

# Fuel Poverty in Korea and Its Policy Implications

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## Fuel poverty defined

Fuel poverty has been defined by the UK's Warm Homes and Energy Conservation Act (2000) as a condition where a household needs to spend at least 10 percent of its income on fuel to keep its home properly heated, to 21°C in the living room and 18°C in the other parts of it. The definition has been found to be overly broad and unable to preclude high-income households that spends more than 10 percent of their income on fuel. In his 2012 report *Getting the measure of fuel poverty*, John Hills proposed the "Low Income, High Cost" (LIHC) approach setting two thresholds: a fuel poverty threshold of 60 percent of median income after deducting fuel costs and a fuel costs threshold which is estimated based on the median modeled cost.

A household's energy cost presupposes an adequate level of energy use, and as the discussion is still ongoing in Korea as to what constitutes an "adequate level" of energy consumption, this study assumes that a household is fuel-poor if it spends too much of its income on energy or is unable to keep the home adequately warm.

## How deep is fuel poverty in Korea?

A look at data on actual fuel bills found that in 2013 an estimated 1.78 million households spent more than 10 percent of their disposable income on fuel and more than 614,000 households spent more than 20 percent of their disposable income on fuel. Of those with less than 50 percent of national median income, 1.584 million households spent 10 percent or more of their disposable income on fuel, while 608,000 households spent 20 percent or more.

<Table 1> Number of households with an excessive energy cost burden

	Energy spending as % of disposable income	2010	2011	2012	2013
All households	10% and more	1,646,353	1,630,908	1,748,064	1,780,824
	20% and more	606,763	596,180	556,742	614,249
Households below 50% of median	10% and more	1,467,915	1,472,330	1,576,865	1,584,103
	20% and more	596,969	589,955	554,183	608,925

Source: *Household Income and Expenditure Survey*, Statistics Korea

## Fuel consumption in low-income households

The *Household Income and Expenditure Survey* of Statistics Korea revealed that during the period 2010~13, those in the 1st income decile spent as much as 21 percent on average of their disposable income on fuel for heating and cooking. The same period saw an increase in fuel spending both in amount and as a percentage of disposable income for low income households. Considering that fuel spending decreased for high-income households both in amount and as a percentage of disposable income, it is likely that during this period there has been an increase in the number of low-income households with excessive burdens.

Given the considerable increases over this period in the prices of kerosene (27 percent), gas (19.9 percent), and electricity (5.5 percent), the fact that there was little growth in fuel spending suggests a cutback in fuel consumption, which in turn hints at an increase in the number of fuel-poor households that consume less energy than needed to keep their homes heated properly.

<Table 2> Monthly energy bill and its share in disposable income, by income decile

	Fuel cost				Fuel cost/disposable income			
	2010	2011	2012	2013	2010	2011	2012	2013
1st decile	58,706	62,810	65,665	66,377	19.6%	20.6%	21.1%	21.0%
2nd decile	76,680	79,162	81,249	80,757	8.1%	8.2%	8.3%	8.5%
10th decile	124,047	128,138	133,031	133,964	1.8%	1.8%	1.7%	1.7%
All	99,347	102,380	107,084	108,517	5.4%	5.3%	5.4%	5.3%
Below 50% of median	67,372	71,590	73,907	74,475	13.9%	14.1%	14.2%	14.0%

Source: *Household Income and Expenditure Survey*, Statistics Korea

Note: Some extreme values are excluded to avoid their undue influence on the mean ratio of household fuel expenditure to disposable income for each decile

The elderly, young children, and disabled people are among those who are likely to spend more time indoors in the home and who therefore are likely to be most affected by fuel poverty. As shown in Table 3, elderly-only households and lone-mother families in the 1st income decile spent around 20 percent of their disposable income on fuel. That fuel spending as a share of disposable income for elderly-only households remained below the average is attributable in part to the fact that many older Koreans choose to get by in winter with electric thermal blankets, leaving their homes under-heated. Despite all this, elderly-only households accounted for as much as 53 percent of those with excessive energy burdens. Lone-mother families were less likely than elderly-only households to use less energy than needed for proper heating. However, households headed by lone mothers in the 1st quintile were found to spend as much as 22 percent of their income on fuel.

<Table 3> Monthly energy bills and their share in disposable income in elderly-only and lone-mother households

		2010	2011	2012	2013	2010	2011	2012	2013
		1st decile	Elderly-only households	50,872	56,425	59,033	59,577	16.5%	19.5%
	Lone-mother households	78,782	78,573	107,250	98,952	20.2%	15.3%	21.9%	21.9%
2nd decile	Elderly-only households	64,151	64,481	68,707	70,157	8.5%	8.4%	8.5%	8.9%
	Lone-mother households	78,111	87,011	87,338	93,752	7.5%	8.0%	7.6%	8.8%
10th decile	Elderly-only	153,023	175,332	131,856	131,597	3.3%	3.2%	2.4%	1.9%

	households									
	Lone-mother households	144,530	116,437	136,067	129,291	2.2%	1.7%	2.1%	1.8%	
All	Elderly-only households	65,022	67,201	72,374	74,078	11.0%	12.0%	12.3%	11.5%	
	Lone-mother households	96,544	98,005	113,104	112,339	5.6%	5.1%	5.1%	4.9%	
Below 50% of median	Elderly-only households	55,717	59,664	62,904	63,970	13.6%	15.1%	15.3%	14.8%	
	Lone-mother households	77,488	84,113	92,321	93,532	12.1%	10.5%	11.3%	11.3%	

Source: Household Income and Expenditure Survey, Statistics Korea

As it was difficult to come by data on the actual indoor temperature of each household, we looked instead at the *Welfare Needs Survey* (2011) to understand the characteristics of households that are likely to be living in under-heated homes. Our analysis of the *Welfare Needs Survey* found that the near-poor and the poor (those living on 120 percent or less of the national minimum) were more likely to be unable to keep the indoor temperature at a reasonable level or pay energy bills as they fall due. As many as 13.3 percent of households in receipt of National Basic Living Security benefits "often" found themselves unable to keep their indoor temperature at a reasonable level; at 7.6~9.8 percent, the figure for those whose countable income was 120 percent or less of the poverty threshold was considerably higher than for other income groups.

<Table 4> Frequency of inability to keep the home adequately heated (in %)

	Households in receipt of Basic Living Security benefits	Households with a countable income of less than 120% of poverty line		Households with a countable income of more than 120% of poverty line and whose income is less than 120% of poverty line		Households with an income between 120% ~ 180% of poverty line				Households with an income of more than 180% of poverty line	All
		2	3	4	5	6	7	8	9		
	1	2	3	4	5	6	7	8	9	10	
Never	23.9	21.1	29.1	25.5	25.7	23.3	16.8	40.8	29.6	41.4	36.8
Seldom	32.2	27.1	31.3	39.1	36.6	40.0	46.2	24.9	36.6	38.4	37.3
Sometimes	30.5	44.2	29.8	32.1	30.9	30.4	29.1	28.1	29.0	17.8	22.1
Often	13.3	7.6	9.8	3.3	6.8	6.3	7.9	6.2	4.8	2.4	3.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: 1-households in receipt of National Basic Living Security benefits; 2-households with a countable income of less than 120% of the poverty line and whose income is below the poverty line; 3-households with an income between 100%~120% of the poverty line and whose countable income is less than 120% of the poverty line; 4-households with an income of less than 100% of the poverty line and whose countable income is above 120% of the poverty line; 5-households with an income between 100~120% of the poverty line and whose countable income is above 120% of the poverty line; 6-households with an income between 120~130% of the poverty line; 7-households with an income between 130~140% of the poverty line; 8-Households with an income between 140~150% of the poverty line; 9-households with an income between 150~160% of the poverty line; 10-Households with an income of more than 180% of the poverty line

Source: A Survey Study of Poverty Reduction Policy (2011), Tae-jin Lee et al., Ministry of Health and Welfare & Korea Institute for Health and Social Affairs.

As illustrated in Table 5, as income falls energy bills rise as a share of income. Household income shows a positive association with fuel consumption, and yet energy expenditure as a share of household income was more than three times higher for households with a monthly income of less than KRW 1 million than for households with an income between KRW 3 million and KRW 4 million. There is more to the income-poor's fuel poverty than their low income. The questions of what sources they use for heating and how energy-efficient their homes are, also have to do with their being fuel-poor. The higher the income of households, the more dependent they were on energy-efficient sources of heating, while low income was associated with a higher dependency on coal briquette and kerosene.

<Table 5> Average annual fuel consumption, by monthly income group

	Less than KRW 1 million	KRW 1~2 million	KRW 2~3 million	KRW 3~4 million	KRW 4~5 million	KRW 5~6 million	More than KRW 6 million
Energy consumption (1,000 kcal)	10,046	11,854	13,252	14,215	14,932	14,563	15,868
Energy cost (KRW 1,000)	966	1,166	1,342	1,475	1,540	1,484	1,670
Coefficient (100 for less than KRW 1 million)	100	60	42	33	27	21	15
All	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
Coal briquette	5.0	2.8	1.0	0.8	0.2	0.2	-
Oil	20.1	13.8	10.0	6.7	4.9	3.4	0.7
Gas	48.5	55.5	58.5	58.1	57.3	54.2	55.5
Electricity	22.8	24.1	24.1	24.9	24.6	24.6	25.5
Thermal energy	3.5	3.9	6.4	9.4	13.0	17.6	18.4

Note: "Gas" includes LPG; the coefficient 100 here represents how much households with a monthly income of less than KRW 1 million spends on energy for every KRW 10,000 of their income

Source: Energy consumption Survey (2011), Korea Energy Economics Institute

Low-income households tend to spend a higher percentage of income on fuel than higher-income households also because often they live in timeworn, energy-inefficient homes. As can be seen in Table 6, those living in homes built in 1994 or before accounted for 67.7 percent of the bottom income quintile, while only 34.4 percent of the top quintile were living in homes that were comparably old.

<Table 6> Residences built in different years, by income group, by special needs group

	Before 1980	In 1981~ 1989	In 1990~1994	In 1995~ 1999	After 2000
All	12.1	15.8	18.5	17.9	35.4
1st income quintile	28.9	18.0	20.8	13.5	18.1
2nd income quintile	12.9	18.8	18.1	17.1	32.7
3rd income quintile	7.3	15.8	17.9	19.4	39.5
4th income quintile	5.9	13.4	18.2	21.2	40.9
5th income quintile	4.4	12.8	17.2	18.6	46.9
Households below 50% of median	24.7	18.2	19.4	14.5	22.7
Households in receipt of Living Security benefits	20.2	15.5	39.4	13.7	11.3
Disabled persons' households	18.1	15.2	24.2	7.6	24.6

Elderly-only households	25.0	18.8	20.2	14.8	20.8
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Note: The percentages do not add up to 100% because there was a non-response rate of 0.2–0.7% for each group.

Source: *Korea Housing Survey (2012)*, Korea Statistics.

### Korea's energy welfare policies

The incident in 2005 of a 15-year-old schoolgirl who died sleeping as the candles she left alight set fire to her home where the electricity had been shut off, emerged something of a watershed point, after which steps were taken toward recognizing access to energy as a basic human right and the need for energy support programs for low-income households. Consequently, the Energy Act was legislated in 2006. In the year that followed, the Korea Energy Foundation was launched and the Energy Welfare Charter adopted. Furthermore, the December 2014 amendment of the Energy Act laid the groundwork for energy support programs for those in fuel poverty. Established in 2014, the 2nd National Basic Energy Plan set out the goal of reducing the excessive burden of energy costs for some 1.2 million households by 2016. The Plan has set as its longer-term objective to reduce the energy costs for near-poor households by 2030. The strategies include, among other things, programs involving energy efficiency advancement and voucher-based energy assistance. By the end of 2013, 11 programs were in operation, with their total expenditure to the tune of KRW 466 billion, a substantial increase from the preceding year's KRW 370 billion.

< Table 5> Energy welfare programs in Korea

(In KRW 100 million; number of benefited households)

	Programs	Benefits	2010-2013				Funding sources
			2010	2011	2012	2013	
Provision and energy-efficiency programs	Residential energy-efficiency for low-income households	Per-household maximum subsidy of KRW 1.5 million for the cost of replacing old windows, doors, walls, and boilers with energy-efficient ones	292 (43,336)	192 (21,428)	296 (29,628)	411 (36,508)	Special Energy Account (Korea Energy Foundation)
	Electricity-efficiency (high-efficiency lighting)	Free replacement with high-efficiency lighting units	191 (68,018)	116 (25,625)	146 (36,674)	246 (46,269)	Electric Power Fund (Korea Energy Management Corporation; Korea Electric Power Corporation)
	New renewable energy facilities for National Rental Housing	Government subsidy equivalent to 80 percent of the cost of installing new renewable energy facilities	80 (56)	90 (20,528)	120 (37,112)	75 (18,120)	Electric Power Fund (Korea Energy Management Corporation)
	Provision of new renewable energy for welfare facilities	Government subsidy equivalent to 80 percent of expenditure on new renewable energy	100 (131)	99 (186)	111 (170)	43 (11)	Electric Power Fund (Local governments)
	Safety checks on general-use electrical installations	24 hours a day emergency response; free-of-charge repairs for at-risk electrical installations	25 (69,423)	25 (65,611)	25 (62,600)	25 (70,313)	Electric Power Fund (Korea Electrical Safety Corporation)
	Improving the gas system for low-income and near-	Free-of-charge replacement of rubber LPG hose with metal pipes	-	159 (85,069)	148 (91,343)	132 (79,523)	Special Energy Account (Korea Electrical

	poor households						Safety Corporation)
	Electricity bill discount	KRW 8,000 per month for basic livelihood benefit recipients, disabled persons, the war-disabled, and national merit holders; KRW 2,000 per month for households in near-poverty	2,750 (2,79,962)	2,720 (2,212,657)	2,129 (253,331)	2,525 (2,274,847)	Private-sector funding (Korea Electric Power Corporation)
Energy bill discount programs	Gas bill discount	5~15 percent (KRW 14,000/month)	266 (571050)	335 (622425)	454 (678739)	931 (767640)	Private-sector funding (Korea Gas Corporation)
	Heating bill discount	KRW 10,000/month	29 (118,465)	42 (133,353)	48 (137,902)	48 (148,212)	Private-sector funding (Korea District Heating Corporation)
Energy cost assistance programs	Heating energy assistance for low-income households	200 liters of heating kerosene per household (KRW 310,000/household)	-	-	81 (18,000)	81 (18,000)	Lottery Fund (Korea Energy Foundation)
	Coal briquette assistance for low-income households	Coal briquette coupons (KRW 169,000/household)	142 (88,752)	141	141	141	Special Energy Account (Mine Reclamation Corporation)
Total			3,875 (354,738)	3,932 (3,276,054)	3,699 (3,398,787)	4,658 (3,544,312)	

Source: *Social Security in Statistics* (2014), Ministry of Health and Welfare; Korea Institute for Health and Social Affairs

## Policy implications

As the data on actual household energy consumption reveals, those in the bottom income quintile are more likely than the rest to be burdened with excessive energy costs or unable to heat their homes adequately. This study suggests therefore that the energy voucher scheme, which as of now assists households below 40 percent of the median income, should be expanded in a stepwise fashion to include households living on less than 50 percent of the median income.

Income support programs can help poor households keep their homes adequately warm, and providing rebates on energy bills can help lighten the burden of energy costs for low-income households. Cash energy assistance has proved conducive to helping low-income households increase their energy consumption to a level needed for adequate heating. Notwithstanding their obvious advantages, however, they may not be as useful and efficient in the long-term.

Hills' report *Getting the Measure of Fuel Poverty* has underscored the importance of "policies that improve the thermal efficiency of the housing stock," as these are measures that "tend to be the most cost-effective" and "have persisting benefits in reducing fuel poverty, reduce greenhouse gases, and have very substantial net societal benefits." Policies aimed at bringing improvements to the energy efficiency of residences can bring out a deeper and longer-term impact on addressing the problem of high energy costs.