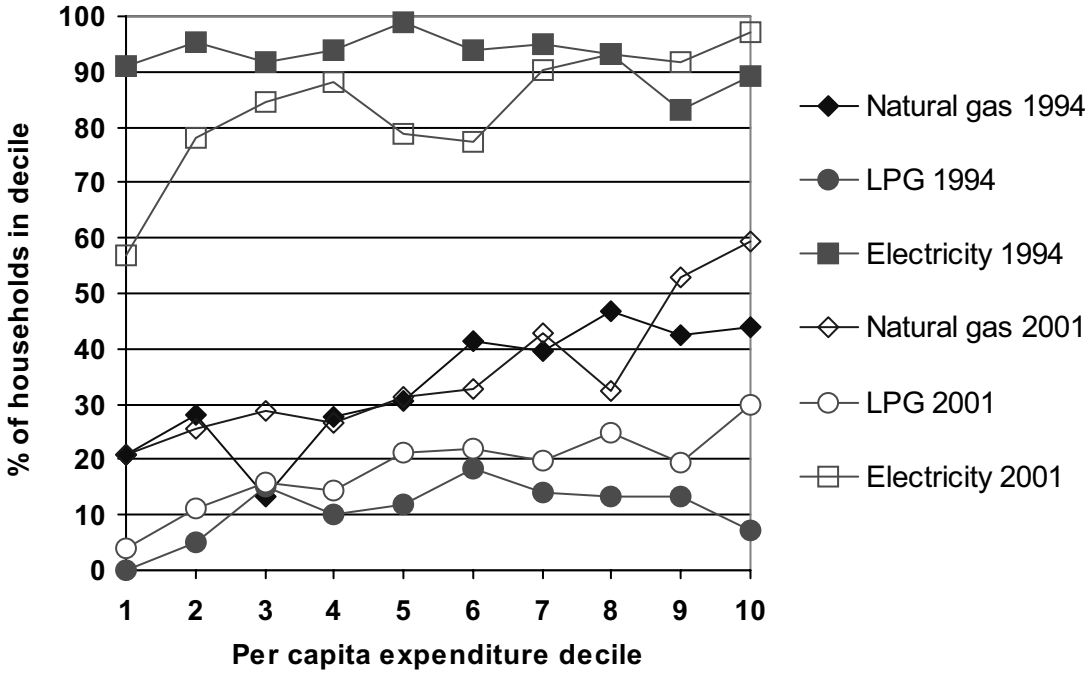
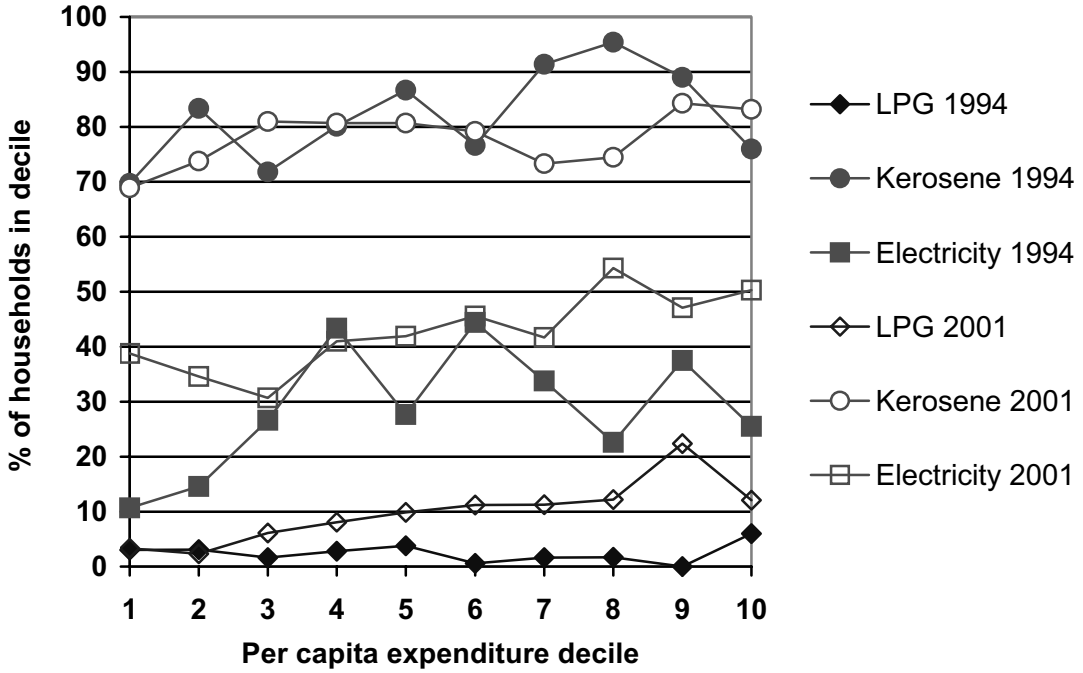


Figure A4.28: Historical Progression of LPG, Kerosene, and Electricity Uptake in Rural Balochistan



A4.46 Table A4.36 shows how much LPG, kerosene, and fuelwood households consume in a month in Balochistan. Again, data reliability is questionable in certain cases, such as the price of LPG in 1999. If the 2001 data are assumed to be reasonably accurate, LPG cost considerably more in 2001 in Balochistan than in other provinces. In contrast, kerosene did not cost any more than the national average, reflecting pan-territorial pricing. The amount of kerosene purchased dropped over the years as in the rest of the country but was higher in rural areas than the national average (except in 1999). Urban households, in contrast, were buying less than half the national average by 2001. More fuelwood was consumed per household than in the rest of the country.

Table A4.36: Monthly Household Purchase or Consumption in Balochistan

Area and Survey Year	*LPG Cylinder Buyers*	*Rs/Cylinder*	*Liters Kerosene Buyers*	*Rs/Liter Kerosene Buyers*	*Kg Wood, all Households*	*Kg Wood Users*	*Kg Wood Buyers*
Balochistan							
1994	1.6	82	7.4	5.8	136	150	156
1997	1.2	219	5.1	9.4	128	147	147
1999	1.8	77	2.9	13.2	191	223	130
2001	0.25	524	3.1	18.9	140	163	127
Urban							
1994	1.8	149	6.2	6.7	78	150	152
1997	1.2	287	8.5	9.3	57	122	114
1999	2.2	92	3.1	12.1	77	166	128
2001	0.39	499	2.5	18.4	84	165	139
Rural							
1994	1.6	78	7.4	5.8	143	150	156
1997	1.1	232	4.8	9.5	144	149	156
1999	1.7	74	2.9	13.3	206	227	131
2001	0.19	534	3.1	18.9	151	163	124

Notes: *LPG cylinder buyers = number of LPG cylinders purchased per month; Rs/cylinder = nominal rupees paid per cylinder; all households = averaged across all households; users = averaged across all users; buyers = averaged across purchasers only.*

A4.47 Table A4.37 and Table A4.38 show expenditure statistics for purchasers. Expenditures on natural gas and fuelwood were higher, and those on electricity and LPG were lower, than nationally. Expenditures on electricity rose much faster than the CPI between 1994 and 2001, whereas those on LPG, kerosene, and fuelwood fell in real terms. In 1999 and 2001, biomass purchasers and urban natural gas users were spending approximately the same percentage of their total expenditures as nationally, but electricity users were spending considerably less than the national average, as were LPG users.

Table A4.37: Monthly Expenditure on Purchased Energy in Balochistan

Nominal Rupees Averaged across Purchasers

Area and Survey Year	*Electricity*	*Natural Gas*	*Kerosene*	*LPG*	*Wood*
Balochistan					
1994	65	155	43	136	159
1997	99	186	48	271	181
1999	161	262	38	150	222
2001	190	261	58	118	220
Urban					
1994	81	156	42	149	162
1997	107	191	79	287	164
1999	202	235	37	212	243
2001	256	266	46	174	240
Rural					
1994	60	151	43	129	159
1997	94	150	45	232	185
1999	152	295	38	139	217
2001	163	252	59	95	216

Table A4.38: Purchased Energy in Balochistan

In Percentage of Total Household Spending, Averaged across Purchasers

Area and Survey Year	*Electricity*	*Natural Gas*	*Kerosene*	*LPG*	*Biomass*	*Total Energy*
Balochistan						
1994	1.9	3.2	1.5	3.1	5.3	5.0
1997	2.2	2.9	1.3	4.9	4.8	4.4
1999	2.1	2.9	0.6	1.7	3.5	3.1
2001	2.6	3.4	1.0	1.5	3.5	3.9
Urban						
1994	2.0	3.0	1.2	4.2	4.9	6.3
1997	2.0	3.0	1.7	5.1	4.0	6.0
1999	2.5	2.6	0.7	2.7	3.6	5.4
2001	3.1	2.9	0.7	2.2	3.4	5.8
Rural						
1994	1.9	4.2	1.6	2.4	5.3	4.8
1997	2.3	2.8	1.3	4.5	5.1	4.0
1999	2.1	3.2	0.6	1.5	3.5	2.8
2001	2.4	4.0	1.1	1.3	3.5	3.5

A4.48 Table A4.39 shows cash expenditures on various energy sources, averaged across all households. Expenditures on electricity were significantly lower than nationally, in part because of the lower rate of electrification. Expenditures on kerosene in rural areas and on LPG in urban areas were much higher than nationally, reflecting in part higher uptake rates of these two fuels. Amounts spent on traditional fuels (non-OGE in the table) were also much higher than nationally.

Table A4.39: Nominal Monthly Household Expenditures on Purchased Energy in Balochistan

In Rupees, Averaged across all Households

Area and Survey Year	*Electricity*	*Natural Gas*	*Kerosene*	*LPG*	*OGE*	*Non-OGE*	*% OGE*
Balochistan							
1994	23	7.0	33	4	67	75	47
1997	44	16	37	9	106	70	60
1999	86	23	30	31	169	48	78
2001	93	28	41	14	177	79	69
Urban							
1994	73	57	16	18	164	78	68
1997	99	78	29	36	242	70	78
1999	175	95	15	54	340	76	82
2001	218	103	17	36	373	90	81
Rural							
1994	17	2	35	3	57	74	43
1997	31	2	38	3	74	70	51
1999	74	13	32	27	145	44	77
2001	69	13	46	9	137	77	64

Note: *OGE = oil products, gas, and electricity; non-OEG = biomass, coal, and charcoal; % OGE = percentage spent on oil products, gas, and electricity out of total expenditure on energy purchase.*

A4.49 Table A4.40 shows expenditures on various energy sources as a percentage share of total household expenditure, averaged across all households. Electricity and natural gas constituted smaller percentages of total household expenditure. The shares of kerosene in rural areas and of biomass in urban areas were higher.

Table A4.40: Purchased Energy as Share of Household Expenditures in Balochistan

In Percentage of Total Spending, Averaged across all Households

Area and Survey Year	*Electricity*	*Natural Gas*	*Kerosene*	*LPG*	*Biomass*	*Total Energy*
Balochistan						
1994	0.7	0.1	1.2	0.1	2.4	4.6
1997	1.0	0.3	1.0	0.2	1.9	4.3
1999	1.1	0.2	0.5	0.3	0.7	3.0
2001	1.3	0.4	0.7	0.2	1.2	3.8
Urban						
1994	1.8	1.1	0.5	0.5	2.3	6.3
1997	1.8	1.2	0.6	0.6	1.7	6.0
1999	2.2	1.0	0.3	0.7	1.1	5.3
2001	2.6	1.1	0.3	0.4	1.3	5.7
Rural						
1994	0.5	0.0	1.3	0.1	2.5	4.4
1997	0.8	0.0	1.1	0.1	1.9	3.9
1999	1.0	0.1	0.5	0.3	0.7	2.7
2001	1.0	0.2	0.8	0.1	1.2	3.4

A4.50 Figure A4.29 to Figure A4.32 examine expenditures on various forms of energy as a percentage of total household expenditure for each decile. Comparison of Figure A4.29 with the national statistics shows a slightly larger contribution of cash-free energy sources in Balochistan among the middle deciles. Expenditures on natural gas in urban areas shows a greater dependence on the expenditure decile than nationally in 2001.

Figure A4.29: Energy as Share of Household Expenditures in Balochistan

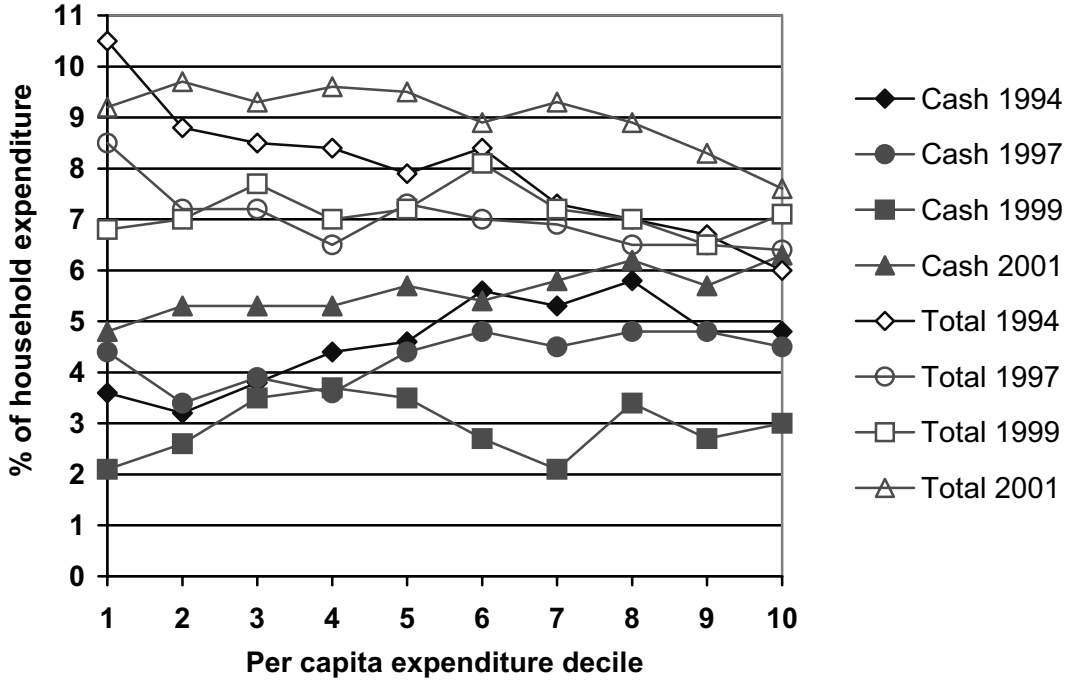


Figure A4.30: Expenditure on Natural Gas in Urban Balochistan

In Percentage of Total Household Spending, Averaged across all Households

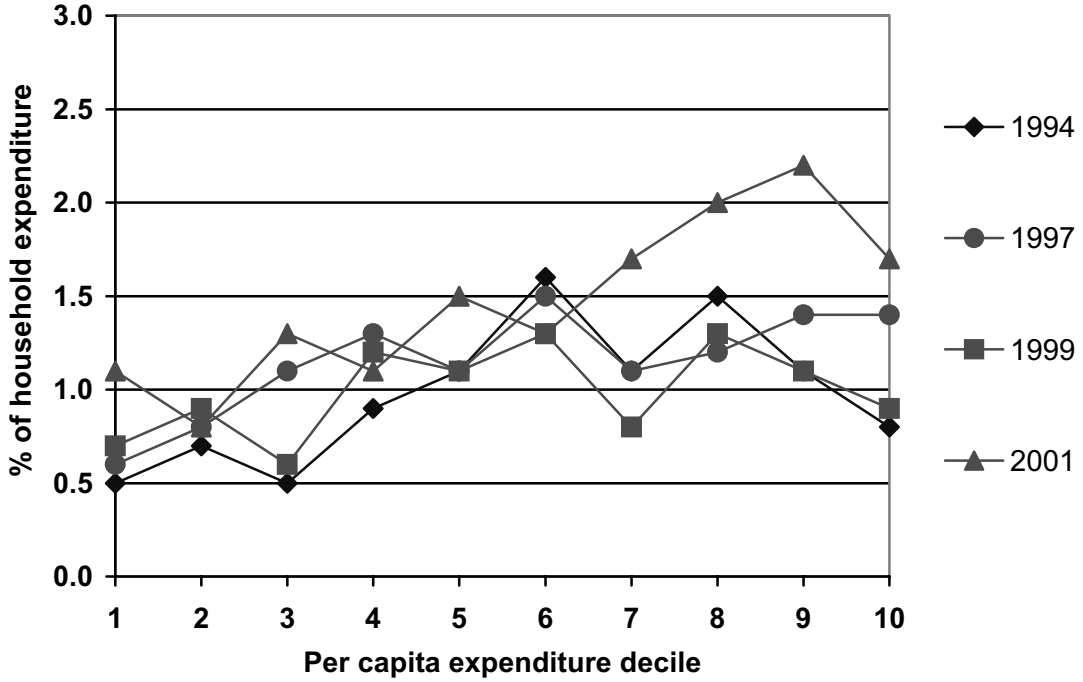


Figure A4.31: Expenditure on Electricity in Urban Balochistan

In Percentage of Total Household Spending, Averaged across all Households

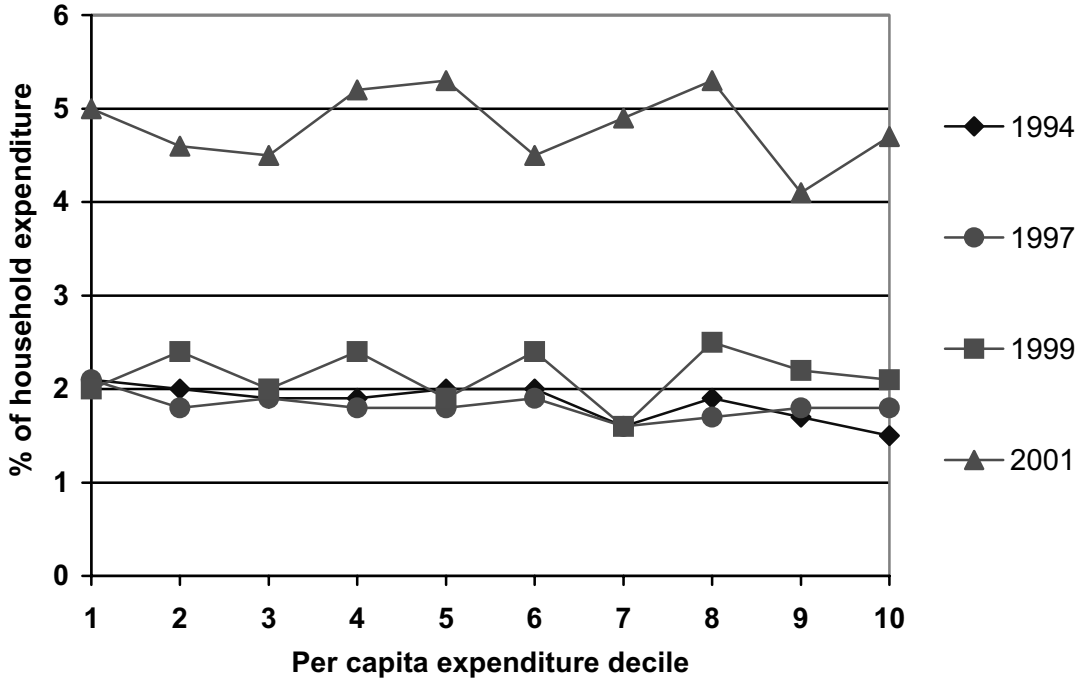
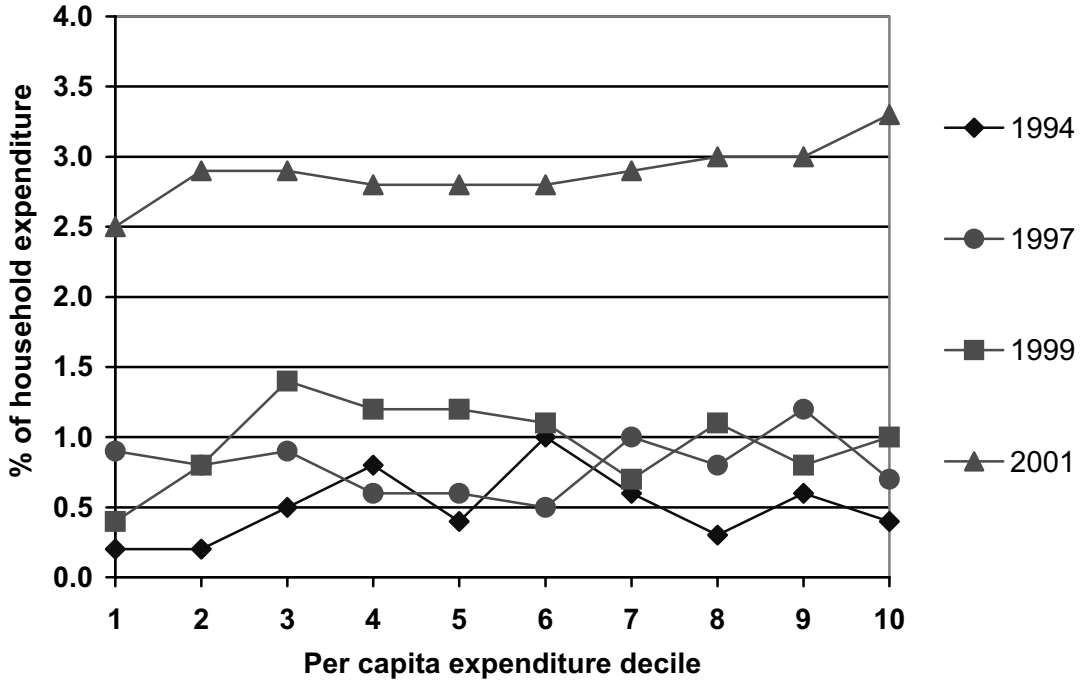


Figure A4.32: Expenditure on Electricity in Rural Balochistan

In Percentage of Total Household Spending, Averaged across all Households



Other Areas

A4.51 Data were available for Azad Jammu and Kashimir from the 1996–97 HIES, 1998–98 PIHS, and 2001–02 PIHS. Data were available for the Northern Areas from the 1998–99 and 2001–02 PIHS, and for the FATA from the 1998–99 PIHS. However, analysis of the data by area is problematic because of the small sample size. The sample size in each survey and estimated numbers of people in urban and rural areas are given in Table A4.41. Given these small sizes, analysis by decile or quintile would not be meaningful, especially in urban areas where lower expenditure groups had few samples. For example, in the 1998–99 HIES, the bottom quintile in both the Northern Areas and Azad Jammu and Kashmir had only 12 samples each in urban areas. Because of rising income relative to other areas, by 2001–02, the corresponding figure in Azad Jammu and Kashmir had fallen to four, and even the next two quintiles had a total of only 13 urban households each. Because of these limitations, only aggregate results are presented.

Table A4.41: Sample Size and Population in Other Areas

Area	*Location*	*Data Type*	*1996–97 HIES*	*1998–99 PIHS*	*2001–02 PIHS*
Azad Jammu and Kashmir	Urban	Sample Size	191	192	191
		Population	230,000	250,000	290,000
	Rural	Sample Size	448	448	443
		Population	1,700,000	2,900,000	2,700,000
Northern Areas	Urban	Sample Size	N.A.	142	143
		Population	N.A.	110,000	110,000
	Rural	Sample Size	N.A.	317	314
		Population	N.A.	1,100,000	790,000
FATA	Rural	Sample Size	N.A.	383	N.A.
		Population	N.A.	2,100,000	N.A.

Note: *N.A. = Not* Available.

A4.52 Basic population statistics are presented in Table A4.42. Azad Jammu and Kashmir had the largest total population. The percentage of the total population that was urban was much smaller than the national average in the three areas. The rural households in these areas were better off than the national average. In the case of the Northern Areas and FATA, this was because rural households were larger; expenditures per capita were lower than the national average. In Azad Jammu and Kashmir, both expenditure per capita and household expenditure were higher than the national average in rural areas for the three survey years. In urban areas in 2001, Azad Jammu and Kashmir were considerably better off than the national average; the converse held true in the Northern Areas.

Table A4.42: Population Statistics in Other Areas, by Survey Year

	Azad Jammu & Kashmir			*Northern Areas*		*FATA*
Parameter	*1997*	*1999*	*2001*	*1999*	*2001*	*1999*
Total Population (millions)	2.0	3.2	3.0	1.2	0.9	2.1
Urban Population (thousands)	230	250	290	110	84	0
Percent Urban	12	8	10	9	10	0
Rural Population (millions)	1.7	2.9	2.7	1.1	0.8	2.1
Percent Rural	88	92	90	91	90	100
Total # of Households (thousands)	330	490	440	150	110	250
Urban Households (thousands)	36	37	40	13	11	0
Rural Households (thousands)	300	450	400	140	100	250
Per Capita Expenditure [1]	879	1,136	1,073	879	854	770
Urban per Capita Expenditure [1]	1,050	1,422	1,524	1,217	966	0
Rural per Capita Expenditure [1]	858	1,112	1,028	846	842	770
Household Expenditure [2]	4,783	6,599	6,731	5,980	6,148	5,628
Urban Household Expenditure [2]	5,894	8,487	9,458	8,958	6,937	0
Rural Household Expenditure [2]	4,648	6,442	6,454	5,697	6,062	5,628
Adjusted per Capita Expenditure [3]	1,047	1,223	1,073	946	854	829
Urban per Capita Expenditure [3]	1,251	1,530	1,524	1,310	966	0
Rural per Capita Expenditure [3]	1,022	1,197	1,028	911	842	829
Household Expenditure [3]	5,696	7,104	6,731	6,438	6,148	6,059
Urban Household Expenditure [3]	7,019	9,137	9,458	9,644	6,937	0
Rural Household Expenditure [3]	5,535	6,935	6,454	6,133	6,062	6,059

[1] Nominal per capita expenditures in rupees per month, inclusive of imputed and cash outlays.
[2] Nominal total household expenditures in rupees per month, inclusive of imputed and cash outlays.
[3] Monthly expenditures adjusted for the CPI with 2001 as the base year.

A4.53 Uptake of different energy sources is illustrated in Table A4.43. In general, there was greater use of fuelwood, kerosene, and LPG in the three areas than the national average, and lesser use of natural gas, dung, and agricultural residues. In the absence of natural gas, the much higher uptake of LPG is not surprising. However, the much higher uptake of LPG in rural FATA—where per capita expenditures were lower than the national average for rural Pakistan and the average household expenditure about the same—is somewhat unexpected. Electricity uptake was quite high in Azad Jammu and Kashimir, but less than half the national average in the FATA. The large decline in the *percentage* of rural households in the Northern Areas reporting electricity consumption between 1999 and 2001, against reportedly declining population, is puzzling and may be an indication of inherent problems associated with a small sample size (about 300 in this case).

Table A4.43: Percentage of Households in Other Areas Using Different Energy Sources

Area and Survey Year	*Biomass*	*Wood*	*Dung*	*Agr Resid*	*Electricity*	*Kerosene*	*Natural Gas*	*LPG*
Azad Jammu & Kashmir								
1997	81	80	0.2	10.6	88	62	0.0	39
1999	93	93	0.7	0.4	74	69	0.3	34
2001	93	92	2.3	0.6	92	67	0.7	35
Azad Jammu & Kashmir, Urban								
1997	38	38	0.0	5.6	98	39	0.0	87
1999	57	56	1.5	2.0	94	53	0.0	60
2001	55	55	0.0	0.0	99	39	0.0	74
Azad Jammu & Kashmir, Rural								
1997	87	86	0.2	11.2	86	65	0.0	33
1999	96	96	0.6	0.2	73	70	0.4	31
2001	96	96	2.5	0.7	91	70	0.7	31
Northern Areas								
1999	94	89	1.7	16.3	83	78	0.0	12
2001	97	97	0.0	2.6	69	82	1.7	14
Northern Areas, Urban								
1999	73	73	4.7	0.0	76	77	0.4	29
2001	84	84	0.0	0.8	90	74	1.1	26
Northern Areas, Rural								
1999	96	90	1.4	17.8	84	78	0.0	10
2001	98	98	0.0	2.8	67	83	1.7	13
FATA								
1999	99	99	45	9.7	31	95	0.5	22

Note: *Agr resid = bagasse, cotton sticks, sawdust, shrubs, weeds, tobacco sticks, and so on for fuel purposes.*

Annex 5

Focus Group Discussions and Individual Interviews

A5.54 An attempt was made to make the qualitative data as representative as possible by randomizing the selection of sites where discussions and interviews were held. Multistage stratified proportional random sampling was adopted for site selection. The focus groups were separated into male and female groups, with the same number of groups of each gender.

A5.55 The procedure used in Punjab is given as an illustration. Punjab was divided into north, south, and central regions, and the districts in these regions were listed alphabetically, from which every fourth district was selected. For each selected district, *tehsils* were listed in alphabetical order; a tehsil would be chosen randomly, and the fourth tehsil was selected for the final sample.[8] Sindh was divided into two regions, and Balochistan was not divided further.

A5.56 The results of focus group selection are given in Table A5.1 to Table A5.3. The focus group discussion participants were all energy consumers. They were classified into three income groups—lower low income, upper low income, and middle income—based on observations made and the known characteristics of the neighborhoods in which the participants lived.

[8] A tehsil is an administrative subdivision of local government, typically part of a district, and contains villages or municipalities.

Table A5.1: Focus Group Discussion Locations in Punjab

Income	*Gender*	*Urban/ Rural*	*District*	*Village/ Locality*	*Number of Participants*
			Central Punjab		
2	Male	Urban	Lahore	Green Town (Bhatha Number 1)	6
2	Male	Urban	Lahore	Green Town	6
2	Male	Urban	Lahore	Green Town (Marium Colony)	5
2	Male	Urban	Lahore	Green Town	7
3	Male	Urban	Lahore	Ravi Road (Timber market)	8
3	Male	Urban	Lahore	Iqbal Town (Raza block)	8
2	Male	Urban	Sheikhupura	Farooq-Abad (Momin abad)	13
3	Female	Urban	Lahore	Green Town (Mian chowk)	7
3	Female	Urban	Lahore	Green Town (Nagra park)	6
3	Female	Urban	Lahore	Iqbal Town (Neelum block)	9
2	Female	Urban	Sheikhupura	Farooq Abad (Momin abad)	9
3	Female	Urban	Lahore	Ravi Road	7
3	Female	Urban	Lahore	Iqbal Town (Jahanzaib block)	10
1	Male	Rural	Kasure	Chak 33	10
2	Male	Rural	Lahore	Niaz Baig	11
1	Male	Rural	Sheikhupura	Kot Sonda	8
1	Male	Rural	Lahore	Shah Pur (Kanjran)	7
1	Male	Rural	Jhang	Chinute (Jassrat)	8
1	Female	Rural	Lahore	Shah Pur (Kanjran)	7
1	Female	Rural	Lahore	Garden Town (Jeevan hana)	7
1	Female	Rural	Lahore	Niaz Baig	10
1	Female	Rural	Kasure	Chak 33	6
1	Female	Rural	Sheikhupura	Terhun-Syedan	7
1	Female	Rural	Sheikhupura	Kot-Sonda	7
1	Female	Rural	Jhang	Chinute (Jassrat)	7
			North Punjab		
3	Male	Urban	Rawalpindi	Kahuta (Mohallah rajgaan)	9
3	Female	Urban	Rawalpindi	Kahuta	7
1	Male	Rural	Rawalpindi	Brathain (Panjar)	10
1	Female	Rural	Rawalpindi	Brathian (Panjar)	8

South Punjab

3	Male	Urban	D.G.Khan	Khayabn-e-Serwer	7
3	Male	Urban	Multan	Mandi Kumharan	8
2	Male	Urban	Rajan Pur	Jam pur (Madni Colony)	10
3	Female	Urban	D.G.Khan	Khayaban-e-Serwer	8
3	Female	Urban	Multan	Mandi Kumharan	8
2	Female	Urban	Rajan Pur	Jam Pur (Madni Colony)	10
1	Male	Rural	D.G.Khan	Gubrah (Chait sarkani)	7
2	Male	Rural	Multan	Basti Peray wala (Hamid pura)	14
1	Male	Rural	Rajan Pur	Jam Pur (Rakh rekh)	13
1	Female	Rural	D.G.Khan	Gubrah (Doday wala)	8
2	Female	Rural	Multan	Peray wala	8
1	Female	Rural	Rajan Pur	Jam Pur (Rakh rekh)	7

Note: *For income status, 1 = Lower Low, 2 = Upper Low, 3 = Middle.*

Table A5.2: Focus Group Discussion Locations in Sindh

Income	*Gender*	*Urban/ Rural*	*District*	*Village/ Locality*	*Number of Participants*
			Lower Sindh		
1	Male	Urban	Dadu	Nangolane Kotri	8
2	Male	Urban	Hyderabad	Morimanger, Hyderabad	9
3	Male	Urban	Karachi (central)	Kosar Niazi Colony	8
3	Male	Urban	Karachi (west)	Orangi Town	8
2	Male	Urban	Thatta	Gharo	7
1	Female	Urban	Dadu	Nangolane Kotri	8
2	Female	Urban	Hyderabad	Morimanger, Hyderabad	9
3	Female	Urban	Karachi (central)	Kosar Niazi Colony	8
3	Female	Urban	Karachi (west)	Orangi Town	11
2	Female	Urban	Thatta	Gharo	8
1	Male	Rural	Dadu		9
1	Male	Rural	Hyderabad	Bhawal Zanoor, Tando Hyder	8
2	Male	Rural	Karachi (central)	Bhangoria Goth	12
2	Male	Rural	Karachi (west)	Maripur	8
1	Male	Rural	Thatta	Mirpur Sakro, Village	10
1	Female	Rural	Dadu	Darya Khan Goth Thana Bolan Khan	10
1	Female	Rural	Hyderabad	Bhawal Zanoor, Tando Hyder	8
2	Female	Rural	Karachi (central)	Bhangoria Goth	8
2	Female	Rural	Karachi (west)	Maripur	9
1	Female	Rural	Thatta	Mirpur Sakro, Lashri	11
			Upper Sindh		
2	Male	Urban	Khairpur Mirs	Saeeda Goth	9
2	Male	Urban	Larkana	Rahmat Pur/ Lateef Colony	8
2	Male	Urban	Sukkur	New yard/Kot Yaqoob Ali Khan Shah Rohri	10
2	Female	Urban	Khairpur Mirs	Saeeda Goth	9
2	Female	Urban	Larkana	Rahmat Pur/ Lateef Colony	11
2	Female	Urban	Sukkur	New yard/Kot Yaqoob Ali Khan Shah Rohri	12
1	Male	Rural	Khairpur Mirs	Rind Hanja Kot Deji	10
1	Male	Rural	Larkana	Goth Ghazi Khan Mashori Dorki	12
1	Male	Rural	Sukkur	Rohri	9
1	Female	Rural	Khairpur Mirs	Rind Hanja Kot Deji	8
1	Female	Rural	Larkana	Goth Ghazi Khan Mashori Dorki	10
1	Female	Rural	Sukkur	Rohri Sukkur	9

Note: *For income status, 1 = Lower Low, 2 = Upper Low, 3 = Middle.*

Table A5.3: Focus Group Discussion Locations in Balochistan

Income	*Gender*	*Urban/ Rural*	*Districts*	*Village/ Locality*	*Number of Participants*
3	Male	Urban	Quetta	Rahmat Colony	13
2	Male	Urban	Pishin	City Area	9
1	Male	Urban	Kalat	Pus-e-Shehar	13
2	Male	Urban	Ziarat	City Ziarat	9
3	Female	Urban	Quetta	Rahmat Colony	7
2	Female	Urban	Mastung	Khawaj Khail Masjid Road	7
2	Female	Urban	Kalat	Gum Guzar	7
3	Female	Urban	Ziarat	City Ziarat	7
1	Male	Rural	Ziarat	Killi Zindra	11
1	Male	Rural	Mastung	Killi Parang Abad	14
1	Male	Rural	Kalat	New Gradi Grani	13
2	Male	Rural	Quetta	Saragurgai	9
1	Female	Rural	Kalat	Gharani	7
1	Female	Rural	Pishin	Killi Abdul Razaq	7
2	Female	Rural	Quetta	Saragurgai	7
1	Female	Rural	Ziarat	Zindra	7

Note: *For income status, 1 = Lower Low, 2 = Upper Low, 3 = Middle.*

A5.57 Estimated household incomes are given in Table A5.4. Data classifying focus groups by location (urban or rural), gender, and income status is shown in Table A5.5.

Table A5.4: Estimated Income of Focus Groups

Urban/Rural	*Region*	*Mean*	*Median*	*Range*
Urban	Central Punjab	15,000	12,500	8,000–40,000
Rural	Central Punjab	8,000	7,500	5,000–25,000
Urban	Lower Sindh	14,000	12,000	10,000–30,000
Rural	Lower Sindh	7,000	6,500	5,000–25,000
Urban	Upper Sindh	12,000	11,000	8,000–25,000
Rural	Upper Sindh	8,000	7,500	6,000–20,000
Urban	Balochistan	12,000	10,000	7,000–25,000
Rural	Balochistan	6,000	5,500	5,000–18,000

Note: *Mean, Median, and Range are in rupees per month per household.*

Table A5.5: Characteristics of Focus Groups

	Total			*Male*			*Female*		
Income	*Urban*	*Rural*	*Total*	*Urban*	*Rural*	*Total*	*Urban*	*Rural*	*Total*
Lower Low	3	35	38	2	16	18	1	19	20
Upper Low	22	9	31	13	5	18	9	4	13
Middle	20	0	20	8	0	8	12	0	12
Total	45	44	89	23	21	44	22	23	45

A5.58 The characteristics of the individuals interviewed are given in Table A5.6 to Table A5.9.

Table A5.6: Individual Interviews in Punjab

Income	*Gender*	*Age*	*Years of Education*	*Classi-fication*	*Urban/ Rural*	*District*	*Locality/ Village*
				Central Punjab			
3	Male	40	10	Local Leader	Urban	Lahore	Ravi road (Killa Muhammadi)
3	Male	n.a.	n.a.	Local Leader	Urban	Sheikhupura	Farooq Abad
2	Male	30	5	Consumer	Urban	Lahore	Ravi Road (Timber market)
2	Male	22	0	Consumer	Urban	Lahore	Green Town (Marium Colony)
2	Male	40	0	Consumer	Urban	Lahore	Green Town(Marium Colony)
3	Male	45	5	Supplier	Urban	Lahore	Ravi Road (Timber market)
2	Female	26	0	Consumer	Urban	Lahore	Ravi Road
3	Male	40	8	Local Leader	Rural	Lahore	Shah Pur Kanjran
3	Male	61	8	Local Leader	Rural	Jhang	Chaniot (Jasrat)
2	Male	22	10	Consumer	Rural	Lahore	Shah Pur Kanjran
2	Male	60	0	Consumer	Rural	Jhang	Chniot (Jasrat)
1	Female	50	0	Consumer	Rural	Lahore	Shah Pur Kanjran
				Northern Punjab			
2	Male	34	8	Supplier	Urban	Rawalpindi	Kahuta
3	Female	36	8	Local Leader	Urban	Rawalpindi	Kahuta (Mohalla rajgan)
1	Female	49	10	Consumer	Urban	Rawalpindi	Kahuta (Mohalla rajgan)
2	Male	n.a.	n.a.	Local Leader	Rural	Rawalpindi	Khidyot
2	Male	50	12	Local Leader	Rural	Rawalpindi	Kahuta
1	Male	35	0	Supplier	Rural	Rawalpindi	Kahuta (Brathian)
1	Female	n.a.	n.a.	Consumer	Rural	Rawalpindi	Kahuta (Brathian)
				Southern Punjab			
3	Male	34	12	Local Leader	Urban	Multan	Mandi Kumharan
2	Male	38	12	Local Leader	Urban	Rajan Pur	Jam pur (Tibbi lundan)
3	Male	50	10	Local Leader	Urban	Multan	Double Phattak
3	Male	30	16	Local Leader	Urban	D.G.Khan	Khayaban-e-Sarwar
2	Male	32	8	Consumer	Urban	Multan	Mandi Khumaran
2	Male	40	14	Consumer	Urban	Rajan Pur	Jampur (Madni Colony)
1	Male	40	14	Consumer	Urban	D.G.Khan	Khayaban-e-Sarwar
1	Male	40	0	Supplier	Urban	Rajan Pur	Jampur (Irfan abad)
3	Male	45	0	Supplier	Urban	Rajan Pur	Rajan Pur
2	Male	55	0	Supplier	Urban	D.G.Khan	Khayaban-e-Sarwar
1	Female	55	5	Consumer	Urban	Multan	Aria Samaj

Income	*Gender*	*Age*	*Years of Education*	*Classi-fication*	*Urban/ Rural*	*District*	*Locality/ Village*
1	Female	40	8	Consumer	Urban	Rajanpur	Jampur
2	Female	70	0	Consumer	Urban	D.G.Khan	Khayaban-e-Sarwar
1	Male	37	12	Local Leader	Rural	Multan	Hamidpura (Kanora)
1	Male	50	8	Local Leader	Rural	D.G.Khan	Gubrah
1	Male	40	0	Local Leader	Rural	Rajan pur	Jampur (Rakh rekh)
1	Male	85	16	Consumer	Rural	Multan	Basti Peeray Wala
1	Male	34	N.A.	Consumer	Rural	Rajan pur	Jampur (Rakh rekh)
1	Male	N.A.	N.A.	Consumer	Rural	D.G.Khan	Gubrah
2	Male	40	0	Supplier	Rural	Multan	Chowk Nag Shah
1	Male	30	0	Supplier	Rural	D.G.Khan	—
1	Female	70	0	Consumer	Rural	Multan	Basti Peeray Wala
2	Female	50	0	Consumer	Rural	Rajan pur	—
1	Female	40	0	Consumer	Rural	D.G.Khan	Gubrah

Notes: *For income status, 1 = Lower Low, 2 = Upper Low, 3 = Middle. N.A. =. Not Available, — = Not Applicable.*

Table A5.7: Individual Interviews in Balochistan

Income	*Gender*	*Age*	*Years of Education*	*Classi-fication*	*Urban/ Rural*	*District*	*Locality/ Village*
3	Male	30	14	Local Leader	Urban	Pishin	City Pishin
3	Male	N.A.	N.A.	Local Leader	Urban	Mastung	Khelan Masjid Road
2	Male	43	N.A.	Local Leader	Urban	Ziarat	City Ziarat
2	Male	N.A.	N.A.	Local Leader	Urban	Kalat	Takri Abdul Khaliq
2	Male	44	0	Consumer	Urban	Ziarat	Ziarat City
1	Male	25	16	Consumer	Urban	Mastung	City Mastung
2	Male	35	N.A.	Supplier	Urban	Kalat	City Kalat
2	Male	22	10	Supplier	Urban	Mastung	City Mustang
1	Male	24	N.A.	Supplier	Urban	Ziarat	City Ziarat
3	Female	85	0	Local Leader	Urban	Ziarat	Baboo Mohalla
3	Female	25	14	Local Leader	Urban	Mastung	Saddat Road
2	Female	61	10	Consumer	Urban	Quetta	Patal Housing
1	Female	28	10	Consumer	Urban	Zaiarat	Baboo Mohalla
2	Female	35	16	Consumer	Urban	Mastung	Khawaja Khail
2	Female	50	8	Consumer	Urban	Kalat	Gham Ghuzar
2	Male	53	N.A.	Local Leader	Rural	Quetta	Saragurgai
1	Male	22	10	Local Leader	Rural	Ziarat	Killi Zindra
2	Male	37	0	Local Leader	Rural	Kalat	Killi new Grani
2	Male	35	0	Supplier	Rural	Quetta	Saragurgai
1	Male	32	0	Supplier	Rural	Kalat	Gharani
1	Female	40	0	Consumer	Rural	Ziarat	Zindra
1	Female	N.A.	N.A.	Consumer	Rural	Quetta	Saragurgai
1	Female	50	0	Consumer	Rural	Pishin	Killi Abdul Razaq
1	Female	80	0	Consumer	Rural	Kalat	Gharani

Notes: *Income status 1 Lower Low, 2 Upper Low, 3 Middle; N.A. =. Not Available, — = Not Applicable.*

Table A5.8: Characteristics of Individuals Interviewed

	Consumers			*Fuel Suppliers*			*Local Leaders*		
Income	*Urban*	*Rural*	*Total*	*Urban*	*Rural*	*Total*	*Urban*	*Rural*	*Total*
Lower Low	6	11	17	2	3	5	0	4	4
Upper Low	11	3	14	4	2	6	3	4	7
Middle	0	0	0	2	0	2	10	2	12
Total	17	14	31	8	5	13	13	10	23

Table A5.9: Estimated Income of Individuals Interviewed

Urban/Rural	*Region*	*Mean*	*Median*	*Range*
Urban	Central Punjab	16,000	14,000	10,000–40,000
Rural	Central Punjab	10,000	9,000	7,000–30,000
Urban	Balochistan	7,000	6,500	6,000–35,000
Rural	Balochistan	5,000	6,000	5,000–50,000

Note: *Mean, Median, and Range are in rupees per month per household.*

References

Asia Pulse. 2001. "Pakistan oil cos told to cut liquefied petroleum gas prices 20 pct." August 2.

Business Recorder. 2005a. "10% rise likely in gas prices: OGRA chief." April 13.

———. 2005b. "POL consumption up by 10%." July 11.

———. 2005c. "Message from Federal Minister for Petroleum & Natural Resources." September 30.

———. 2006. "LPG prices hit Rs 80 per kg during Eid holidays." January 14.

Dawn. 2005. "LPG price shoots up to Rs50 per kg." November 6.

Energy Intelligence. 2006. *Oil Market Intelligence*. January.

ESMAP. 2003a. *India: Access of the Poor to Clean Household Fuels*. Report 263/03. Washington, DC: World Bank. http://wbln0018.worldbank.org/esmap/site.nsf/files/263-03+India.pdf/$FILE/263-03+India.pdf.

ESMAP. 2003b. *Household Energy Use in Developing Countries: A Multicountry Study*. Report 042/03. Washington, DC: World Bank. www-wds.worldbank.org/servlet/WDS_IBank_Servlet?pcont=details&eid=000090341_20040115105717.

Frontier Star. 2005. "Only 38 pc oil sector deregulated, rest is almost fully regulated." August 20.

HDIP and MPNR (Hydrocarbon Development Institute of Pakistan and Ministry of Petroleum and Natural Resources). Various years. *Pakistan Energy Yearbook*. Islamabad.

IMF (International Monetary Fund). 2006. International Financial Indicators. Online database.

MPNR (Ministry of Petroleum and Natural Resources). 2005. "Brief on pricing of petroleum products." November 10. www.mpnr.gov.pk/pricing%20formula.php.

Pakistan Press International. 2001. "PSO further reduces LPG price." February 23.

———. 2005. "Pakistan budget deficit target would be achieved." June 12.

Population Census Organization. 2006. www.statpak.gov.pk/depts/pco/.

World Bank. 2003. *Pakistan Oil and Gas Sector Review*. Report No. 26072–PK. Washington, DC. http://lnweb18.worldbank.org/SAR/sa.nsf/Attachments/POGSR-2003/$File/POGSR-2003.pdf.

———. 2006. World Development Indicators. Online database.

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ENERGY SECTOR MANAGEMENT ASSISTANCE PROGRAMME (ESMAP)

LIST OF REPORTS ON COMPLETED ACTIVITIES

Region/Country	*Activity/Report Title*	*Date*	*Number*
	SUB-SAHARAN AFRICA (AFR)		
Africa Regional	Anglophone Africa Household Energy Workshop (English)	07/88	085/88
	Regional Power Seminar on Reducing Electric Power System Losses in Africa (English)	08/88	087/88
	Institutional Evaluation of EGL (English)	02/89	098/89
	Biomass Mapping Regional Workshops (English)	05/89	--
	Francophone Household Energy Workshop (French)	08/89	--
	Interafrican Electrical Engineering College: Proposals for Short- and Long-Term Development (English)	03/90	112/90
	Biomass Assessment and Mapping (English)	03/90	--
	Symposium on Power Sector Reform and Efficiency Improvement in Sub-Saharan Africa (English)	06/96	182/96
	Commercialization of Marginal Gas Fields (English)	12/97	201/97
	Commercilizing Natural Gas: Lessons from the Seminar in Nairobi for Sub-Saharan Africa and Beyond	01/00	225/00
	Africa Gas Initiative – Main Report: Volume I	02/01	240/01
	First World Bank Workshop on the Petroleum Products Sector in Sub-Saharan Africa	09/01	245/01
	Ministerial Workshop on Women in Energy	10/01	250/01
	Energy and Poverty Reduction: Proceedings from a Multi-Sector And Multi-Stakeholder Workshop Addis Ababa, Ethiopia, October 23-25, 2002.	03/03	266/03
	Opportunities for Power Trade in the Nile Basin: Final Scoping Study	01/04	277/04
	Énergies modernes et réduction de la pauvreté: Un atelier multi-sectoriel. Actes de l'atelier régional. Dakar, Sénégal, du 4 au 6 février 2003 (French Only)	01/04	278/04
	Énergies modernes et réduction de la pauvreté: Un atelier multi-sectoriel. Actes de l'atelier régional. Douala, Cameroun du 16-18 juillet 2003. (French Only)	09/04	286/04
	Energy and Poverty Reduction: Proceedings from the Global Village Energy Partnership (GVEP) Workshops held in Africa	01/05	298/05
	Power Sector Reform in Africa: Assessing the Impact on Poor People	08/05	306/05
	The Vulnerability of African Countries to Oil Price Shocks: Major Factors and Policy Options. The Case of Oil Importing Countries	08/05	308/05
Angola	Energy Assessment (English and Portuguese)	05/89	4708-ANG
	Power Rehabilitation and Technical Assistance (English)	10/91	142/91
	Africa Gas Initiative – Angola: Volume II	02/01	240/01
Benin	Energy Assessment (English and French)	06/85	5222-BEN
Botswana	Energy Assessment (English)	09/84	4998-BT
	Pump Electrification Prefeasibility Study (English)	01/86	047/86
	Review of Electricity Service Connection Policy (English)	07/87	071/87
	Tuli Block Farms Electrification Study (English)	07/87	072/87
	Household Energy Issues Study (English)	02/88	--
	Urban Household Energy Strategy Study (English)	05/91	132/91
Burkina Faso	Energy Assessment (English and French)	01/86	5730-BUR
	Technical Assistance Program (English)	03/86	052/86
	Urban Household Energy Strategy Study (English and French)	06/91	134/91
Burundi	Energy Assessment (English)	06/82	3778-BU

Region/Country	*Activity/Report Title*	*Date*	*Number*
Burundi	Petroleum Supply Management (English)	01/84	012/84
	Status Report (English and French)	02/84	011/84
	Presentation of Energy Projects for the Fourth Five-Year Plan (1983-1987) (English and French)	05/85	036/85
	Improved Charcoal Cookstove Strategy (English and French)	09/85	042/85
	Peat Utilization Project (English)	11/85	046/85
	Energy Assessment (English and French)	01/92	9215-BU
Cameroon	Africa Gas Initiative – Cameroon: Volume III	02/01	240/01
Cape Verde	Energy Assessment (English and Portuguese)	08/84	5073-CV
	Household Energy Strategy Study (English)	02/90	110/90
Central African Republic	Energy Assessment (French)	08/92	9898-CAR
Chad	Elements of Strategy for Urban Household Energy The Case of N'djamena (French)	12/93	160/94
Comoros	Energy Assessment (English and French)	01/88	7104-COM
	In Search of Better Ways to Develop Solar Markets: The Case of Comoros	05/00	230/00
Congo	Energy Assessment (English)	01/88	6420-COB
	Power Development Plan (English and French)	03/90	106/90
	Africa Gas Initiative – Congo: Volume IV	02/01	240/01
Côte d'Ivoire	Energy Assessment (English and French)	04/85	5250-IVC
	Improved Biomass Utilization (English and French)	04/87	069/87
	Power System Efficiency Study (English)	12/87	--
	Power Sector Efficiency Study (French)	02/92	140/91
	Project of Energy Efficiency in Buildings (English)	09/95	175/95
	Africa Gas Initiative – Côte d'Ivoire: Volume V	02/01	240/01
Ethiopia	Energy Assessment (English)	07/84	4741-ET
	Power System Efficiency Study (English)	10/85	045/85
	Agricultural Residue Briquetting Pilot Project (English)	12/86	062/86
	Bagasse Study (English)	12/86	063/86
	Cooking Efficiency Project (English)	12/87	--
	Energy Assessment (English)	02/96	179/96
Gabon	Energy Assessment (English)	07/88	6915-GA
	Africa Gas Initiative – Gabon: Volume VI	02/01	240/01
The Gambia	Energy Assessment (English)	11/83	4743-GM
	Solar Water Heating Retrofit Project (English)	02/85	030/85
	Solar Photovoltaic Applications (English)	03/85	032/85
	Petroleum Supply Management Assistance (English)	04/85	035/85
Ghana	Energy Assessment (English)	11/86	6234-GH
	Energy Rationalization in the Industrial Sector (English)	06/88	084/88
	Sawmill Residues Utilization Study (English)	11/88	074/87
	Industrial Energy Efficiency (English)	11/92	148/92
	Corporatization of Distribution Concessions through Capitalization	12/03	272/03
Guinea	Energy Assessment (English)	11/86	6137-GUI
	Household Energy Strategy (English and French)	01/94	163/94
Guinea-Bissau	Energy Assessment (English and Portuguese)	08/84	5083-GUB
	Recommended Technical Assistance Projects (English & Portuguese)	04/85	033/85
	Management Options for the Electric Power and Water Supply Subsectors (English)	02/90	100/90
	Power and Water Institutional Restructuring (French)	04/91	118/91
Kenya	Energy Assessment (English)	05/82	3800-KE
	Power System Efficiency Study (English)	03/84	014/84
	Status Report (English)	05/84	016/84

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Kenya	Coal Conversion Action Plan (English)	02/87	--
	Solar Water Heating Study (English)	02/87	066/87
	Peri-Urban Woodfuel Development (English)	10/87	076/87
	Power Master Plan (English)	11/87	--
	Power Loss Reduction Study (English)	09/96	186/96
	Implementation Manual: Financing Mechanisms for Solar Electric Equipment	07/00	231/00
Lesotho	Energy Assessment (English)	01/84	4676-LSO
Liberia	Energy Assessment (English)	12/84	5279-LBR
	Recommended Technical Assistance Projects (English)	06/85	038/85
	Power System Efficiency Study (English)	12/87	081/87
Madagascar	Energy Assessment (English)	01/87	5700-MAG
	Power System Efficiency Study (English and French)	12/87	075/87
	Environmental Impact of Woodfuels (French)	10/95	176/95
Malawi	Energy Assessment (English)	08/82	3903-MAL
	Technical Assistance to Improve the Efficiency of Fuelwood Use in the Tobacco Industry (English)	11/83	009/83
	Status Report (English)	01/84	013/84
Mali	Energy Assessment (English and French)	11/91	8423-MLI
	Household Energy Strategy (English and French)	03/92	147/92
Islamic Republic of Mauritania	Energy Assessment (English and French)	04/85	5224-MAU
	Household Energy Strategy Study (English and French)	07/90	123/90
Mauritius	Energy Assessment (English)	12/81	3510-MAS
	Status Report (English)	10/83	008/83
	Power System Efficiency Audit (English)	05/87	070/87
	Bagasse Power Potential (English)	10/87	077/87
	Energy Sector Review (English)	12/94	3643-MAS
Mozambique	Energy Assessment (English)	01/87	6128-MOZ
	Household Electricity Utilization Study (English)	03/90	113/90
	Electricity Tariffs Study (English)	06/96	181/96
	Sample Survey of Low Voltage Electricity Customers	06/97	195/97
Namibia	Energy Assessment (English)	03/93	11320-NAM
Niger	Energy Assessment (French)	05/84	4642-NIR
	Status Report (English and French)	02/86	051/86
	Improved Stoves Project (English and French)	12/87	080/87
	Household Energy Conservation and Substitution (English and French)	01/88	082/88
Nigeria	Energy Assessment (English)	08/83	4440-UNI
	Energy Assessment (English)	07/93	11672-UNI
	Strategic Gas Plan	02/04	279/04
Rwanda	Energy Assessment (English)	06/82	3779-RW
	Status Report (English and French)	05/84	017/84
	Improved Charcoal Cookstove Strategy (English and French)	08/86	059/86
	Improved Charcoal Production Techniques (English and French)	02/87	065/87
	Energy Assessment (English and French)	07/91	8017-RW
	Commercialization of Improved Charcoal Stoves and Carbonization Techniques Mid-Term Progress Report (English and French)	12/91	141/91
SADC	SADC Regional Power Interconnection Study, Vols. I-IV (English)	12/93	-
SADCC	SADCC Regional Sector: Regional Capacity-Building Program for Energy Surveys and Policy Analysis (English)	11/91	-
Sao Tome and Principe	Energy Assessment (English)	10/85	5803-STP
Senegal	Energy Assessment (English)	07/83	4182-SE

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Senegal	Status Report (English and French)	10/84	025/84
	Industrial Energy Conservation Study (English)	05/85	037/85
	Preparatory Assistance for Donor Meeting (English and French)	04/86	056/86
	Urban Household Energy Strategy (English)	02/89	096/89
	Industrial Energy Conservation Program (English)	05/94	165/94
Seychelles	Energy Assessment (English)	01/84	4693-SEY
	Electric Power System Efficiency Study (English)	08/84	021/84
Sierra Leone	Energy Assessment (English)	10/87	6597-SL
Somalia	Energy Assessment (English)	12/85	5796-SO
Republic of South Africa	Options for the Structure and Regulation of Natural Gas Industry (English)	05/95	172/95
Sudan	Management Assistance to the Ministry of Energy and Mining	05/83	003/83
	Energy Assessment (English)	07/83	4511-SU
	Power System Efficiency Study (English)	06/84	018/84
	Status Report (English)	11/84	026/84
	Wood Energy/Forestry Feasibility (English)	07/87	073/87
Swaziland	Energy Assessment (English)	02/87	6262-SW
	Household Energy Strategy Study	10/97	198/97
Tanzania	Energy Assessment (English)	11/84	4969-TA
	Peri-Urban Woodfuels Feasibility Study (English)	08/88	086/88
	Tobacco Curing Efficiency Study (English)	05/89	102/89
	Remote Sensing and Mapping of Woodlands (English)	06/90	--
	Industrial Energy Efficiency Technical Assistance (English)	08/90	122/90
	Power Loss Reduction Volume 1: Transmission and Distribution System Technical Loss Reduction and Network Development (English)	06/98	204A/98
	Power Loss Reduction Volume 2: Reduction of Non-Technical Losses (English)	06/98	204B/98
Togo	Energy Assessment (English)	06/85	5221-TO
	Wood Recovery in the Nangbeto Lake (English and French)	04/86	055/86
	Power Efficiency Improvement (English and French)	12/87	078/87
Uganda	Energy Assessment (English)	07/83	4453-UG
	Status Report (English)	08/84	020/84
	Institutional Review of the Energy Sector (English)	01/85	029/85
	Energy Efficiency in Tobacco Curing Industry (English)	02/86	049/86
	Fuelwood/Forestry Feasibility Study (English)	03/86	053/86
	Power System Efficiency Study (English)	12/88	092/88
	Energy Efficiency Improvement in the Brick and Tile Industry (English)	02/89	097/89
	Tobacco Curing Pilot Project (English)	03/89	UNDP Terminal Report
	Energy Assessment (English)	12/96	193/96
	Rural Electrification Strategy Study	09/99	221/99
Zaire	Energy Assessment (English)	05/86	5837-ZR
Zambia	Energy Assessment (English)	01/83	4110-ZA
	Status Report (English)	08/85	039/85
	Energy Sector Institutional Review (English)	11/86	060/86
	Power Subsector Efficiency Study (English)	02/89	093/88
	Energy Strategy Study (English)	02/89	094/88
	Urban Household Energy Strategy Study (English)	08/90	121/90
Zimbabwe	Energy Assessment (English)	06/82	3765-ZIM
	Power System Efficiency Study (English)	06/83	005/83
	Status Report (English)	08/84	019/84

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	Power Sector Management Assistance Project (English)	04/85	034/85
	Power Sector Management Institution Building (English)	09/89	--
Zimbabwe	Petroleum Management Assistance (English)	12/89	109/89
	Charcoal Utilization Pre-feasibility Study (English)	06/90	119/90
	Integrated Energy Strategy Evaluation (English)	01/92	8768-ZIM
	Energy Efficiency Technical Assistance Project: Strategic Framework for a National Energy Efficiency Improvement Program (English)	04/94	--
	Capacity Building for the National Energy Efficiency Improvement Programme (NEEIP) (English)	12/94	--
	Rural Electrification Study	03/00	228/00
	EAST ASIA AND PACIFIC (EAP)		
Asia Regional	Pacific Household and Rural Energy Seminar (English)	11/90	--
China	County-Level Rural Energy Assessments (English)	05/89	101/89
	Fuelwood Forestry Preinvestment Study (English)	12/89	105/89
	Strategic Options for Power Sector Reform in China (English)	07/93	156/93
	Energy Efficiency and Pollution Control in Township and Village Enterprises (TVE) Industry (English)	11/94	168/94
	Energy for Rural Development in China: An Assessment Based on a Joint Chinese/ESMAP Study in Six Counties (English)	06/96	183/96
	Improving the Technical Efficiency of Decentralized Power Companies	09/99	222/99
	Air Pollution and Acid Rain Control: The Case of Shijiazhuang City and the Changsha Triangle Area	10/03	267/03
	Toward a Sustainable Coal Sector In China	07/04	287/04
	Demand Side Management in a Restructured Industry: How Regulation and Policy Can Deliver Demand-Side Management Benefits to a Growing Economy and a Changing Power System	12/05	314/05
Fiji	Energy Assessment (English)	06/83	4462-FIJ
Indonesia	Energy Assessment (English)	11/81	3543-IND
	Status Report (English)	09/84	022/84
	Power Generation Efficiency Study (English)	02/86	050/86
	Energy Efficiency in the Brick, Tile and Lime Industries (English)	04/87	067/87
	Diesel Generating Plant Efficiency Study (English)	12/88	095/88
	Urban Household Energy Strategy Study (English)	02/90	107/90
	Biomass Gasifier Preinvestment Study Vols. I & II (English)	12/90	124/90
	Prospects for Biomass Power Generation with Emphasis on Palm Oil, Sugar, Rubberwood and Plywood Residues (English)	11/94	167/94
Lao PDR	Urban Electricity Demand Assessment Study (English)	03/93	154/93
	Institutional Development for Off-Grid Electrification	06/99	215/99
Malaysia	Sabah Power System Efficiency Study (English)	03/87	068/87
	Gas Utilization Study (English)	09/91	9645-MA
Mongolia	Energy Efficiency in the Electricity and District Heating Sectors	10/01	247/01
	Improved Space Heating Stoves for Ulaanbaatar	03/02	254/02
	Impact of Improved Stoves on Indoor Air Quality in Ulaanbaatar, Mongolia	11/05	313/05
Myanmar	Energy Assessment (English)	06/85	5416-BA

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Papua New Guinea	Energy Assessment (English)	06/82	3882-PNG
	Status Report (English)	07/83	006/83
	Institutional Review in the Energy Sector (English)	10/84	023/84
	Power Tariff Study (English)	10/84	024/84
Philippines	Commercial Potential for Power Production from Agricultural Residues (English)	12/93	157/93
	Energy Conservation Study (English)	08/94	--
	Strengthening the Non-Conventional and Rural Energy Development Program in the Philippines: A Policy Framework and Action Plan	08/01	243/01
	Rural Electrification and Development in the Philippines: Measuring the Social and Economic Benefits	05/02	255/02
Solomon Islands	Energy Assessment (English)	06/83	4404-SOL
	Energy Assessment (English)	01/92	979-SOL
South Pacific	Petroleum Transport in the South Pacific (English)	05/86	--
Thailand	Energy Assessment (English)	09/85	5793-TH
	Rural Energy Issues and Options (English)	09/85	044/85
	Accelerated Dissemination of Improved Stoves and Charcoal Kilns (English)	09/87	079/87
	Northeast Region Village Forestry and Woodfuels Preinvestment Study (English)	02/88	083/88
	Impact of Lower Oil Prices (English)	08/88	--
	Coal Development and Utilization Study (English)	10/89	--
	Why Liberalization May Stall in a Mature Power Market: A Review of the Technical and Political Economy Factors that Constrained the Electricity Sector Reform in Thailand 1998-2002	12/03	270/03
	Reducing Emissions from Motorcycles in Bangkok	10/03	275/03
Tonga	Energy Assessment (English)	06/85	5498-TON
Vanuatu	Energy Assessment (English)	06/85	5577-VA
Vietnam	Rural and Household Energy-Issues and Options (English)	01/94	161/94
	Power Sector Reform and Restructuring in Vietnam: Final Report to the Steering Committee (English and Vietnamese)	09/95	174/95
	Household Energy Technical Assistance: Improved Coal Briquetting and Commercialized Dissemination of Higher Efficiency Biomass and Coal Stoves (English)	01/96	178/96
	Petroleum Fiscal Issues and Policies for Fluctuating Oil Prices In Vietnam	02/01	236/01
	An Overnight Success: Vietnam's Switch to Unleaded Gasoline	08/02	257/02
	The Electricity Law for Vietnam—Status and Policy Issues—The Socialist Republic of Vietnam	08/02	259/02
	Petroleum Sector Technical Assistance for the Revision of the Existing Legal and Regulatory Framework	12/03	269/03
Western Samoa	Energy Assessment (English)	06/85	5497-WSO

SOUTH ASIA (SAS)

Bangladesh	Energy Assessment (English)	10/82	3873-BD
	Priority Investment Program (English)	05/83	002/83
	Status Report (English)	04/84	015/84
	Power System Efficiency Study (English)	02/85	031/85
	Small Scale Uses of Gas Pre-feasibility Study (English)	12/88	--
	Reducing Emissions from Baby-Taxis in Dhaka	01/02	253/02

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India	Opportunities for Commercialization of Non-conventional Energy Systems (English)	11/88	091/88
	Maharashtra Bagasse Energy Efficiency Project (English)	07/90	120/90
	Mini-Hydro Development on Irrigation Dams and Canal Drops Vols. I, II and III (English)	07/91	139/91
	WindFarm Pre-Investment Study (English)	12/92	150/92
	Power Sector Reform Seminar (English)	04/94	166/94
	Environmental Issues in the Power Sector (English)	06/98	205/98
	Environmental Issues in the Power Sector: Manual for Environmental Decision Making (English)	06/99	213/99
	Household Energy Strategies for Urban India: The Case of Hyderabad	06/99	214/99
	Greenhouse Gas Mitigation In the Power Sector: Case Studies From India	02/01	237/01
	Energy Strategies for Rural India: Evidence from Six States	08/02	258/02
	Household Energy, Indoor Air Pollution, and Health	11/02	261/02
	Access of the Poor to Clean Household Fuels	07/03	263/03
	The Impact of Energy on Women's Lives in Rural India	01/04	276/04
	Environmental Issues in the Power Sector: Long-Term Impacts And Policy Options for Rajasthan	10/04	292/04
	Environmental Issues in the Power Sector: Long-Term Impacts And Policy Options for Karnataka	10/04	293/04
Nepal	Energy Assessment (English)	08/83	4474-NEP
	Status Report (English)	01/85	028/84
	Energy Efficiency & Fuel Substitution in Industries (English)	06/93	158/93
Pakistan	Household Energy Assessment (English)	05/88	--
	Assessment of Photovoltaic Programs, Applications, and Markets (English)	10/89	103/89
Pakistan	National Household Energy Survey and Strategy Formulation Study: Project Terminal Report (English)	03/94	--
	Managing the Energy Transition (English)	10/94	--
	Lighting Efficiency Improvement Program Phase 1: Commercial Buildings Five Year Plan (English)	10/94	--
	Clean Fuels	10/01	246/01
	Household Use of Commercial Energy	05/06	320/06
Regional	Toward Cleaner Urban Air in South Asia: Tackling Transport Pollution, Understanding Sources.	03/04	281/04
Sri Lanka	Energy Assessment (English)	05/82	3792-CE
	Power System Loss Reduction Study (English)	07/83	007/83
	Status Report (English)	01/84	010/84
	Industrial Energy Conservation Study (English)	03/86	054/86
	Sustainable Transport Options for Sri Lanka: Vol. I	02/03	262/03
	Greenhouse Gas Mitigation Options in the Sri Lanka Power Sector: Vol. II	02/03	262/03
	Sri Lanka Electric Power Technology Assessment (SLEPTA): Vol. III	02/03	262/03
	Energy and Poverty Reduction: Proceedings from South Asia Practitioners Workshop How Can Modern Energy Services Contribute to Poverty Reduction? Colombo, Sri Lanka, June 2-4, 2003	11/03	268/03

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	EUROPE AND CENTRAL ASIA (ECA)		
Armenia	Development of Heat Strategies for Urban Areas of Low-income Transition Economies. Urban Heating Strategy for the Republic Of Armenia. *Including a Summary of a Heating Strategy for the Kyrgyz Republic*	04/04	282/04
Bulgaria	Natural Gas Policies and Issues (English)	10/96	188/96
	Energy Environment Review	10/02	260/02
Central Asia and The Caucasus	Cleaner Transport Fuels in Central Asia and the Caucasus	08/01	242/01
Central and Eastern Europe	Power Sector Reform in Selected Countries	07/97	196/97
Central and Eastern Europe	Increasing the Efficiency of Heating Systems in Central and Eastern Europe and the Former Soviet Union (English and Russian)	08/00	234/00
	The Future of Natural Gas in Eastern Europe (English)	08/92	149/92
Kazakhstan	Natural Gas Investment Study, Volumes 1, 2 & 3	12/97	199/97
Kazakhstan & Kyrgyzstan	Opportunities for Renewable Energy Development	11/97	16855-KAZ
Poland	Energy Sector Restructuring Program Vols. I-V (English)	01/93	153/93
	Natural Gas Upstream Policy (English and Polish)	08/98	206/98
	Energy Sector Restructuring Program: Establishing the Energy Regulation Authority	10/98	208/98
Portugal	Energy Assessment (English)	04/84	4824-PO
Romania	Natural Gas Development Strategy (English)	12/96	192/96
	Private Sector Participation in Market-Based Energy-Efficiency Financing Schemes: Lessons Learned from Romania and International Experiences.	11/03	274/03
Slovenia	Workshop on Private Participation in the Power Sector (English)	02/99	211/99
Turkey	Energy Assessment (English)	03/83	3877-TU
	Energy and the Environment: Issues and Options Paper	04/00	229/00
	Energy and Environment Review: Synthesis Report	12/03	273/03
	MIDDLE EAST AND NORTH AFRICA (MNA)		
Arab Republic of Egypt	Energy Assessment (English)	10/96	189/96
	Energy Assessment (English and French)	03/84	4157-MOR
	Status Report (English and French)	01/86	048/86
Morocco	Energy Sector Institutional Development Study (English and French)	07/95	173/95
	Natural Gas Pricing Study (French)	10/98	209/98
	Gas Development Plan Phase II (French)	02/99	210/99
Syria	Energy Assessment (English)	05/86	5822-SYR
	Electric Power Efficiency Study (English)	09/88	089/88
	Energy Efficiency Improvement in the Cement Sector (English)	04/89	099/89
	Energy Efficiency Improvement in the Fertilizer Sector (English)	06/90	115/90
Tunisia	Fuel Substitution (English and French)	03/90	--
	Power Efficiency Study (English and French)	02/92	136/91
	Energy Management Strategy in the Residential and Tertiary Sectors (English)	04/92	146/92
	Renewable Energy Strategy Study, Volume I (French)	11/96	190A/96
	Renewable Energy Strategy Study, Volume II (French)	11/96	190B/96

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Tunisia	Rural Electrification in Tunisia: National Commitment, Efficient Implementation and Sound Finances	08/05	307/05
Yemen	Energy Assessment (English)	12/84	4892-YAR
	Energy Investment Priorities (English)	02/87	6376-YAR
	Household Energy Strategy Study Phase I (English)	03/91	126/91
	Household Energy Supply and Use in Yemen. Volume I: Main Report and Volume II: Annexes	12/05	315/05

LATIN AMERICA AND THE CARIBBEAN REGION (LCR)

LCR Regional	Regional Seminar on Electric Power System Loss Reduction in the Caribbean (English)	07/89	--
	Elimination of Lead in Gasoline in Latin America and the Caribbean (English and Spanish)	04/97	194/97
	Elimination of Lead in Gasoline in Latin America and the Caribbean - Status Report (English and Spanish)	12/97	200/97
	Harmonization of Fuels Specifications in Latin America and the Caribbean (English and Spanish)	06/98	203/98
	Energy and Poverty Reduction: Proceedings from the Global Village Energy Partnership (GVEP) Workshop held in Bolivia	06/05	202/05
	Power Sector Reform and the Rural Poor in Central America	12/04	297/04
	Estudio Comparativo Sobre la Distribución de la Renta Petrolera en Bolivia, Colombia, Ecuador y Perú	08/05	304/05
	OECS Energy Sector Reform and Renewable Energy/Energy Efficiency Options	02/06	317/06
	The Landfill Gas-to-Energy Initiative for Latin America and the Caribbean	02/06	318/06
Bolivia	Energy Assessment (English)	04/83	4213-BO
	National Energy Plan (English)	12/87	--
	La Paz Private Power Technical Assistance (English)	11/90	111/90
	Pre-feasibility Evaluation Rural Electrification and Demand Assessment (English and Spanish)	04/91	129/91
	National Energy Plan (Spanish)	08/91	131/91
	Private Power Generation and Transmission (English)	01/92	137/91
	Natural Gas Distribution: Economics and Regulation (English)	03/92	125/92
	Natural Gas Sector Policies and Issues (English and Spanish)	12/93	164/93
	Household Rural Energy Strategy (English and Spanish)	01/94	162/94
	Preparation of Capitalization of the Hydrocarbon Sector	12/96	191/96
	Introducing Competition into the Electricity Supply Industry in Developing Countries: Lessons from Bolivia	08/00	233/00
	Final Report on Operational Activities Rural Energy and Energy Efficiency	08/00	235/00
	Oil Industry Training for Indigenous People: The Bolivian Experience (English and Spanish)	09/01	244/01
	Capacitación de Pueblos Indígenas en la Actividad Petrolera. Fase II	07/04	290/04
	Estudio Sobre Aplicaciones en Pequeña Escala de Gas Natural	07/04	291/04
Brazil	Energy Efficiency & Conservation: Strategic Partnership for Energy Efficiency in Brazil (English)	01/95	170/95
	Hydro and Thermal Power Sector Study	09/97	197/97
	Rural Electrification with Renewable Energy Systems in the Northeast: A Preinvestment Study	07/00	232/00
	Reducing Energy Costs in Municipal Water Supply Operations "Learning-while-doing" Energy M&T on the Brazilian Frontlines	07/03	265/03

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Chile	Energy Sector Review (English)	08/88	7129-CH
Colombia	Energy Strategy Paper (English)	12/86	--
	Power Sector Restructuring (English)	11/94	169/94
Colombia	Energy Efficiency Report for the Commercial and Public Sector (English)	06/96	184/96
Costa Rica	Energy Assessment (English and Spanish)	01/84	4655-CR
	Recommended Technical Assistance Projects (English)	11/84	027/84
	Forest Residues Utilization Study (English and Spanish)	02/90	108/90
Dominican Republic	Energy Assessment (English)	05/91	8234-DO
Ecuador	Energy Assessment (Spanish)	12/85	5865-EC
	Energy Strategy Phase I (Spanish)	07/88	--
	Energy Strategy (English)	04/91	--
	Private Mini-hydropower Development Study (English)	11/92	--
	Energy Pricing Subsidies and Interfuel Substitution (English)	08/94	11798-EC
	Energy Pricing, Poverty and Social Mitigation (English)	08/94	12831-EC
Guatemala	Issues and Options in the Energy Sector (English)	09/93	12160-GU
	Health Impacts of Traditional Fuel Use	08/04	284/04
Haiti	Energy Assessment (English and French)	06/82	3672-HA
	Status Report (English and French)	08/85	041/85
	Household Energy Strategy (English and French)	12/91	143/91
Honduras	Energy Assessment (English)	08/87	6476-HO
	Petroleum Supply Management (English)	03/91	128/91
Jamaica	Energy Assessment (English)	04/85	5466-JM
	Petroleum Procurement, Refining, and Distribution Study (English)	11/86	061/86
	Energy Efficiency Building Code Phase I (English)	03/88	--
	Energy Efficiency Standards and Labels Phase I (English)	03/88	--
Jamaica	Management Information System Phase I (English)	03/88	--
	Charcoal Production Project (English)	09/88	090/88
	FIDCO Sawmill Residues Utilization Study (English)	09/88	088/88
	Energy Sector Strategy and Investment Planning Study (English)	07/92	135/92
Mexico	Improved Charcoal Production Within Forest Management for the State of Veracruz (English and Spanish)	08/91	138/91
	Energy Efficiency Management Technical Assistance to the Comisión Nacional para el Ahorro de Energía (CONAE) (English)	04/96	180/96
	Energy Environment Review	05/01	241/01
Nicaragua	Modernizing the Fuelwood Sector in Managua and León	12/01	252/01
	Policy & Strategy for the Promotion of RE Policies in Nicaragua. (Contains CD with 3 complementary reports)	01/06	316/06
Panama	Power System Efficiency Study (English)	06/83	004/83
Paraguay	Energy Assessment (English)	10/84	5145-PA
	Recommended Technical Assistance Projects (English)	09/85	--
	Status Report (English and Spanish)	09/85	043/85
	Reforma del Sector Hidrocarburos (Spanish Only)	03/06	319/06
Peru	Energy Assessment (English)	01/84	4677-PE
	Status Report (English)	08/85	040/85
	Proposal for a Stove Dissemination Program in the Sierra (English and Spanish)	02/87	064/87
	Energy Strategy (English and Spanish)	12/90	--

Region/Country	*Activity/Report Title*	*Date*	*Number*
Peru	Study of Energy Taxation and Liberalization of the Hydrocarbons Sector (English and Spanish)	120/93	159/93
	Reform and Privatization in the Hydrocarbon Sector (English and Spanish)	07/99	216/99
	Rural Electrification	02/01	238/01
Saint Lucia	Energy Assessment (English)	09/84	5111-SLU
St. Vincent and the Grenadines	Energy Assessment (English)	09/84	5103-STV
Sub Andean	Environmental and Social Regulation of Oil and Gas Operations in Sensitive Areas of the Sub-Andean Basin (English and Spanish)	07/99	217/99
Trinidad and Tobago	Energy Assessment (English)	12/85	5930-TR

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Energy End Use Efficiency: Research and Strategy (English)	11/89	--
Women and Energy--A Resource Guide The International Network: Policies and Experience (English)	04/90	--
Guidelines for Utility Customer Management and Metering (English and Spanish)	07/91	--
Assessment of Personal Computer Models for Energy Planning in Developing Countries (English)	10/91	--
Long-Term Gas Contracts Principles and Applications (English)	02/93	152/93
Comparative Behavior of Firms Under Public and Private Ownership (English)	05/93	155/93
Development of Regional Electric Power Networks (English)	10/94	--
Roundtable on Energy Efficiency (English)	02/95	171/95
Assessing Pollution Abatement Policies with a Case Study of Ankara (English)	11/95	177/95
A Synopsis of the Third Annual Roundtable on Independent Power Projects: Rhetoric and Reality (English)	08/96	187/96
Rural Energy and Development Roundtable (English)	05/98	202/98
A Synopsis of the Second Roundtable on Energy Efficiency: Institutional and Financial Delivery Mechanisms (English)	09/98	207/98
The Effect of a Shadow Price on Carbon Emission in the Energy Portfolio of the World Bank: A Carbon Backcasting Exercise (English)	02/99	212/99
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Best Practice Manual: Promoting Decentralized Electrification Investment	10/01	248/01
Peri-Urban Electricity Consumers—A Forgotten but Important Group: What Can We Do to Electrify Them?	10/01	249/01
Village Power 2000: Empowering People and Transforming Markets	10/01	251/01
Private Financing for Community Infrastructure	05/02	256/02
Stakeholder Involvement in Options Assessment: Promoting Dialogue in Meeting Water and Energy Needs: A Sourcebook	07/03	264/03
A Review of ESMAP's Energy Efficiency Portfolio	11/03	271/03
A Review of ESMAP's Rural Energy and Renewable Energy Portfolio	04/04	280/04
ESMAP Renewable Energy and Energy Efficiency Reports 1998-2004 (CD Only)	05/04	283/04
Regulation of Associated Gas Flaring and Venting: *A Global Overview and Lessons Learned from International Experience*	08/04	285/04
ESMAP Gender in Energy Reports and Other related Information (CD Only)	11/04	288/04
ESMAP Indoor Air Pollution Reports and Other related Information (CD Only)	11/04	289/04
Energy and Poverty Reduction: Proceedings from the Global Village Energy Partnership (GVEP) Workshop on the Pre-Investment Funding. Berlin, Germany, April 23-24, 2003.	11/04	294/04
Global Village Energy Partnership (GVEP) Annual Report 2003	12/04	295/04
Energy and Poverty Reduction: Proceedings from the Global Village Energy Partnership (GVEP) Workshop on Consumer Lending and Microfinance to Expand Access to Energy Services, Manila, Philippines, May 19-21, 2004	12/04	296/04
The Impact of Higher Oil Prices on Low Income Countries And on the Poor	03/05	299/05
Advancing Bioenergy for Sustainable Development: Guideline For Policymakers and Investors	04/05	300/05
ESMAP Rural Energy Reports 1999-2005	03/05	301/05
Renewable Energy and Energy Efficiency Financing and Policy Network: Options Study and Proceedings of the International Forum	07/05	303/05
Implementing Power Rationing in a Sensible Way: Lessons Learned and International Best Practices	08/05	305/05
The Urban Household Energy Transition. Joint Report with RFF Press/ESMAP. ISBN 1-933115-07-6	08/05	309/05
Pioneering New Approaches in Support of Sustainable Development In the Extractive Sector: Community Development Toolkit, also Includes a CD containing Supporting Reports	10/05	310/05
Analysis of Power Projects with Private Participation Under Stress	10/05	311/05
Potential for Biofuels for Transport in Developing Countries	10/05	312/05

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