SECOND CARNEGIE INQUIRY INTO POVERTY

AND DEVELOPMENT IN SOUTHERN AFRICA

Energy and poverty in urban and peri-urban areas around Cape Town

by

A A Eberhard

Carnegie Conference Paper No. 155

Cape Town

13 - 19 April 1984

ISBN 0 7992 0633 4

ENERGY AND POVERTY IN URBAN AND PERI- URBAN AREAS AROUND CAPE TOWN

A A EBERHARD

Energy Research Institute, University of Cape Town

1. INTRODUCTION

South Africa generates approximately 60 per cent of total electricity supplies in Africa, but the majority of its own citizens do not have access to its benefits. The electricity grid has been extended mainly to "white" industrial, mining and urban centres and some farms, while rural populations in underdeveloped areas are dependent on scarce and rapidly depleting fuelwood resources for meeting their domestic energy requirements (Eberhard 1984).

Further disparities in the quality and availability of energy occur within the urban domestic sector (1). Although "whites" constitute only about 17 per cent of the population they consume about 67 per cent of the electricity used in the domestic sector (Stone, 1979 : 18). It has been estimated that three-quarters of "black" urban houses have no access to electricity and that a further 7 per cent have a restricted supply only, where installed circuit breakers limit the maximum electricity demand (Dept. of Health, 1977 : 18).

Poorer urban and peri-urban households generally do not have electricity

1. The developed domestic sector accounts for approximately 10 per cent of total nett energy consumption in South Africa.

and are forced to rely on less convenient and expensive fuels such as paraffin, gas, coal, candles, batteries and also fuelwood which has become increasingly commercialized.

This paper explores relationships between energy and poverty by presenting data on electricity consumption and expenditure in a range of Cape Town suburbs of varying income levels, as well as the results of extensive surveys of energy consumption patterns in the main areas around Cape Town which do not have electricity: viz. Lotus River, Grassy Park, Valhalla Park, Belville South and Crossroads.

2. ELECTRICITY CONSUMPTION AND EXPENDITURE IN CAPE TOWN

Table I presents data on electricity consumption and expenditure in a range of Cape Town suburbs.

TABLE I: HOUSEHOLD ELECTRICITY CONSUMPTION AND EXPENDITURE IN CAPE TOWN OCTOBER 1983 (2)

	Pinelands	Heath-field	Bonte-heuwel	Valhalla Park	Guguletu
Mean no. of units consumed	755	687	351	428	413
Mean monthly charge	43,96	40,13	21,21	25,54	24,70
Mean, head of household monthly income	1536	800	300	214	208
% electricity expenditure	2,9	5	7,1	11,9	11,8

A number of trends are evident. Wealthier households consume on average more, but spend a lower proportion of their income, on electricity. The average Pinelands household, for example, consumes nearly twice as

2. Table I takes into account head of household income only. If full household income is taken into account the proportion of income spent on electricity would be even smaller than that indicated in this table.

much electricity but, proportionately, pays only a quarter as much as the average household in Guguletu.

Furthermore, whereas all houses in Pinelands are electrified, only a quarter of those in Guguletu are connected to the grid (Urban Foundation, 1980: 5). In many other poorer areas around Cape Town, such as Langa, Atlantis, and Woodstock which are electrified, many individual households do not have electricity either because they cannot afford the high connection and wiring installation charges or because their supplies have been cut-off through defaults in the payment of electricity bills. In 1981, the City Treasurer issued more than 72 000 disconnection orders in respect of unpaid electricity and assisted wiring accounts (City Electrical Engineeer, 1981: 9). It is clear that poorer households are struggling to pay for their domestic energy requirements. This hardship is compounded when electricity supplies are cut off and, not being able to afford the reconnection fee, households are forced to rely on more expensive fossil fuels such as gas, coal and paraffin. These are bought only when households can afford them and thus less energy tends to be consumed than that which is required, with adverse consequences for health, welfare and comfort levels.

3. ENERGY CONSUMPTION AND EXPENDITURE IN NON-ELECTRIFIED URBAN AREAS

Surveys of energy consumption patterns were undertaken in Lotus River, Grassy Park, Valhalla Park and Belville South.

The proportion of household income which is spent on domestic fuel requirements is indicated according to different income groupings in Table II and according to different areas in Table III.

TABLE II: DOMESTIC FUEL EXPENDITURE FOR DIFFERENT INCOME GROUPS IN LOTUS RIVER, GRASSY PARK, BELLVILLE SOUTH AND VALHALLA PARK IN NOVEMBER 1983.

Weekly Household Income(R)	1 - 50	51 - 100	101 - 150	151 - 200	200	Total
% respondents	16	44	22	9	2	Missing(7)
Mean weekly household income (R)	38,29	72,03	122,05	179,25	232	92,27
Mean weekly household fuel expenditure (R)	14,48	14,67	15,39	15,05	21,88	15,15
% fueld expenditure	38,2	21	12,8	8,6	9,4	19,1

TABLE III: DOMESTIC FUEL EXPENDITURE BY AREA, NOVEMBER 1983 (3)

Area	Lotus River	Grassy Park	Bellville South	Valhalla Park	Total
% respondents	28	15	43	14	100
Mean weekly household income (R)	97,04	107,69	92,77	62,45	92,27
Mean weekly household income (R)	13,84	17,10	15,29	15,29	15,15
% fuel expenditure	15,16	18,14	20,36	24,52	19,12

3. This data corresponds well with the results of a survey undertaken in Umlazi and other townships around Durban which found that the average percentage of household income spent on energy was 16 percent (Rivett-Carnac, 1979 : 9).

Table IV indicates the average amount spent on different fuels by those families which use that type of fuel.

TABLE IV: MEAN, WEEKLY, DOMESTIC FUEL EXPENDITURE ON DIFFERENT FUELS. NOVEMBER 1983.

Area	Lotus Park	Grassy Park	Bellville South	Valhalla Park
Paraffin	4,08	6,62	4,57	7,79
Gas	6,54	4,16	5,67	6,14
Coal	-	-	6,47	-
Wood	4,22	4,38	5,16	0
Candles	1,40	1,66	1,61	1,34
Batteries	1,78	2,26	1,76	1,86

Table V summarises the mean annual consumption of various fuels and Table VI presents the equivalent energy values of fuels consumed.

TABLE V: MEAN, ANNUAL, PER CAPITA DOMESTIC NETT ENERGY CONSUMPTION IN NON-ELECTRIFIED AREAS AROUND CAPE TOWN.

Fuel/Area	Lotus River	Grassy Park	Bellville South	Valhalla Park	Total	% H/holds using Fuel
Paraffin(ℓ)	83	112	57	187	90	90
Gas (kg)	36,9	18	40	36,9	31,5	75
Coal (kg)			29,9			7
Wood (kg)	605	757	536	58	521	57
Candles	105	123	115	145	117	97
Batteries (kWh)	2,3	2,2	1,2	1,1	1,6	73

TABLE VI: MEAN, ANNUAL, PER CAPITA DOMESTIC NETT ENERGY CONSUMPTION (Gigajoules)

Area	Lotus River	Grassy Park	Bellville South	Valhalla Park	Total
Paraffin	3,06	4,16	2,12	6,96	3,35
Gas	1,81	0,88	1,52	1,81	1,54
Coal	-	-	1,87	-	0,81
Wood	10,28	12,86	9,11	0,74	8,86
Candles	0,36	0,43	0,40	0,51	0,40
Batteries	,008	,008	,004	,004	,006
TOTAL	15,52	18,34	15,02	10,02	14,97

Paraffin, gas and candles constitute the most commonly used fuels. It is apparent though, that even in urban areas, wood accounts for the major share of domestic energy consumption. Just under one tonne per capita is consumed annually amongst those households using this fuel.

The actual amount of energy usefully utilised differs considerably from these tabulated data as the efficiency of conversion of different fuels in different appliances varies enormously, viz. higher than 75 percent for gas and less than 5 percent for wood or less than 1 percent for candles. Comparative costs of useful energy from different fuels is given in Table VII, assuming a range of typical conversion efficiencies for different fuels and utilising the cost data from the surveyed areas.

TABLE VII: COMPARATIVE COSTS OF USEFUL ENERGY, NOVEMBER 1983, CENTS/MJ

Electricity	1,7
Paraffin	2,0
Gas	3,1
Coal	3,4
Wood	4,7
Batteries	250
Candles	295

4. ENERGY CONSUMPTION AND EXPENDITURE IN PERI-URBAN AREAS

Energy surveys were undertaken in the peri-urban settlement of Crossroads and this data is summarised in Tables VIII and IX.

TABLE VIII: DOMESTIC FUEL EXPENDITURE FOR DIFFERENT INCOME GROUPS IN CROSSROADS, SEPTEMBER 1983.

Weekly household Income (R)	1 - 40	41 - 60	61 - 80	81 - 100	101 - 120	120	Total
% respondents	28	35	17	12	6	2	100
Mean, weekly household income (R)	29,37	51,53	70,71	90,00	111,60	0,00	58,58
Mean, weekly household fuel expenditure(R)	8,69	10,02	11,73	17,67	14,18	34,50	11,65
% Fuel expenditure	29,6	19,4	16,6	19,6	12,7	24,6	19,9

TABLE IX: ENERGY CONSUMPTION IN CROSSROADS, SEPTEMBER 1983

Fuel	Households using Fuel %	Mean Weekly Household Expenditure (R)	Mean Weekly Per Capita Consumption	Mean Annual Per Capita Energy Consumption (GH)
Paraffin	100	4,69	1,84 ℓ	3,54
Gas	4	0,25		0,084
Coal	45	2,96	4,18 kg	5,87
Wood	38	2,26	4,1 kg	3,62
Candles	52	0,49	0,71	0,13
Batteries	49	0,99	10,7 Wh	0,002
TOTAL		11,64		13,25

Similar trends to the other areas surveyed are evident. Poorer households spend a larger proportion of their income on energy. All households use paraffin, many use coal, but far fewer use gas. Supprisingly, Crossroads residents use less wood than the urban areas surveyed. In spite of the availability of wood in the vicinity, women do not necessarily have the time to collect it because many are involved in wage labour. Many of those interviewed also expressed fears of going into the bush because of the danger of "skollies". Most of the wood consumed in Crossroads is bought from vendors in trucks. It appears that the use of wood (and other fuels such as coal) is a function of marketing and its availability through vendors.

Another feature of the survey was the prevalence of batteries which are used mostly to power radios or television sets. Dry cell batteries as well as car batteries are used and the latter are allowed to run completely flat (usually within a week) before being carried to the nearest service station for recharging. Two of the households interviewed also had small petrol driven generators.

Although batteries comprise a very small proportion of total energy consumption in these areas it is clear that the form of energy produced (ie electricity) is important in quality of life considerations.

5. PERCEIVED PROBLEMS

Nearly all households expressed dissatisfaction with the fuels which they were using. A majority considered paraffin, gas, coal, wood and batteries to be too expensive and fuels such as gas and candles to constitute a fire danger. Many complained that paraffin and candles were messy to use, that they provided poor light, that gas cylinders and batteries were cumbersome to carry, that the smoke from coal and wood fires permeated clothes and that wood wasn't always readily available from vendors and was often sold green.

Three quarters of respondents complained of the lack of adequate heating and stated that at least one member of the household suffered from bronchial complaints.

All respondents expressed a preference for electricity when asked to rank a number of fuels for cooking, heating and lighting purposes.

6. CONCLUSIONS

Households with electricity spend less on energy than those households without electricity. In the case of Valhalla Park, those households with electricity spend on average R25 permonth, while those without electricity spend nearly three times as much (R65). Households without electricity in Lotus River, Grassy Park and Bellville South spend R59, R73 and R65 respectively per month on domestic fuel requirements while households in Guguletu, Bonteheuwel, Heathfield and Pinelands spend R25, R21, R40 and R44 respectively on electricity.

Poorer households are able to buy less energy but spend proportionately more of their income on energy. Hence, relatively wealthy Pinelands spends, on average, less than 3 percent of household income on domestic energy, while Valhalla Park households, with electricity, spend 11,9 per cent and Valhalla Park residents, without electricity, spend 24,5 per cent of their income. Poorer households earning less than R50 per week buy about a third of the energy which Pinelands households consume, but spend on average 38 percent of their income on energy and in some extreme cases, over 50 percent.

The lack of electricity is felt to be a severe hardship because of the expense, inconvenience and dangers associated with current fuels. These hardships are best expressed in the words of the respondents.

"The houses are very cold in winter and in summer it's like hell. The need for electricity is very important for our people."

"Ons voel sleg omdat daar baie geld moet betaal word vir gas, batterye, ens. Dit is veel meer as elektrisiteit. Die mense wat die minste verdien, betaal die meeste."

"Die kerslig maak die skoolkinders se oë swak".

"Die baie rook en gasse is ook baie ongesond vir ons borse."

"Electricity is a desperate need. My children are suffering."

"We need electricity because it is safe and convenient. It is also very essential".

"As daar 'lektriek is, sal dit beter gaan, omdat 'lektriek geriefliker is. Mense sukkel baie."

"Electricity is a right, not a privilege."

7. REFERENCES

Christie, Renfrew (1978). The Electrification of South Africa 1905 - 1975. Unpublished D.Phil thesis, St. Anthony's College, Oxford.

City of Cape Town (1981). Annual Report of the City Electrical Engineer.

Department of Health (1977). Implikasies van die Voorsiening van Elektrisiteit aan Bantoedorpe. Government Printer, Pretoria.

Eberhard, AA (1984). The Real "Energy Crisis". Energy Demand in Underdeveloped Areas in Southern Africa. Energy and the Environment January.

Electricity Supply Commission (1982). Annual Report.

Gilmour, R R (1979). Analysis, Control and Economics of Electricity Consumption, Victor-Electrical and Illumination Engineering, July, pp 24-29.

Rivett-Carnac,JL (1979). A Strategy for Electrification of the Black Townships in and around Durban and its Impact on the Energy Situation in South Africa. Urban Foundation, Durban.

Stone, A (1979). Energy Utilisation in the Domestic Sector, Report No. 25/101/06. Energy Research Institute, University of Cape Town.

TAP (1983). Electricity Struggles - Power to the People. Technical Assistance Project, Cape Town.

Urban Foundation (1980). Report on the Electrification of Nyanga, Guguletu and Langa Townships, Cape Town.