THE KNOWLEDGE FORUM

Gas-ping for survival

Impact of winter gas shortages on low-income households

Table of Contents

Foreword:

Pakistan has had an abundant supply of indigenous natural gas which facilitated accessibility and affordability for its domestic use up until recently. These reserves of natural gas have slowly depleted with each passing year, and the available indigenous gas supply is no longer sufficient to meet rising domestic needs. Due to this, domestic consumers have been experiencing significant problems related to gas shortage especially during winter seasons when gas is needed for heating and cooking purposes. Low-income households have disproportionately experienced the negative impacts of this gas shortage due to difficulty in arranging alternatives which may be expensive or not feasible. These gas shortages have a direct and substantial impact on the health, education, and financial wellbeing of low income families.

Introduction

Since the 1950s, natural gas has been the fuel of choice for households across large and medium-sized cities of Pakistan connected to the gas supply grid.

This non-renewable, fossil fuel has long taken the fancy of policy makers, primarily on the back of relative abundance of indigenous reserves in years past.

It is important to remember at the outset that although natural gas is often billed as a clean fuel, that may be so only in comparison with other fossil fuels. Methane, the primary component of natural gas, is a potent greenhouse gas. Over a 20-year period, methane is 80 times more potent at warming than carbon dioxide.[1]

Over the years, the extent of natural gas usage in Pakistan has been determined by factors such as availability, affordability, infrastructure, and government policies.

Pakistan has a well-developed and extensive gas distribution infrastructure, and despite recent tariff hikes, natural gas remains easily the most affordable fuel for domestic use.

Initially focused on the cooking and heating needs of the urban households, in recent decades natural gas has increasingly been diverted to industrial and commercial sectors, including electricity generation and powering the fertilizer and cement industries, among others. In 1992, the government decided to introduce compressed natural gas (CNG) as an alternative fuel for petrol-run vehicles to reduce the import bill. In hindsight, that decision for petrol-run vehicles to switch to CNG contributed much to accelerated depletion of the country's gas reserves. But that saga merits a study of its own.

Pakistan has 0.4% of global gas reserves[2] and accounts for 1.1% of the global consumption.[3] As things stand today, the available indigenous gas is no longer sufficient to meet rising domestic needs and Pakistanis is heavily dependent on gas imports. Scheduled and unannounced gas shortages during winters have been a recurring phenomenon in Pakistan for around two decades now. Some years and some regions

[1] UN Environment Programme, 20 August 2021, https://www.unep.org/news-and-stories/story/methane-emissions-are-driving-climate-change-heres-how-reduce-them#:~:text=Methane%20is%20the%20primary%20contributor,at%20warming%20than%20carbon%20dioxide.

[2] https://www.worldometers.info/gas/gas-reserves-by-country/

[3] https://www.worldometers.info/gas/gas-consumption-by-country/

experience more severe gas scarcity than others. The gas shortages in Pakistan have become particularly severe in the last couple of winters.

A long list of factors—including growing energy demand, depletion of existing reserves and lack of new discoveries, infrastructure limitations, and weather-related reasons—affects the supply and demand imbalances behind the gas shortages.

Through the years, the immediate ways to cope with gas shortages have included suspending supplies to various sectors during periods of high demand and occasional bans on issuing new gas connections. Pakistan has also sought to augment the shortfall by adding imported liquefied natural gas (LNG) to the distribution network through both long-term contracts as well as short-term, or spot, LNG cargoes.

Pakistan has signed contracts with neighbours and other reginal countries for import of gas via pipelines. However, progress towards implementing these agreements has been hindered for years. The Turkmenistan-Afghanistan-Pakistan-India (TAPI) gas pipeline project has been stalled amid differences over price reviews and the delivery point. The project completion would likely take between three to four years even in the best-case scenario.[4] The Iran-Pakistan gas pipeline project has been held up mainly on account of international sanctions against Tehran.

The LNG infusion initially did help ease the shortages, but more recently a cash-starved Pakistan has struggled to arrange spot cargoes amid steep cost hikes and high demand, especially as Europe rushed to find alternative supplies after shunning Russian gas following the invasion of Ukraine.

Of late, the supply shortfall in the system has been growing both in intensity and duration. In fact, the gas shortages in late 2022 lasted beyond the winter, persisting not just through the spring of 2023 but also well into the summer months.

In 2023, as Pakistan headed towards the summer, historically a period of supply-demand parity, the federal minister for the sector stated that natural gas could simply no longer be supplied round the clock due to depleting reserves.[5]

[4] TAPI gas pipeline can be completed within 3 to 4 years after achieving financial close, The Nation, November 18, 2022, https://www.nation.com.pk/18-Nov-2022/tapi-gas-pipeline-can-be-completed-within-3-to-4-years-after-achieving-financial-close

[5] Gas cannot be supplied round the clock, says minister, Dawn, April 6, 2023, https://www.dawn.com/news/1746150

So acute had the shortage become, said the minister, that ensuring gas supply even merely at the beginning and the end of fasting every day during the month of Ramadan was a struggle.[6]

“Our gas resources are depleting by 10 percent every year. We have only 1,600mmcfd (million cubic feet per day) of gas left for the entire country while the demand is on the rise,” the minister said in April.[7]

He did, however, declare that the provision of gas to poor households would be ensured on priority. The minister also announced a ban on new gas connections.

With the low rate of replenishment and rising demand, it takes no mathematician to forecast that the indigenous reserves would run out inside a decade.

Through the years, the winter shortages have been accompanied by gas supply suspension to industry and commercial concerns for months. The sectors affected have included electricity generation, fertilizer production, textile and CNG.

Speaking to members of the country’s biggest representative body for businesses and industry in Karachi in April, the energy minister said the gas load shedding crisis in the industrial sector could be tackled through an expensive blend of natural gas and imported re-gasified LNG (RLNG). The businessmen were concerned that suspension of gas supply was crippling local production and exports.[8]

However, not everyone can afford this expensive mix. In June 2022, the minister had informed parliament that the government was giving between 68 and 88 percent per unit subsidy to domestic gas consumers of the two lowest slabs, who used minimal amounts of gas every month.[9] The subsidy covered 91 percent and 80 percent of the total households connected with the networks of SNGPL and SSGCL, the two gas distribution companies, respectively.

Whether the minister can keep his promise to low-income consumers—and whether such priority supply meets their basic energy needs—stands between poor households and

[6] Ibid.
[7] Ibid.
[8] Ibid.
[9] Almost 88pc per unit subsidy being given to gas consumers of two lowest slabs: NA, Pakistan today, June 9, 2022, https://www.pakistantoday.com.pk/2022/06/09/almost-88pc-per-unit-subsidy-being-given-to-gas-consumers-of-two-lowest-slabs-na/

what noted campaigner and academic Brenda Boardman had referred to as 'energy poverty'[10] in 1991.[11]

With historic high inflation, steep rupee devaluation making energy imports difficult and a full-blown cost-of-living crisis pummelling the citizenry for a number of years now, the rising gas shortages are having an impact on households rich and poor. It is those with limited means that find coping harder than the rest.

Against that backdrop, this research study endeavors to understand the impact of winter gas shortages on low-income households.

[10] Energy poverty is lack of access to modern energy services. It refers to the situation of large numbers of people in developing countries and some people in developed countries whose well-being is negatively affected by very low consumption of energy, use of dirty or polluting fuels, and excessive time spent collecting fuel to meet basic needs.

[11] Boardman had first described the term as not having enough power to heat and cool homes. Energy poverty has since come to be understood as complex systemic inequalities that hinder access to energy at an affordable price.

Natural gas & Pakistan: quick facts

This section covers some key facts and statistics about Pakistan's natural gas landscape to highlight the place of natural gas both in the national energy mix and its importance as the main household cooking and heating source in urban areas. The statistics bring out the centrality of natural gas as an important plank of Pakistan's energy landscape. They also bring into focus the scale and dimensions of the crisis that shortages during the winter and beyond expose.

National gas Infrastructure[12]

Length of transmission pipelines:	13,768km
Length of distribution pipelines:	191,478km
Total gas connections nationwide:	10.62 million by the end of FY2020-21.
Total consumers of SNGPL:	7.41 million (371,618 new connections in FY 2020-21)
Total consumers of SSGCL:	3.21 million (95,436 new connections in FY 2020-21).

Gas subsidy[13]

- 68-88 percent per unit subsidy given to domestic gas consumers of two lowest slabs.
- Subsidy given to 91% households connected with SNGPL and 80% with SSGC.

Consumption & production trends[14]

- During FY 2020-21, indigenous gas production declined by over 6% to 2,006 MMCFD from 2,138 MMCFD in FY 2019-20.
- FY 2020-21 gas consumption rose by over 5%, to 3,884 MMCFD from 3,683 MMCFD in FY 2019-20.

Provinces' share in gas consumption & supply[15]

Province	Consumption	Supply
Balochistan	2% (64 MMCFD)	11% (333 MMCFD)
Khyber Pakhtunkhwa	7% (190 MMCFD)	12% (398 MMCFD)

[12] State of Regulated Petroleum Industry for fiscal year 2020-21, Oil & Gas Regulatory Authority.
[13] Almost 88pc per unit subsidy being given to gas consumers of two lowest slabs: NA, Pakistan Today, 9 June 2022, https://www.pakistantoday.com.pk/2022/06/09/almost-88pc-per-unit-subsidy-being-given-to-gas-consumers-of-two-lowest-slabs-na/
[14] State of Regulated Petroleum Industry for fiscal year 2020-21, Oil & Gas Regulatory Authority.
[15] Ibid.

Punjab	52% (1,426 MMCFD)	3% (83 MMCFD)
Sindh	39% (1,052 MMCFD)	40% (1,192 MMCFD)

Consumption across sectors[16]

The main users of the total natural gas consumed in Pakistan in FY 2020-21 were:

Power sector: 30% (1,305 MMCFD)
Domestic sector: 20% (862 MMCFD)
Fertilizer: 19% (829 MMCFD)
General Industry: 8% (365 MMCFD)
Captive power: 5% (203 MMCFD)

LNG[17]

- LNG imports rose by 13% to 969 MMCFD in FY 2020-21 from 857 MMCFD the previous year.
- LNG share in overall natural gas supplies increased to 33% in FY 2020-21 from 29% the previous year.
- From July to February in FY2022, 24% of gas was imported and 76% domestically sourced.[18]

LPG[19]

- Around 61% of the LPG demand was met through local production and 39% through import during FY 2020-21.
- LPG share in the country's primary energy supplies was 1.3 percent.

CNG[20]

- In FY 2020-21, the natural gas consumption in the transport sector declined from 127 MMCFD (3.11%) to 108 MMCFD (2.51%)
- More than 700 CNG stations were closed during the year.

[16] Ibid.
[17] Ogra Annual Report 2020-21, https://www.ogra.org.pk/download/8124
[18] Pakistan Economic Survey 2021-22, p. 261, https://www.finance.gov.pk/survey/chapter_22/PES14-ENERGY.pdf
[19] Ogra Annual Report 2020-21, https://www.ogra.org.pk/download/8124
[20] Ibid.

Methodology & structure

In addition to desk research, the research methods for this study included key informant interviews (KIIs) and a survey[21] with natural gas consumers from low-income households. The survey was conducted in nine districts while key informants, mainly medical practitioners and educators, from three of the nine districts were interviewed for the study. The KIIs with educators and healthcare professionals were scheduled after the conclusions of the survey data analysis. The report deliberately does not identify key informants specifically, as they were assured confidentiality to encourage them to frankly express their views without having to worry about any repercussions for doing so.

This report is organised as under: the following section (Section IV) offers analysis of the impact of the gas shortage on low-income families. Section V discusses the key findings, while conclusions are presented in Section VI. The report concludes with recommendations for stakeholders.

The survey sample

The analysis for this study is based largely on data obtained through a survey of natural gas consumers from low-income households. Comprising open and close-ended questions, the survey was conducted through face-to-face interviews.

In selecting the respondents, gas consumers in low-income neighbourhoods were targeted. Each of the respondents selected for the survey had a gas connection at home and the combined monthly income of her or his household was below Rs 70,000.

Although the survey sample was small, 90 respondents in all, the choice of the cities for the survey was aimed at capturing the experience of low-income families not just in the big cities in the more populous provinces but also in medium-sized cities across the country. The desire for such coverage, despite time and budgetary constraints, resulted in the survey being conducted in nine districts, with 10 respondents in each district. The nine districts were: Quetta and Jaffarabad in Balochistan; Peshawar and Haripur in

[21] The survey questionnaire is appended as Annex I.

Khyber Pakhtunkhwa; Lahore, Rawalpindi and Multan in Punjab; and Karachi and Sukkur in Sindh.

Because of the small survey sample, the findings of this study do caution against inferring generalizations for the entire national population.

Active efforts were made for gender parity among the survey sample. The 90 respondents in the nine districts included 47 men, 42 women and one transgender person. Two-thirds of the respondents were earning members of their households. These included 46 out of the 47 male respondents, 21 out of the 42 women and the sole transgender respondent.

As mentioned earlier, the nine cities where the survey was conducted were spread across all four provinces of Pakistan. The selected cities included those with really cold winter, such as Quetta, Haripur and Peshawar on one end of the spectrum and mild winters, as are generally the norm in cities like Karachi. This section examines the survey responses with a view to assess the impact of gas shortages on various aspects of life of low-income families.

Access and preference

It is important to underline at the outset that the barriers to accessing natural gas are substantial in Pakistan. Even today, many towns and small cities in the country are not on the gas network. Natural gas connections are not easy to get even in the areas serviced by the distribution network. Additionally, there have been long periods when outright bans were imposed on issuance of new connections.

As described earlier, a domestic gas connection was one of the criteria for selecting the survey respondents. Among the respondents, 68% had had a domestic gas connection for more than a decade and another 28% for longer than five years. Many spoke of having had to wait for years after submitting their applications for gas connection. More than a third of the respondents described the process to get the gas connection as easy, a third considered it difficult, while one in 10 respondents described it as nearly impossible. As many as 13 respondents could not comment on the difficulty level in getting a gas connection because they lived in rented accommodations where the property owners had got gas installed.

Every single respondent cited natural gas as their preferred fuel for cooking, while only half of them (44 respondents) favoured natural gas as a source for heating. The overwhelming majority of those who did not indicate a preference for natural gas as a heating fuel said that so low was the gas pressure during winter months that even managing to cook was difficult and it was unrealistic to consider using natural gas for heating.

The respondents cited a variety of reasons for their preference for natural gas. As many as 78% believed it to be a clean or environment friendly fuel; 76% considered gas to be

affordable; 69% deemed it safe and 56% called it reliable. Many said that despite recent tariff hikes, natural gas was still by far the least expensive fuel for households, especially for those whose low usage, in the first two tariff slabs, qualified them for a subsidised tariff.

Ease of use, having to pay the gas bill only once a month, unlike alternatives that had to be bought repeatedly every month, were some of the more common attributes that endeared natural gas to the respondents. That gas usage did not produce any smoke, ash, or visible pollution and the house stayed clean was also cited as a factor for choosing it.

Scale and impact

The winter gas shortages had come to have an outsized effect on all aspects of daily lives. Every single one of the respondents said that the gas shortages had affected their daily routine in the winter. A little over half of the respondent (52%) said the shortages had a severe impact on everyday routine. Around 45% described the impact as moderate and another three percent called it mild.

Eight out of 10 respondents (77%) stated that their households had experienced winter gas shortages in at least three of the past five years.

Financial impact

The respondents overwhelmingly (87%) mentioned financial cost as the first and the most immediate impact of the winter gas shortages on their households. The two most direct and frequently cited effects were: having to buy cooked food from outside and, on top of paying the monthly gas bill, bearing the cost of alternative fuel at a time of the year when fuel prices usually peak amid high demand.

A number of respondents also bemoaned more frequent doctor visits and medicine costs linked to cold-related ailments as an additional drain on their finances due to gas shortages.

LPG, the most commonly available fuel that can be used in the conventional gas stoves, was said to be three times more expensive than natural gas during the 2022-23 winter. Due to its high cost,

none of the respondents reported using LPG for heating; they said that they could barely afford to use it for cooking.

Out of the 96% respondents that felt that the gas shortages impacted the household budget in one way or another, more than half (54%) described this impact on their budget to be moderate while nearly a third (31%) said that it affected their finances to a great extent.

Despite the long hours of winter shortages, as many as 91% of the respondents reported that their gas bill during the winter months was higher compared to that in summer. The respondents' monthly gas bills during the winter ranged from 4% to 12% of the family's total income. In almost all cases, the monthly cost of alternative fuels was higher than the natural gas bill for the same period. The combined expense on fuel, including the gas bill and the cost of alternatives, took a big chunk, between 10% to a quarter on average, out of the respondents' monthly household income. This left little room for accumulating savings for low-income families, and important expenses kept being deferred until after the winter months and the most acute shortages passed. Among the respondents, 41% cited the winter gas shortages as a direct or indirect cause of a loss of income, and in at least seven instances loss of a family member's job, mainly because gas scarcity delayed their breakfast and departure for their jobs on a number of occasions. Others also mentioned reprimand, deduction of wages and lost bonuses on account of frequent late arrival at work connected in some way to the absence of gas in the morning.
A respondent from Rawalpindi stated that even very basic cooked food bought from the market was so expensive that just two meals for his six-member family consumed his entire earning for the day. He lamented how a single *roti* cost 20 rupees, when, if only gas was available, his family could prepare at least 75 *rotis* at home with a 10-kg bag of wheat flour that cost Rs 650.

Impact on health

A number of health-related issues that the respondents highlighted appeared to be a direct consequence of their inability to meet heating and / or cooking needs during the winter gas scarcity.

Two thirds (68%) of the respondents said the gas shortages had a direct impact on their own or other family members' health. One of the two most frequently cited issues was ailments linked to consuming cold or previously prepared food or cooked food bought from shops or roadside vendors. The second issue was lack of indoor heating resulting in more frequent cold-related

ailments, especially among the children, and complication of existing health conditions among the elderly. Lack of warm water for bathing, and ablution was said to be affecting health, with children and the elderly again cited as the most vulnerable.

Some respondents stated that low-income families could only afford to heat their homes and water using natural gas. An inability to use gas heaters during winter due to low pressure exposed the children to the risk of falling ill. Many respondents also worried that if gas supply was suspended while a gas heater was being used and later resumed it could lead to gas leakage. They recounted numerous incidents of gas inhalation taking human lives in their respective districts.

An issue with serious health implications was the low gas pressure making it difficult to boil water for drinking. This was all the more crucial in the areas affected by the 2022 monsoon rains and floods where water-borne diseases already posed a constant hazard to health. A female respondent recounted that so severe was the gas shortage this year that she had struggled to heat water to follow her doctor's advice, who had asked her to have her medicine thrice a day with a sip of warm water.

Both the respondents and the medical practitioners interviewed for this research spoke of people having to change their sleep schedule and duration to cope with gas outages. The toll that the gas scarcity took did not appear to be merely physical. Some respondents described being stressed, feeling rushed and having to constantly change their routine. Medical practitioners spoke of anxiety among low socio-economic groups, often linked to their struggles to meet increased cooking and heating expenditure.

Education impact

Besides health, the impact of the gas outages on education noted during the research was also unmissable. As many as 77% of the respondents shared that the shortages affected the routine of their children who went to schools or colleges as well as the routine of the earning family members.

Low gas pressure in the morning delaying breakfast preparation, and leading to pupils reaching schools late, was a common account. The research team learned of children missing their school vans due to low gas pressure hampering timely breakfast preparation.

Many respondents shared that due to low gas pressure, food was only cooked once a day and consumed twice or thrice. That was the routine for several respondents throughout the winters. A number of respondents stated that their school-going children and other family members heading out for work routinely ate food prepared the previous night. It was not uncommon for students to go to school hungry and they could also not take along any home-cooked food for lunch. Parents who could afford it, gave their children fruits to compensate for the missed breakfast, which did not satisfy children's hunger and parents and educators told the research team how they believed all of this undermined students' attention to studies.

The delay in breakfast preparation also rushed parents who had to drop their children to school before heading off to work. A government employee in Haripur informed the research team how the impact of the gas shortages on the household routine had forced him to move his children to a school closer to their home.

The educators who were interviewed for this study readily corroborated that impact, recalling how pupils and other school staff arriving late at educational institutions, or arriving without having breakfast, cited gas shortages as the reason. They said that the gas shortages directly affected the concentration and focus of students and the educators and affected the learning environment.

Many respondents who used firewood called the smoke emitted during the process a problem that disturbed the breathing of some family members. The cold winter air was stagnant, which prevented the smoke from dispersing, they said.

Social impact

As many as 56% of the respondents said they faced a variety of social impacts on account of the winter gas shortages.

Some of the cited examples of social impact included an inability to properly host guests. Family gatherings were said to be greatly affected due to the hassle, and often also the cost, of arranging food and heating rooms and water if guests visited. If some heating was possible, all family members and guests had to sit in the same room, which affected privacy.

At times, missing the often small window for cooking food caused tensions among family members. A female respondent from Peshawar said that her husband "disrespected" her and they quarrelled often due to the delay in food preparation because of the gas shortages.

I once had relatives visiting from my village as they had to go to a hospital in the city. I had to get them food from outside because of the gas load shedding. They sat me down and advised me to return to the village with them. They said that back at the village everything was still cooked at home any hour of the day, using firewood that was in abundance. Hearing that was just too big a thing for me, as if my decision to move to the city had proven to be unwise. It was not a nice feeling. ***—A respondent from Sukkur***

Environmental impact

As noted earlier, an overwhelming majority of the survey respondents (78%) considered natural gas to be a clean or environment-friendly fuel.

When it burns, natural gas indeed produces less pollution and greenhouse gases than other fossil fuels but environment friendly it is not. According to the Center for Liquefied Natural Gas, when natural gas is burned, it produces 45% less carbon dioxide than coal, 30 percent less than oil and 15 percent less than wood. However, methane (the primary component of natural gas) has a much higher global warming potential than carbon dioxide.

References to natural gas being a clean fuel were a common theme across the nine cities where the survey was conducted. Conversations with the respondents suggested that smoke-free and environment-friendly were adjectives used interchangeably to describe natural gas. In at least a score of instances, gas seemed to be branded as clean simply because it did not release visible fumes as it burned nor caused dark smoke or ash that wood or coal left behind. Just because the gas usage did not leave such marks at home, there seemed to be a belief that it left no mark on the environment either. Smoke-free was essentially a synonym for environment friendly in this context.

Not only did many respondents appear to be poorly informed about the hazardous impact of using natural gas, they also seemed to know little about the substantial environmental footprint associated with the exploration, extraction and transportation of gas.

Fascination with free firewood – accounts from Haripur

The brief section presents varying perspectives on the use of wood for household cooking needs noted during the survey in Haripur.

A peculiar aspect of the data from Haripur was how firewood did not always have to be bought but could reportedly be obtained for free from trees and other woody vegetation in the area. Desperation and lack of affordable alternatives may be behind such preferences. This may have grave implications for forest cover, especially in the country's northern regions, where the winters are long and bitterly cold, shortages excessive and proximity to the trees or woody vegetation on the forest floor presents the possibility of obtaining an alternative free of charge. It appeared that in areas close to forests, woody vegetation was used during gas outages. A forest department official in Haripur, however, did not agree to the assertion that the gas shortages led to firewood being taken from forests.

Some of the respondents' comments in this regard were particularly instructive and are reproduced verbatim here. The respondents' consent was contingent on their identity being kept anonymous. Only the name of a respondent's district and his or her serial number on an internal list is mentioned along with the comments.

"LPG is much more expensive compared to natural gas. It is simply beyond our budget. That is why my husband ventures out to chop and bring home firewood. We prefer wood because it is in abundance and costs little. However, it does take up the entire day to arrange wood." ***— Respondent 1, Haripur***

"No fuel is cheap. In order to deal with the winter gas shortages, I try to find a tree which I can chop down and use the wood for my family's cooking needs. I prefer wood as it is easily available for free or at very little cost." ***—Respondent 4, Haripur***

Wood did not appear to be as attractive an alternative in Haripur when it had to be bought. Here are thoughts of some of the other respondents from the district on wood as an alternative cooking fuel.

"Wood and LPG are easily available, but they are very expensive compared to gas." ***— Respondent 6, Haripur***

"LPG and firewood are easily available fuels, but they are considerably expensive than gas." ***—Respondent 7, Haripur***

"Electricity, coal, wood and LPG are available, but all these fuels are expensive compared to natural gas. Wood is easily available and is not that expensive, but we use LPG because these days women find it easier to cook using gas." ***—Respondent 8, Haripur***

Meanwhile, some things that made wood undesirable were the smoke and ash it left behind, making the home untidy as well as women—who were invariably said to be the ones tending to kitchens—preferring fuels that were easier and more convenient for cooking. The following were the considerations of some Haripur respondents for not choosing wood.

"The only inexpensive fuel other than natural gas is firewood, but that causes pollution in the house. Therefore, we have to use LPG, which is an expensive fuel." ***—Respondent 5, Haripur***

"The available alternatives in our area include electricity, LPG, coal and wood. Wood is comparatively the least expensive of the lot. But women in our family hesitate to use it. Therefore, we use LPG as an alternative, but it is much expensive compared to natural gas." ***—Respondent 9, Haripur***

Responses & coping mechanisms

There was a range of ways that the respondents said that they made adjustments to cope with the extensive winter gas outages. The most frequent resort (adopted by 80% of the respondents) was to change the meal preparation time. As many as 77% of the respondents opted to prepare meals just once a day rather than multiple times, 67% refrigerated cooked food for use at meal times, 64% mentioned using one alternative fuel or another, 59% changed water heating time to match the gas availability schedule, 54% bought cooked food from outside, 53% changed their sleeping hours to adjust to the gas availability timings, 20% used cooking and heating devices that did not use gas.

Referring to the rising cost of living and high inflation, many respondents indicated that their financial situation did not allow them to spend money on fuels to replace natural gas. Several respondents reported switching to cheaper foods even if those did not provide as much nutrition,

or resorting to consuming smaller food portions or reducing the number of meals from three to two.

Somewhat surprisingly, the majority of the respondents mentioned availability, rather than cost, as the determining factor for their choice of alternative fuels. Many explained that when demand ramped up in winter, alternatives were also in short supply or much more expensive than at other times of the year. A general response was that none of the alternative fuels was cheap. Additionally, the respondents did not feel that they had the option to choose; they felt compelled to find the money for what was available and was least inconvenient.

LPG was by far the most frequently used alternative to gas, with 66% of the respondents relying on it amid shortages. One of the reasons for choosing it over other options included prohibitively high cost of electricity and lack of consistent availability of any other viable alternatives. In fact, most respondents said that LPG was one of the more expensive alternatives but added that at least it was available when other fuels were scarce. Many used LPG due to relative convenience as LPG cylinders could be used with natural gas stoves.

As many as 42% respondents used firewood and 20% coal, either exclusively or in conjunction with other fuels. However, not a single respondent relied on renewable resources, such as solar or wind to replace gas. Firewood was favoured more in cities like Jaffarabad and Haripur. Respondents in other cities shared how the architecture and lack of open spaces in urban lodgings made the use of wood and the resulting smoke and ash a nuisance.

As many as 79% of the respondents stated that the alternative fuel they had to rely upon was either ‘more expensive’ or ‘much more expensive’ compared to the cost of natural gas. Only 12 percent said that their choice of alternative fuels was based on how clean a fuel was or its environmental impact. Ironically, many of the same respondents cited LPG as the alternative they preferred.

In Haripur, Multan and Sukkur, wood had a place of prominence among substitute fuels, while it was wood and coal in Quetta, and wood and dried cattle dung in Jaffarabad. Localities on the peripheries of the cities often used wood or coal as they had to travel longer distance to reach LPG selling concerns. Some respondents preferred to used wood not only on account of its cheaper cost. They said that smoke was an irritant, but it was better than LPG cylinders “putting lives at risk”. They pointed to exploding LPG cylinders bringing down whole houses and taking many lives.

Perspective on official responses

In terms of the authorities' responses to the recurring winter shortages, 93% of the respondents said that they did not see any government effort to address the issue after winter passed every year. Those who said that they had seen some effort invariably drew attention to rhetoric rather than concrete action.

The respondents expressed disappointment over lack of effective measures even as the previous seasonal outages aggravated into a year-round crisis. Many said that consistent sincere efforts would have yielded a solution.

A substantial section of the respondents genuinely seemed to believe that the shortages could be addressed simply by switching industry to alternative fuels and dedicating natural gas supplies for domestic consumers, especially during the winter. This belief obviously overlooked aspects such as the fast-dwindling gas reserves, growing population, gas being a fossil fuel, lack of indigenous alternatives and a dearth of foreign exchange for Pakistan to afford import of the gas or its alternatives.

Some respondents said that the supply of natural gas for public transport should be suspended during the winter. But such respondents were far fewer in the number than those suggesting the suspension of gas to industry.

Nearly two-thirds of the respondents (64%) believed that despite Pakistan's economic challenges, the gas shortages could be ended within the next couple of years through focused action. Their suggested solutions were confined to fossil fuels, mainly through two long-pending cross-border gas pipelines projects, either from Iran or from Central Asian Republics via Afghanistan. One-third (36%) were of the view that overcoming the gas shortages would take longer.

Most of the respondents seemed to be in denial of the declining reserves and believed that better management of gas allocation, preferential supply to domestic consumers, enhanced transmission capacity and prevention of leakage and theft would suffice to overcome the natural gas scarcity.

It is important to highlight that 94% of the respondents were of the view that the government should consider cultivating alternatives to curb winter gas shortages. However, their grasp of the range of alternatives was rather limited and many advised provision of free or subsidised LPG cylinders to the poor as the solution.

It was interesting to note that the proposed solutions of the respondents from Lahore and Karachi and Quetta, and to some degree Rawalpindi and Sukkur, leaned towards renewables, mainly solar. In Multan, the respondents' thrust was on suspending supply to industry and CNG sector and providing gas to households. In Jaffarabad, the respondents demanded supply of free or highly subsidized LPG cylinders as a solution if the government could not ensure natural gas

supply to households in the winter. In Quetta, the demand was that the cost of alternative fuels should be low and supply ensured during gas shortages.

The KIIs for this study were intentionally deferred until after the analysis of the survey data, so that key informants could comment on and offer insight regarding the survey findings. The KIIs were initially planned to be conducted with healthcare professionals and educators in two cities, Rawalpindi and Karachi. Interview with a forest department official in Haripur was also organised after the survey data indicated possible impact of a preference for firewood from the district's forests on the natural habitat and environment.

This study reached out to health and education professionals in the public sector, which catered to low-income households.

The key informants were promised confidentiality to encourage them to candidly share their thoughts without having to worry about any consequences for speaking their mind. That is why this report does not provide identifying information for the interviewees.

Educators' predicament

- ***The administrator of a leading public school in Rawalpindi***

"Our staff and students are affected both directly and indirectly by the winter gas shortages. Public sector school classrooms do not have heaters anyway, so we are not affected in that respect. As for our students, many often arrive late and cite absence of gas delaying breakfast preparation as the reason.

We also notice neglect of personal hygiene among students as cold showers can be a challenge. Their parents say gas shortages make water heating difficult. Not everyone's financial resources allow them to keep cylinders or other alternatives. We see every day how the shortages are a drain on financial resources and are increasing poverty. Parents often mention financial challenges and how they manage three, and sometimes even only two, meals with great difficulty. When the situation is so dire that basic needs are not being met and buying groceries is difficult, it sounds insensitive to advise parents to buy a cylinder for heating water or preparing breakfast in time.

Despite all the challenges, the gas shortages have not had much impact on attendance of either educators or students, who come to school even without having breakfast. The people have perhaps become immune to such difficulties and accepted various deficiencies as something that they must endure.

The shortages have certainly had an adverse impact on learning. A student who has not had breakfast or complains of stomach pains or headache by the second or third period would be

taken to the infirmary or the office. In either case, that student's learning is disrupted. It is not uncommon for students to complain of stomach pains, often on account of not having had breakfast or consuming substandard food bought from outside due to gas scarcity. In a class with 45 students, even if two or three students leave early it is a loss for them as well as the educator. These are constant problems that affect the learning process during gas shortages.

One of our educators lives in a locality with considerable gas outages. She has two children who are also enrolled in our school. The educator and her children often come to school without having had their breakfast due to absence of gas at home. On the way to school, the educator sometimes buys something for herself and her children. It is only natural that that educator's focus would be on whether her children have eaten rather than concentrating on properly performing her responsibilities.

The gas shortages not only affect domestic chores but also household finances. Teachers have rather nominal salaries, particularly in view of the ongoing inflation. So, this is a considerable additional burden. Besides added expense, this robs the educators and students of the quality, freshness and hygiene of home-cooked food.

Our school has biometric attendance, and any staff member who does not arrive before the school starts is marked late or absent. So, the staff is punctual despite the gas shortages, but many arrive without having breakfast. The educators can teach a period or two on an empty stomach, but after that they find it difficult to concentrate despite their best efforts. Unlike past years, there is no gas in the school cafeteria this year, so the educator can only wait for a belated breakfast or morning tea. In our experience, the gas shortages have not affected staff punctuality, but their efficiency and concentration have indeed been affected.

Even without gas shortages and skipped breakfasts, the educators often take three or four consecutive periods of overcrowded classes. They find it difficult to concentrate if after long classes gas scarcity deprives them of even a cup of tea.

Last year and early this year, we had been asking parents to give their children home-made lunch instead of pocket money. During the gas shortage months, particularly from December through February, the students have the option to bring fruit from home. But not all can afford fruit. This too is linked to financial resources.

We have only had a few students leave school this year. If a family has just one or two children they try and manage things despite financial difficulty, but parents with larger families say that it is becoming difficult for them to manage. Education is free in government schools, but nothing is free outside schools. A family whose children were enrolled with us had to move them to a smaller

school closer to their residence because the van owner bringing them to school was charging them Rs. 5,000 a month per child.

Many students, whose parents are poor and illiterate, cannot help their children with their studies at home as they move to higher grades and cannot afford tuition. Of course, how bright or intelligent a student is has nothing to do with his or her financial situation. But when the parents are struggling then far too many factors can persuade them to move their children to a school closer to home or even pull them out and put them to work. Even if their wages are low, there are parents who would think that the children are no longer a burden on them.

Even if the gas supply has to be suspended to factories for a few hours each morning, households should have gas at that time as a child or adult has to leave for school or work from every home at that time. If that is not possible, then the school opening time should be delayed so simultaneous pressure on parents can be relieved. If the authorities facilitate them in some way, the people would feel that their state is concerned about them.

We hear and feel that the gas shortages will only worsen in the coming days. We already cannot meet the existing gas demand. The future of 240 million people cannot be gambled this way.

In looking for solutions, instead of looking to western countries we should wisely look at our neighbouring countries, towards Iran and Central Asian nations.

Furthermore, the media and social media should guide against wasting energy resources. Even the people who can afford the alternatives would struggle when consumption rises, prices spike and shortages multiply. Right now, gas scarcity might be an issue facing one segment, but in the coming days it will be an issue for everyone. When prices spike and supply dwindles all would be in the same queue."

- ***A senior educator at a leading public school in Haripur***

"In winter, suspension of gas shortages impacts the school's ability to offer proper heating in classrooms and leads to children falling ill. Our school caters mostly to children from poor families, who cannot afford warm clothes to protect themselves against the winter cold. Natural gas supply during school hours can help us protect the students from cold-related diseases.

For us, the most pronounced effect of the gas shortages is on the punctuality and attendance of children. Besides arriving late, many students come without having had their breakfast. Students who come to school hungry are not only physically weak, they also cannot actively participate in the class.

In addition to disrupting the eating and sleeping schedules that ultimately affects pupils' attendance, suspension of gas supply to CNG stations affects school vehicles which use that fuel and affect students' attendance.

The number of classrooms in our school is less than the classes we have as it is. We do have to take some classes on the school lawns, which exposes children to cold. This affects children's health.

In government schools, mostly children from low-income families are enrolled. Some parents tell us that in some winter months their spending on alternative fuels matches their house rent. When the gas shortage hits their budgets, education-related expenses are difficult to manage. Even though the school has no tuition fee, transport costs become a difficult burden.

Balancing energy supply where it is most needed is difficult. One could make a case for the government to reduce gas supply to industries during the winter and prioritise domestic consumers. But that could lead to some businesses closing down, which would ultimately increase unemployment. The government should explore conventional and new energy resources and, wherever needed, conclude international agreements for ensuring reliable and affordable energy."

- ***Principal of a boys elementary public school in Gadap, Karachi***

"We have noticed that the winter gas scarcity affects students' health as their families struggle to provide them breakfast in time. Children from these families often do not have access to the most nutritious of foods to begin with. Students' cleanliness and hygiene also suffer during the winter due to lack of hot water.

Gas unavailability is inconvenient for everyone. However, the families who send their children to public schools are generally financially stressed. Aggravation in their financial troubles during gas scarcity is reflected not just in their children's health, but also in their lack of attendance, punctuality and focus in school.

During the winter, just as gas load shedding increases, the price of LPG cylinders skyrocket. The people who struggle to pay their gas bills lack the capacity to afford a gas cylinder that costs thousands of rupees and needs a refill every week. Wood may be an alternative but it is no less expensive in times of gas scarcity. So real alternatives are not available to the poor.

The government should reserve a quota of LPG cylinders, for salaried segments, government servants, and particularly for teachers, under which subsidised gas should be provided to them.

For students of public schools or educational institutions run by charities or welfare institutions, where families below the poverty line send their children, students should be provided breakfast and lunch. The government and welfare institutions should ensure some subsidy for households of children from poor families."

Medical practitioners' musings

- ***A district health officer at one of the Karachi districts***

"The winter gas shortages have had a direct impact on the healthcare system. It is not just about the healthcare providers missing their breakfast or morning tea like other citizens. Processes that rely on gas, such as sterlisation, have been affected. Among the indirect effects, the number of patients with cold-related diseases greatly increased and the pharmaceutical industry's operations were also affected.

As a practicing physician, I witnessed an increase in the number of patients with allergic disorders like asthma, often due to cooking with wood or other fuels that produce smoke. There were also increased numbers of patients with chronic obstructive pulmonary disease (COPD) and pneumonia among the very old and the very young. Although there has been no specific study on the issue in Karachi, a higher incidence of diseases which spread due to poor hygiene, such as skin infections and acute watery diarrhea, was also noticed.

All of this was witnessed in Karachi, which has mild winters. Rising energy costs and shortages amid a poor economy can lead to physical and mental illnesses, giving rise to a public health emergency, especially in the colder regions of Pakistan. Gas scarcity in such regions would greatly undermine the disease prevention ability of low-income households, mainly as individuals cannot warm themselves properly and cannot bathe with warm water. The quality and routine of their food intake is also compromised.

The adverse impact of the gas shortage is already affecting mental health, especially among the low socio-economic groups. Anger, anxiety and depression have been

commonly noted, mainly due to increased expenditure and the struggles to make ends meet.

Pakistan is not a rich country, but the government should create a mechanism to subsidise LPG or LNG for the poor masses during winters when the price of alternative fuels rises out of all proportion."

- ***A senior medical practitioner at Tehsil Headquarter Hospital, Khanpur, Haripur***

"At the Tehsil Headquarter Hospital, we face considerable direct and indirect impact of gas shortages during the winter season.

The number of patients brought to the emergency ward, especially children and the elderly, rises considerably. It is difficult to say if gas shortage alone is the direct cause in many cases, yet lack of heating in the bitter cold and a clear influx of patients with cold-related ailments is difficult to ignore.

Compared to other patients, the ratio of children brought to the emergency ward perceptibly rises during the winter. Usually, the children and elderly patients are brought in with fever, cough, chest infection and pneumonia. In fact, six out of 10 children brought to the emergency suffer from chest infection. The elderly patients also suffer from asthma or even heart attacks.

Hospitalisation then becomes both vital for immediate care and a burden amid a limited number of beds. We refer critical patients to other hospitals, mainly to the district hospital here in Haripur or hospitals in Rawalpindi and Islamabad.

Amid an absence of gas or lack of any consistent and reliable alternative to keep their houses warm, it is a real Catch-22 for low-income families. They cannot afford clean or environmentally friendly fuel. They use the cheapest alternative fuel only for cooking, not for heating purposes. Burning coal or wood in confined spaces does a lot of harm to health.

If they somehow arrange the cost of alternative fuel at least for cooking, they have little resources left for other necessary expenses, including prevention of disease and any medical expense.

Lack of heating in houses, disturbed sleeping and meal preparation routines, uncertainty and disturbed monthly budget take a toll on both the physical and mental health of the poor and middle-income families.

The policy makers should at least ensure a minimum supply of gas to low-income households in the winter, even if it is at the expense of suspending supply to industry for a few more hours."

Reflections from the forest department[1][22]

- ***A senior officer of Forestry Environment & Wildlife Department, Haripur***

"Shortage of gas does lead to large quantities of firewood being consumed as alternative fuel in the winter. However, that use is in accordance with the prescribed volume in the forest management plan. Burning firewood causes air pollution and smog and has a direct impact on the environment and on human health in the area.

The firewood in Haripur also arrives from the Punjab province and the authorities there would be in a better position to say how or where it was harvested from. As far as Haripur is concerned, the woody vegetation or forest cover has not been disturbed. Besides, the Ten Billion Tree Tsunami project in Khyber Pakhtunkhwa has ensured that any natural regression has been compensated through plantation drives.

While pursuit of firewood has not affected the forests in Haripur, in one of our tehsils, Khanpur, establishment of multiple industries has destroyed the forest, other woody vegetation, the environment and the wildlife habitat. Wildlife has vanished from that area after industrialisation.

The government should strike a balance between gas supply to the industrial, commercial and domestic sectors to avert the crisis that is repeated every winter."

- ***Head of kitchen operations at a charity kitchen in Karachi*** [23]

"We are affected a 100% the by gas load shedding. Our kitchen expenses shoot up when we have to spend additional money on LPG cylinders due to the gas shortage. In the winter, the number of meals we serve increases. During gas load shedding, we notice that we are feeding not just the very poor, who cannot afford food, but also others who can afford food to some extent but whose stoves have been snuffed out by the gas load shedding. All of that translates into a 20% to 25% direct financial impact.

In winter, we notice that those visiting from outside Karachi for any job or for a hospital visit, etc., who lack the money for food also visit our *dastarkhawans*.

[22] Fuelwood seems to play an important role in meeting the energy needs of many low-income households in Haripur. Six out of 10 respondents with gas connections in Haripur said they used wood during winter gas shortages. Most of them said they could simply venture out and chop wood themselves for no cost. That is why insight and perspective from the Forest Department was considered important in the district.

[23] The charity kitchen in question was first established in Karachi around two decades ago. It now operates in nearly three dozen locations across four cities. It provides free meals every day to more than 10,000 citizens in need.

Our staff is directly affected by this gas shortage too. When we are about to leave for home after feeding people here, we get phone calls from family to buy food on the way home because of the gas shortage. I often have to come to office without the morning tea due to gas absence. If that is what we face, others would be faring worse.

Like other citizens who can afford them, we feel compelled to buy LPG cylinders. This comes with the risk of whole buildings collapsing if substandard cylinders explode. Companies that are authorised to sell cylinders should be made to observe standards.

Those making substandard cylinders and those turning a blind eye to that would wake up only when one such cylinder explodes in their homes. How can we the citizens know which cylinders are safe and which we should avoid?

In my 72 years of life, our gas lines have not been upgraded once even as population has grown exponentially. Until a few decades ago, a single or at most double-storey structure housed 12 to 15 residents. Now in the same place, a multi-storey building has risen with 150 people living there."

Key findings

This section comprises the important findings based on the research and data analysis. It is important to emphasise that in view of the small survey sample size, the findings may not be generalized to assume overall national trends. They do, however, represent and offer insight into the varied views, choices and impacts with regard to the natural gas crisis in multiple locations across the country.

Scale and impact

- The argument for the use of natural gas as the go-to energy resource was built around assumptions about low cost, plentiful indigenous reserves and illusions of gas being a relatively clean fossil fuel. None of those assumptions hold true in Pakistan today.
- The winter gas shortages in the late 2022 and early 2023 were clearly more acute compared to previous winters. All sectors were affected, including industrial, commercial and domestic consumers. The cyclical gas shortage that had been occurring every winter was no longer seasonal; it had become a phenomenon lasting throughout the year
- The gas shortages have a direct and substantial impact on the health, education and financial wellbeing of low-income families. Since their low purchase power is no match for historic high inflation, these families are exposed to vulnerabilities that routinely go wholly unaddressed.
- The heightened winter gas demand is mainly on account of greater heating needs. Low-income households try to adjust their traditional gas consumption patterns in the face of shortages. In Pakistan, natural gas remains the universally preferred fuel for cooking, but not for heating due to low pressure and long outages. Low-income families appear to have consciously decided to skip heating their homes or water either with gas or alternative fuels, with the former being consistently scare and the latter costing too much. Many consumers are also cautious to keep their use of gas for cooking in check for fear of high usage attracting a higher tariff slab. Such choices, including avoiding heating, undermine the disease-prevention ability of low-income families.
- Unusually prolonged gas outages have made access to affordable fuel alternatives for the borderline poor households all the more crucial. It was a challenge even when the shortages were confined to around four months of winter. With gas scarcity occurring

throughout the year now, low-income families face in the form of alternative fuels a constant drain on their resources.

- Low-income consumers find coping difficult in particular as gas shortages are worsening amid a quadruple whammy of historic high inflation, severe drop in foreign exchange reserves that making fuel imports very expensive and at times near impossible, and the high demand and depletion of gas reserves occurring at unprecedented pace. Difficult decisions and compromises on health and education are becoming inevitable for low-income households.
- A particular environmental impact of the gas shortages in regions close to natural forests is that poor families often seek to obtain firewood free of cost as an alternative to gas. Any response to the potential impact on the natural fauna and flora in these regions appears to be neither focused nor proactive.

Access and preferences

- The natural gas consumers surveyed for this study largely did not feel they had much choice in terms of alternatives. They argued that their fuel preferences or the reasons for those preferences did not matter, as they largely had to make do with any alternative fuel among the available ones that they could afford.
- There is class distinction in who can afford and access natural gas and alternative fuels. In a high inflationary environment, where consumers' purchasing power is being eroded fast, low-income families have to allocate a sizeable portion of their monthly income to securing cooking fuel. This study noted that the combined cost of cooking fuel, both natural gas and alternatives, hovered around a quarter of a low-income family's earnings, leaving little room for expenses on education, health, food, rent, transportation and other utility bills. In circumstances where savings are difficult, the winter shortages drain low-income households of whatever little saving they manage through the whole year.
- The choice of alternative fuels becomes rather limited as none of the alternatives to natural gas are cheap when demand rises. Neither are all constantly or universally available. Not everyone knows how to cook food with wood, which is not conducive for use in confined urban lodgings but in more airy or open spaces.
- The households that struggle to afford the substantially subsidised gas cannot afford much more pricey alternatives. The natural gas subsidy that had acted as the proverbial lifeline for economically challenged households no longer shields the consumers forced by the

scarcity to seek alternatives in a competitive sellers' market, where affordability alone determines access. Everyone joins the same queue without any safety net, amid high winter demand while the supply is either genuinely scarce, or a shortage is artificially created in order to push up prices and maximise profits.

Responses

- While the gas crisis has aggravated over time, sustainable responses of requisite scale or urgency have been largely non-existent.
- Either due to serious lack of awareness or being in a state of denial, many consumers from low-income families labour under the illusion that plentiful and cheap gas would somehow magically become available for domestic consumers in perpetuity if allocations to various sectors were managed better. The consumers seldom refer to the proverbial elephant in the room—the growing demand for domestic consumers amid unchecked population growth and dwindling reserves.
- The solutions suggested by the survey respondents ignore the urgency to abandon fossil fuels in a bid to mitigate the climate crisis that they have spawned. Low-income consumers are so desperate to meet their day-to-day energy needs that many are willing to use almost any cheap fuel that was convenient, whether it is clean or not.
- Low-income consumers often seem to believe that fuels that do not release visible fumes are clean and environment-friendly. The most widely used alternatives to natural gas are other fossil fuels, mainly LPG, and to some extent coal. Consumers' perception of LPG as a clean fuel is also based on lack of visible fumes when LPG is used. A considerable portion of national LPG needs are met through imports. Even at the policy level, the use of such fossil fuels is discussed in terms of loss of foreign exchange through imports, but seldom in terms of environmental damage and its cost to the climate.
- As is not entirely surprising amid severe economic challenges, rather than looking at the big picture, the imaginations of many respondents as well as several key informants has been limited to self-interest. Their suggested solutions to the increasing gas shortage include a separate or bigger pipeline for their locality, priority allocation to domestic consumers, free or subsidized LPG cylinders. Asking charity organisations to step forward or government to subsidise fossil fuel-based alternatives does nothing more than put a band-aid on the issue and address symptoms, paying little attention to the acute and

growing supply shortfall or indeed the key role of fossil fuels in aggravating global warming and the climate crisis.

- The fact that the victims of energy poverty are generally not even demanding clean and sustainable renewable resources highlights the need for raising awareness about the possibilities to respond to the gas crisis in a sustainable manner. As this research has noted, suggestions to pursue renewables, mainly solar, coming from the provincial capitals, demonstrates that more aware consumers demand responses that are sustainable and go beyond the usual knee-jerk reactions.

Conclusion

Over the past decade, Pakistan has become accustomed to recurring winter gas shortages. Yet 2023 would be remembered as the year when this seasonal dearth snowballed into yearlong scarcity.

From industry to the CNG sector, power generators and domestic consumers, all are scrambling to adjust to gas unavailability for long hours outside the winter season now.

But none are more severely affected than millions of low-income families. The shortages have pummeled their budgets and eaten into their savings, as households make difficult decisions to divert resources towards alternatives amid absence of their preferred and relatively affordable cooking fuel.

It is no exaggeration to say that the gas shortages in the winter, and now during other seasons, have snatched away the safety net that subsidised natural gas offered to the poor.

To put the expanding shortages into perspective, almost all families surveyed for this study spoke of already making adjustments to how they used natural gas. With up to a quarter of their monthly income spent on paying for the gas bill and alternative fuel, low-income families found it difficult enough to cope for a few winter months. The shortages and the cost of alternative becoming a constant additional drain on their meagre income is simply not sustainable. Consequently, low-income families are having to making difficult decisions that have serious implications not just for their financial security but also their health and their children's education.

This crisis has not befallen Pakistan overnight. For years, we have heard government ministers and other officials speak of around 9% yearly decline in the country's known gas reserves. Spiking demand, on the back of a fast growing population, has doubtless contributed to this situation. The ultimate responsibility for corrective steps lies with the decision makers, who have largely chosen to remain mere spectators as the periodic shortages have today morphed into a constant predicament.

It is one thing to say that responses to the aggravating challenge have been inadequate, and quite another to note lack of enthusiasm or appetite for meaningful and proactive measures to remedy the situation.

Issues of sustainable access to energy for all citizens must no longer be overlooked amid a continuous and steep decline in natural gas availability. It is only well past time that dwindling supply—if not pursuit of clean energy—forced Pakistan to urgently seek alternatives resources. It would be wise to act without further delay and use the opportunity presented by the gas shortages, and the energy crisis in general, to expediate a national push towards renewable energy. Such a transition is neither going to be easy, nor cheap or quick.

To state the obvious, access to affordable cooking and heating is essential for meeting basic human needs; it must not become a luxury reserved only for the wealthy. Yet, past practice makes it seem almost certain that low-income households would be faced with considerable turmoil ahead of and during such a transition. Unless the shift is just, or if such a transition largely comes down to subjective affordability, there is no question that those left behind would be even worse off than they are today.

Recommendations

In examining the impact of the winter gas shortages on low-income families, many aspects are difficult to ignore. Although the authorities' failure to take timely measures bears much of the responsibility for the critical energy situation today, sustainable remedies would depend not only on the actions and attention of the authorities. Preventing further deterioration and turning things around would need sustained and collaborative efforts and resolve of all stakeholders.

The stakeholders should consider implementing the following key recommendations to help overcome the impact of the natural gas shortages on low-income households:

For the government

- Adopt a clear approach towards not just natural gas but all energy resources — whether decarbonised or otherwise — and ensure that access is not determined by affordability alone. The approach should be inclusive in spirit, focusing on actively dealing with unequal access and scaling up targeted social protection to help the most vulnerable.
- Take active steps towards a diversified energy mix that includes renewables and reduces overwhelming reliance on a single or a few energy sources and enhances overall energy security.
- Implement energy-efficient measures and technologies to reduce natural gas demand and mitigate shortages. These steps should include adoption of energy-efficient practices in industries, buildings, and transportation systems through incentives, regulations, and public awareness campaigns.
- Develop comprehensive, long-term gas management plans that consider factors such as population growth, economic development, and environmental sustainability. These plans should prioritize energy diversification, efficiency, and sustainability while addressing the specific national energy needs and resources. Systematically upgrade aging infrastructure and curb energy theft, wastage or other losses
- Involve all relevant stakeholders, including energy companies, environmental groups, local communities and industry representatives, in energy policy discussions and decision-making processes. Collaboration and dialogue can help identify innovative solutions and ensure broad support for energy initiatives.
- Encourage the development of decentralized energy systems, such as microgrids and off-grid solutions, particularly in remote or underserved areas to reduce reliance on natural gas or any other singular resource. These systems could utilise localised renewable energy

sources and reduce strain on centralised grids, improving energy access and resilience in remote regions.

- Collaborate with neighbouring and other countries to not only establish energy-sharing arrangements to mitigate natural gas supply-demand imbalances but also exchange of technological knowhow to indigenously develop renewable energy capabilities.

For civil society

- Conduct awareness campaigns to educate the public about the causes, impact, and potential solutions of natural gas shortages. Raise awareness about energy conservation, alternative energy sources, and efficient energy practices that can help mitigate the effects of shortages. Offer workshops, training sessions, and educational materials to promote energy-saving practices and help consumers reduce their natural gas consumption.
- Collaborate with government agencies and gas utilities to provide input and expertise on managing gas shortages. Advocate for policies that prioritize energy efficiency, renewable energy, and infrastructure development to ensure a reliable and diversified energy supply.
- Identify and support vulnerable populations who may be disproportionately affected by natural gas shortages. Collaborate with local social service organizations to provide assistance, such as distributing emergency kits, connecting individuals with energy assistance programs, or organizing community support networks.
- Conduct research and analysis on energy policies, regulations, and market dynamics related to natural gas shortages. Provide evidence-based recommendations to policymakers on strategies to improve energy security, diversify energy sources, and enhance the resilience of energy systems.
- Engage in advocacy efforts to influence policies and regulations that address natural gas shortages. Raise public awareness through media campaigns, public forums, and community events to foster a broader understanding of the importance of energy conservation, renewable energy, and long-term energy planning.
- Collaborate with other civil society organizations, environmental groups, and energy-focused NGOs to share knowledge, resources, and best practices. Establish networks and partnerships to amplify collective efforts in managing natural gas shortages and promoting sustainable energy solutions.
- Monitor and assess the actions taken by governments and gas utilities to address natural gas shortages. Hold them accountable for implementing effective measures and ensuring transparency in decision-making processes related to energy planning and management.

THE KNOWLEDGE FORUM

Annex I

Survey: impact of winter gas shortages on domestic consumers

Survey ID: _____ Date: _____

About the respondent

Name *(optional)*: _____ Gender: _____ Age: _____
Education: _____ Occupation: _____
Locality: _____ District: _____

About the household

Total members of respondent's household: _____

Number of earning members of the household: _____

Combined monthly income of all members of the household: _____

Is the respondent an earning member of the household? ☐ Yes ☐ No

Background

The Knowledge Forum (TKF) is conducting this research to understand the social, economic and health impact of winter gas shortages on low-income households, who depend on gas supply for their cooking and heating needs. The research also studies the various ways in which the households try to deal with the winter gas shortages.

All fossil fuels, including oil, coal and gas, produce gases that cause global warming and contribute to climate change. With the effects of climate change making life difficult across the globe, more and more countries are increasingly looking to switch to clean and environment-friendly energy sources.
There has been some movement towards that in Pakistan as well. A grasp of the factors and circumstances of various segments, especially of low-income households, is crucial for promoting clean and environment-friendly energy transition for all in a just manner.
The information gathered through this survey would help the TKF formulate a report on the impact of winter gas shortages on low-income urban communities and their coping mechanisms. The report would be used for advocacy for movement towards sustainable and just transition to clean energy sources. The report will not include any **information** that can identify a respondent by name.

Request for consent

Do you give consent to the TKF utilizing the information you provide through this survey for the purposes of research and use in the report?

☐ Yes. I give my consent
☐ No. I do not give my consent

THE KNOWLEDGE FORUM

Section 1: Access & preference **(5 questions -- Approx 3 minutes)**

1. How long have you had a natural gas connection as a domestic consumer? *(Select **only one option**)*

(a) ☐ Less than a year
(b) ☐ Longer than a year
(c) ☐ Longer than five years
(d) ☐ Longer than 10 years

2. How easy was it for you to get that gas connection? *(Select **only one option**)*

(a) ☐ Very easy
(b) ☐ Easy
(c) ☐ Difficult
(d) ☐ Nearly impossible
(e) ☐ I live in rented accommodation/ gas connection was already there when I moved

3. Is natural gas your preferred fuel for:

(a) Cooking ☐ Yes ☐ No
(b) Heating ☐ Yes ☐ No

4. Why, or why not? _____
_____

5. As a domestic consumer, do you consider natural gas as a fuel to be:

(a) Affordable ☐ Yes ☐ No
(b) Reliable ☐ Yes ☐ No
(c) Safe ☐ Yes ☐ No
(d) Clean/ environment friendly ☐ Yes ☐ No

Section 2: Scale & impact of winter shortages **(18 questions -- Approx 10 minutes)**

6. In how many of the past five years has your household experienced gas shortages in the winter?

☐ 1 year ☐ 2 years ☐ 3 years ☐ 4 years ☐ 5 years

7. Do gas shortages in the winter affect your household routine?

☐ Yes ☐ No

8. If yes, how serious is the impact of the gas shortages on your household routine? *(Select **only one option**)*

(a) ☐ Mild
(b) ☐ Moderate
(c) ☐ Severe

9. Do you face any social impact due to the winter gas shortages?

☐ Yes ☐ No

10. If yes, please share brief detail of the social impact: _____
_____

11. Do you face any economic impact due to the winter gas shortages?

☐ Yes ☐ No

12. If yes, please share brief detail of the economic impact:_____
_____

13. Have winter gas shortages resulted, directly or indirectly, in you or a family member losing any income or even a job/employment?

☐ Yes ☐ No

14. If yes, please share brief details:_____ _____
_____

15. Do gas shortages in the winter affect your household budget?

☐ Yes ☐ No

16. If yes, to what extent is your household budget impacted? *(Select **only one option**)*

(a) ☐ To some extent
(b) ☐ To a moderate extent
(c) ☐ To a great extent

17. On average, how much is your monthly natural gas bill during the winter months?
Rupees_____

18. During the winter, your monthly gas bill amount is: *(Select **only one option**)*

☐ Similar to billed amount in the summer months
☐ Less than billed amount in the summer months
☐ More than billed amount in the summer months

19. On average, what amount do you spend every month to buy alternative fuel during gas shortages in the winter?
Rupees _____

20. Do winter gas shortages have any direct impact on your family's health?

☐ Yes ☐ No

21. If yes, please share brief detail: _____

22. Do winter gas shortages affect the routine of your family members that go to work or school?

☐ Yes ☐ No

23. If yes, how?_____

_____

Section 3: Responses & alternatives **(12 questions -- Approx 7 minutes)**

24. In what different ways do you deal with gas shortages in the winter? *(Select **all options that apply**)*

(a) ☐ Change your sleeping hours
(b) ☐ Change meal preparation times
(c) ☐ Prepare meals once instead of multiple times
(d) ☐ Refrigerate cooked food
(e) ☐ Buy cooked food
(f) ☐ Change water heating timing
(g) ☐ Use an alternative fuel/ energy source
(h) ☐ Buy cooking/heating devices that do not use gas
(i) ☐ Other (please elaborate) _____

_____

25. What is the cheapest alternative fuel that is easily available during winter gas shortages in your city?

_____

26. What alternative fuel do you prefer to use during gas shortages in the winter? *(Select **all options that apply**)*

(a) ☐ Electricity from grid
(b) ☐ LPG
(c) ☐ Solar
(d) ☐ Coal
(e) ☐ Firewood
(f) ☐ Other (please explain) _____
(g) ☐ None

27. Why do you prefer to use that particular alternative fuel/s? _____

_____

28. Compared to the natural gas price, is the monthly cost of your alternative fuel choice: *(Select **only one option**)*

(a) ☐ Much cheaper than gas

(b) ☐ Cheaper than gas
(c) ☐ About the same as gas
(d) ☐ More expensive than gas
(e) ☐ Much more expensive than gas

29. What is the main determining factor in your choice of alternative fuel during gas shortages? *(Select **only one option**)*

(a) ☐ Availability
(b) ☐ Cost
(c) ☐ Safety
(d) ☐ Environmental impact / Clean fuel
(e) ☐ Other (please explain) _____

30. Do you see any effective official efforts or evidence during the rest of the year to prevent gas shortages in the winter?

☐ Yes ☐ No

31. If yes, please briefly describe such efforts or evidence: _____
_____
_____

32. Given the current national financial challenges and energy needs, do you see any practical steps that the authorities can urgently take to end winter gas shortage in the next few years?

☐ Yes ☐ No

33. If yes, please briefly describe such steps: _____
_____

34. Do you think the government should consider alternatives fuels/ sources of energy as a way to overcome gas winter shortages for domestic consumers?

☐ Yes ☐ No

35. In your view, what alternative sources of energy at the domestic consumer level may be most practical and affordable in Pakistan's current financial and technological circumstances?

_____
_____