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**A COMPARISON OF ACCESS OF COOKING FUELS IN INDIA AND
OTHER NATIONS**

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ABSTRACT:

With the increase of emission of greenhouse gases, like Carbon-dioxide and Methane, the planet is about 1.1°C warmer than in 1800s and the last decade recorded the warmest. One of the factors of increase in greenhouse gases is due to the CO₂ emitted by cooking fuels. Due to the traditional cooking fuels, a deep scar was left implicated on the world in the field of environment. But now, the world is transiting it by using the alternative source of energy like CNG, Biogas, and LPG, which will not cause harm to the environment. These alternative cooking fuels as a form of clean energy is currently the talk of the show as it emits very little or no greenhouse gases and air pollutants. Most of the developed nations along with some developing countries have achieved a 100 percentage access to clean cooking fuels whereas India has only 68 percentage. Though the usage of LPG has rapidly grown up in India, it still has many short-comings.

This paper undergoes non doctrinal research methodology about the awareness of an individual citizen about clean cooking fuel. It also analyses what governmental policies and schemes are provided by the Government of India to provide clean cooking fuel to the citizens along with its shortcomings. Our paper mainly focuses on why India could not achieve a maximum result in providing clean cooking fuel to the citizens and what it lacks comparing to other nations.

Keywords: Cooking Fuel, Clean Energy, Liquefied Petroleum Gas (LPG), Greenhouse gases

INTRODUCTION

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A cooking fuel is one which is used for heating and cooking of foods. The word “clean cooking fuel” denotes the fuels which contains the prescribed values of fine particulate matter (PM_{2.5}) and carbon-monoxide (CO) in them as given by the WHO guidelines for indoor air quality: Household fuel combustion, 2014. The classification of fuel as clean is made when

- either the annual average air quality guideline level (AQG, 5 µg/m³) or the Interim Target- 1 level (IT1, 35 µg/m³) for PM_{2.5}; and
- either the 24-hour average air quality guideline level (AQG, 4 mg/m³) or the Interim Target-1 level (IT-1, 7 mg/m³) for CO

Clean cooking fuel such as Natural gas, biogas, liquefied petroleum gas (LPG) and e-cooking fuel like electricity based induction stove and microwave-oven emits very low level of air pollutants like the particulate matter and carbon-monoxide compared to the traditional sources of cooking fuel such as burning firewood, kerosene, charcoal, coal and crop wastes. The higher the release of air pollutants, the higher is the increase in greenhouse gases which result in global warming. Almost 3 billion people in the world uses the solid fuels like firewood and coal and highly polluting stoves for cooking and heating their foods where nearly 4 million people dies a premature death due to cardiovascular & respiratory diseases and cancer². The emission of Household air pollutants (HAP) by burning traditional sources of fuel causes the environment to be in a critical situation and it can be reduced greatly by using clean cooking fuels.

STATEMENT OF PROBLEM

- 1) Whether the public has access to clean cooking fuel over the traditional cooking fuels in India?
- 2) Whether the programmes and schemes provided by the government provide a transition towards clean cooking fuel?
- 3) Whether the public has awareness about the programmes and schemes implemented by the government?

²WHO indoor air quality guidelines: Household fuel consumption – 2014, World Health Organization,(Feb 21, 2014, 09.55 AM), apps.who.int/iris/bitstream/handle/10665/141496/9789241548885_eng.pdf?sequence=1&isAllowed=y

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- 4) What measures can be taken to achieve a 100% access by the people towards clean cooking fuel?
- 5) What is the gap between India and other developed or developing or under-developed nations that provided a 100% access to clean cooking fuel to its people?

REVIEW OF LITERATURE:

1. Household cooking fuel choice and adoption of improved cookstoves in developing countries: a review by Sunil Malla, Govinda R Timilsina

The types of cooking fuel that are used in households can be categorized as Traditional cooking fuel such as animal dung, agricultural residues, fuelwood, Intermediate cooking fuel such as wood pellets, charcoal, briquettes, lignite, coal, kerosene and Modern cooking fuel such as solar, LPG, biogas, natural gas, electricity, gel fuel, plant oils and dimethyl ether based on typical level of energy management. These cooking energy types are sometimes referred to as "primary" and "secondary" depending on how they are created or extracted. Natural resources including fuelwood, agricultural waste, animal manure, coal, solar energy, and natural gas are used directly to produce primary energy. Petroleum products (kerosene, LPG, and dimethyl ether) from crude oil, ethanol from sugar cane, charcoal and wood pellets from fuelwood, biogas produced from animal dung and agricultural waste, electricity produced from the combustion of fossil fuels, and electricity from renewable energy sources like solar, hydro, and wind are examples of secondary energy types that result from the transformation of primary energy types³.

2. Fuel switching: evidence from eight developing countries by Rasmus Heltberg

Modern cooking fuels can have a positive impact on health, productivity, and environment. Yet spontaneous fuel switching does not happen as frequently anticipated. The research study uses comparable household survey data from Brazil, Ghana, Guatemala, India, Nepal,

³Sunil Malla, Govinda R Timilsina, Household cooking fuel choice and adoption of improved cook stoves in developing countries: a review, The World Bank Development Research Group Environment and Energy Team June 2014, (Jun 18, 2014, 11.30 AM), openknowledge.worldbank.org/server/api/core/bitstreams/f876247c-e8ac-5216-8efa-ec9e64fb2ae9/content, at 8

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Nicaragua, South Africa, and Vietnam to analyse the factors that affect household fuel usage and fuel switching. An interesting finding is the close relationship between electrification and uptake of modern cooking fuels⁴.

OBJECTIVES:

- 1) To find the level of awareness the people have on clean cooking fuel.
- 2) To find about the level of access of clean cooking fuel by the people.
- 3) To know the impact of governmental schemes and policies on clean cooking fuel.
- 4) To suggest measures that can be used to make people get access to clean cooking fuel.
- 5) To compare India with other nations and calculate its shortcomings.

METHODOLOGY

The research paper has followed Non-doctrinal or Empirical research methodology. Empirical or Non-doctrinal research is an enquiry to assess the impact of non-legal events upon legal decision process or to identify and appraise the magnitude of the variable factors influencing the outcomes of legal decision making.

The methods like observation, interview, questionnaire, survey and case study are generally used under non-doctrinal research method. In this research paper the data has been collected and computed through questionnaire.

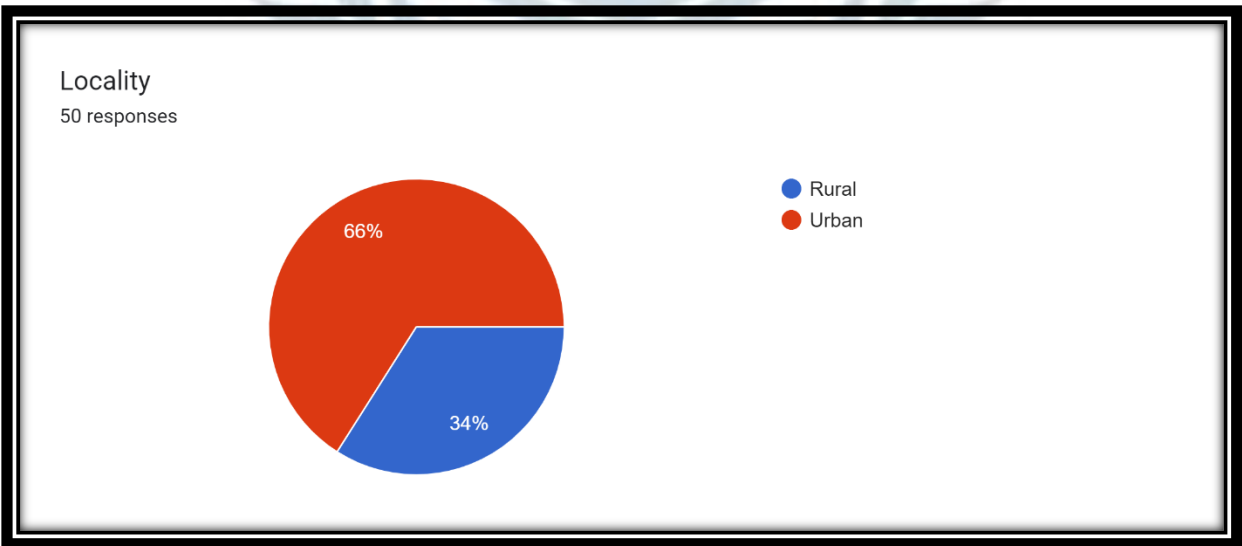
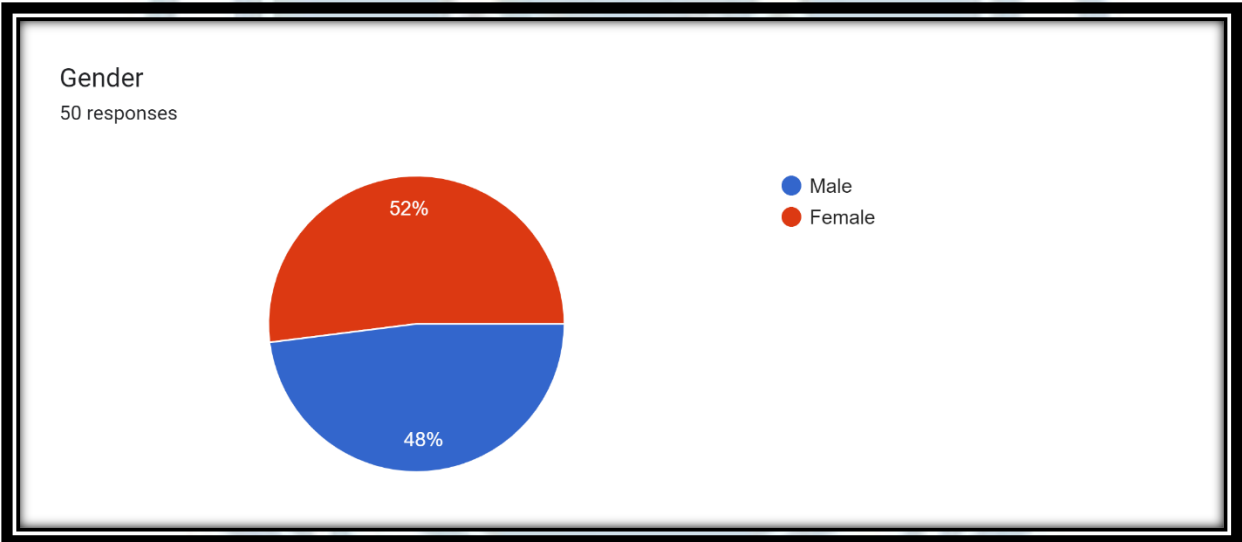
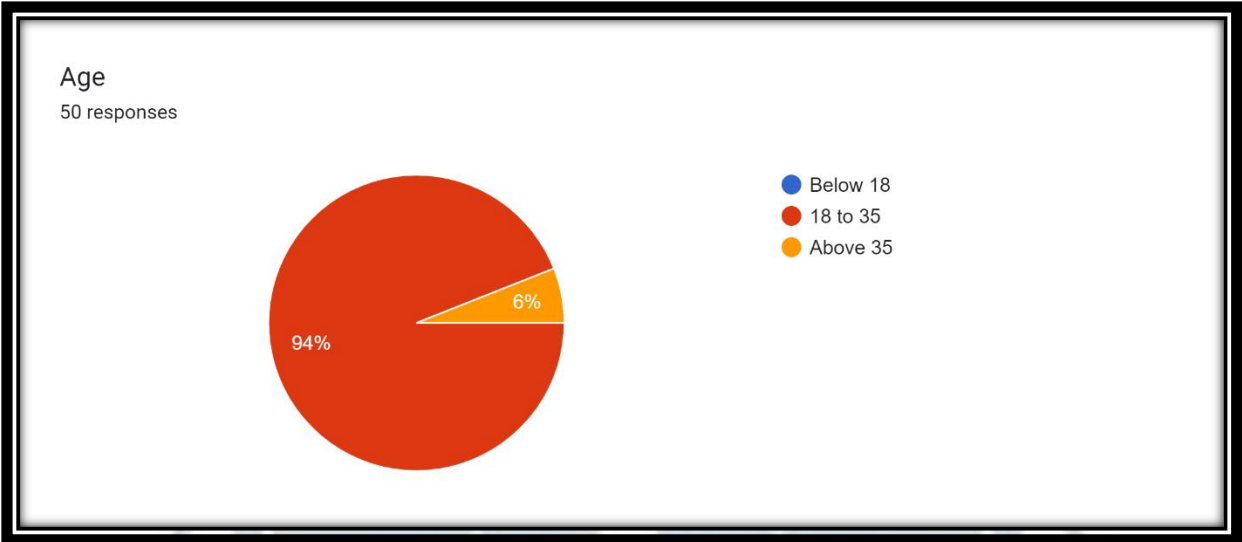
A survey was conducted among 50 respondents, among which 24 are male and 26 are female. 47 people are under the category of 18 to 35 years of age and 3 people are under the category of above 35 years of age. 33 are from urban area and 17 are from rural area.

Chart 1: Composition of the Respondents:

⁴Rasmus Heltberg, Fuel switching: evidence from eight developing countries, Science Direct, (Sep 15, 2004, 11.40 AM), doi.org/10.1016/j.eneco.2004.04.018

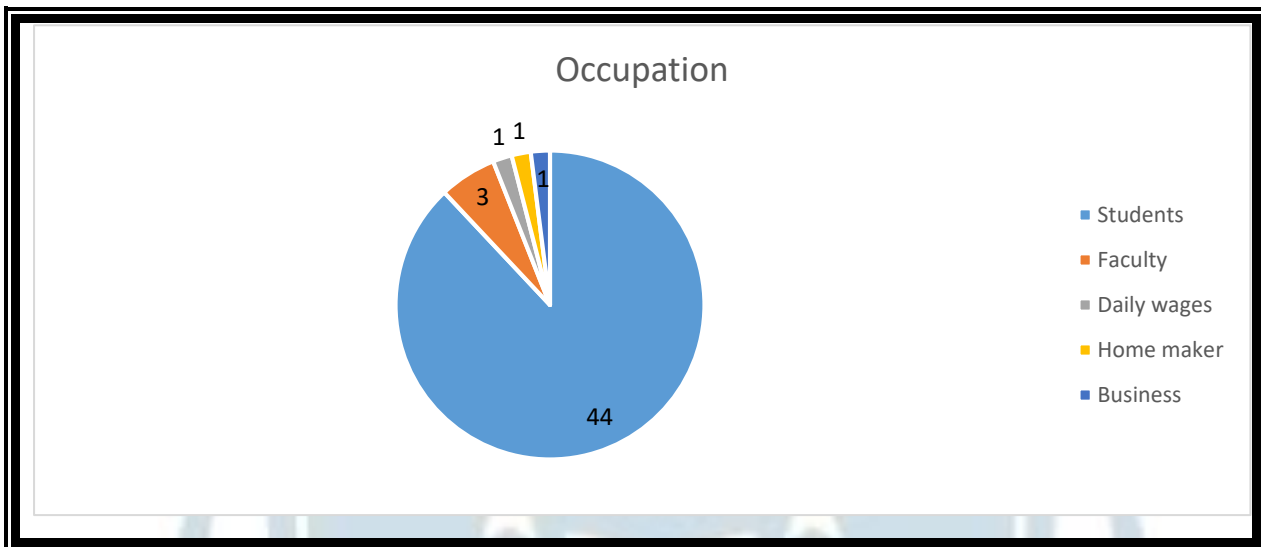
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SIGNIFICANCE:

- 1) This research provides a view on the awareness of the people on the topic of clean cooking fuel.
- 2) It submits on measures that can be taken to transit India to achieve the goal of providing clean cooking fuel to everyone.
- 3) It focuses on the mindset of people about clean cooking fuel and its advantages and shortcomings.
- 4) It proposes how well the people are aware about the governmental schemes and policies.
- 5) It states about why India cannot achieve a 100% access to provide clean cooking fuel to its citizens.
- 6) It explains about what the country lacks compared to other nations in providing clean cooking fuel.

LIMITATIONS:

- 1) The study period of this research is very short. The duration of the research is only one month.

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- 2) This paper has a sample size limited only to Chennai city and its outskirts in the state of Tamil Nadu in India. It cannot be emphasized to the whole of India.
- 3) This paper has no respondents below the age of 18.
- 4) The sample space is only 50 respondents. This is only a limited one.
- 5) This paper has a great number of urban locality than rural locality.
- 6) This paper has mostly students as the respondents.

HYPOTHESIS:

- 1) The traditional sources of cooking fuels are still preferred and used by the people.
- 2) The various schemes and projects introduced by the Government to provide clean cooking fuel to its citizens are not being implemented effectively.
- 3) The socio – economic factors in India is the major reason for non-access to clean cooking fuel.
- 4) There is lack of awareness on the usage and accessibility of clean cooking fuel among the citizens of India.

RESEARCH AND ANALYSIS:

THEORETICAL FRAMEWORK:

1) CLEAN COOKING FUEL – A NEAR POSSIBILITY:

From the average monthly per capita expenditure, people of rural area spend 8% of their expenditure towards fuel and light. The people of urban area spend 6.7% of their income towards the same⁵. The factors like established tradition, gender norms, income of an individual plays a very crucial role in deciding the cooking fuels used in households. Urban India has made significant progress on switching to cleaner cooking fuels, with 68.4% of houses using LPG. In urban areas, the percentage of people who rely on firewood and chips for cooking has decreased from about 22.3% in 1999-2000 to 14.0% in 2011-12 with a remarkable decrease of 8.3%, while the percentage of people who rely on kerosene has decreased from 21.7% to 5.7% over the same time period. On the other hand, more urban

⁵Government of India, Ministry of Statistics and Programme Implementation, National Sample Survey – 68 Round, (Mar 25, 2019, 10.02 AM), microdata.gov.in/nada43/index.php/catalog/126

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households now use LPG that is, the percentage increased to 68.4% in 2011-12 from 44.2% in 1999-2000⁶. The efforts taken by the government are promising yet the rural population tends to use firewood and traditional cooking stoves for cooking, owing to its free access and availability, though they use LPG in their houses too.

2) ACTIONS TAKEN BY THE GOVERNMENT:

➤ *Pradhan Mantri Ujjwala Yojana (PMUY):*

The Pradhan Mantri Ujjwala Yojana (PMUY) is a scheme provided by the government of India for the purpose of safeguarding the health of women and children by providing them with LPG, a clean cooking fuel which is an alternative for the smoky kitchens and reduces their burden of wandering in unsafe area to collect firewood.

It was launched on May 1, 2016 by Hon'ble Prime Minister of India, Mr. Narendra Modi at Ballia in Uttar Pradesh. The target of the scheme was to provide 8 crore LPG connections to below poverty line (BPL) households, identified by the Socio Economic Caste Census Data, with a support of Rs. 1600 per connection by the end of March, 2020. The connections were issued in the name of women, to ensure women empowerment especially in rural India. A fund of Rs. 8000 crores was allocated for this scheme. The release of 8 crore LPG connections to those BPL households helped in increasing the LPG coverage from 62% on May 1, 2016 to 99.8% on April 1, 2021⁷.

Ujjwala 2.0 made an additional allocation of 1.6 crore LPG connection with a special facility to migrant workers under the PMUY scheme.

➤ *New National Biogas and Organic Manure Programme (NNBOMP):*

This is a programme initiated by the Ministry of New and Renewable Energy of Government of India with the objective to provide biogas, a clean cooking fuel for cooking, lighting and thermal and small power needs of individual households and to improve the organic manure

⁶ Jyoti K. Parikh, Ashutosh Sharma, Chandrashekhar Singh and Shruti Neelakantan, Providing Clean Cooking fuel in India: Challenges and Solutions, International Institute of Sustainable Development, (Apr 20, 2016, 08.55 AM), iisd.org/system/files/publications/clean-cooking-india-challenges-solutions_0.pdf

⁷Government of India, Ministry of Petroleum and Natural Gas, (Mar 21, 2022, 09.55 Am), pmuy.gov.in/about.html

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system based on bio-slurry from the biogas plants in rural and semi-urban areas by setting biogas plants of 1 to 25 Metric capacity⁸.

The Ministry set up a target of setting 65,180 biogas plants in India for the year 2017-18, under the NNBOMP. Under this programme about 49.6 lakh household size biogas plants are installed till now. Under this scheme, the Ministry has also introduced new biogas plant design such as floating design Shakti Surabhi Model, Solid-State Deenbandhu design model of biogas plants⁹.

These installation of biogas plants benefits the society by reducing the toiling of women and children in search of firewood, especially in rural areas and helps in mitigating the traditional cooking stoves and cooking fuels that causes health hazards. It helps in reducing environmental degradation and emission of air pollutants which increases the greenhouse gases. It greatly reduces indoor air pollution and saves the cost of refilling LPG.

➤ *Programme for converting used cooking oil into fuel:*

The Ministry of Petroleum and Natural gas (MPNG) launched the Programme for converting used cooking oil into fuel in 100 cities of India on August 2019. Under this programme, the three state run oil marketing companies namely the Indian Oil, Bharat Petroleum and Hindustan Petroleum would procure bio-diesel, a green fuel from the used cooking oil, which can also be used for natural gas stoves.

Around 2700 crore litres of used cooking oil is consumed in India where 140 crore litre can be collected from bulk consumers such as restaurants and hotels and 110 crore litre of fuel

⁸Government of India, India Science Technology and Innovation, (Jan 14, 2022, 09.45 AM), indiascienceandtechnology.gov.in/programme-schemes/societal-development/new-national-biogas-and-organic-manure-programme-nnbomp#:~:text=The%20objective%20of%20the%20scheme,areas%20by%20setting%20up%20of

⁹Press Information Bureau, Government of India, Ministry of New and Renewable Energy, (Mar 22, 2018, 10.35 AM), pib.gov.in/newsite/PrintRelease.aspx?relid=177871

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can be made from it. The aim of this programme is to blend 5 percent of bio-diesel in diesel by the end of 2030, requiring 500 crore litre of diesel every year¹⁰.

As an extension, The Tamil Nadu government also implemented the Scheme for Convert Used Cooking Oil into Fuel by Recycling in the district of Karur¹¹.

3) COMPARISON OF OTHER NATIONS AND INDIA:

Other developed nations have achieved a 100% access to clean cooking fuel owing to their small population and active participation of government on educating them about the ill-effects and harm caused by the traditional cooking fuels. Being less populated, those governments have enough funds and resources to make this possible. Developing countries like Lithuania and Hungary achieved this owing to the same reason.

In India, people tend to use biomass for cooking still now. Though India had achieved a huge progress in bringing electricity to every rural and urban household, there are 80 million people without clean cooking fuel over the past 15 years. Only 1% of households use improved biomass cook stoves after 3 decades of government's programmes to distribute them¹².

ANALYSIS:

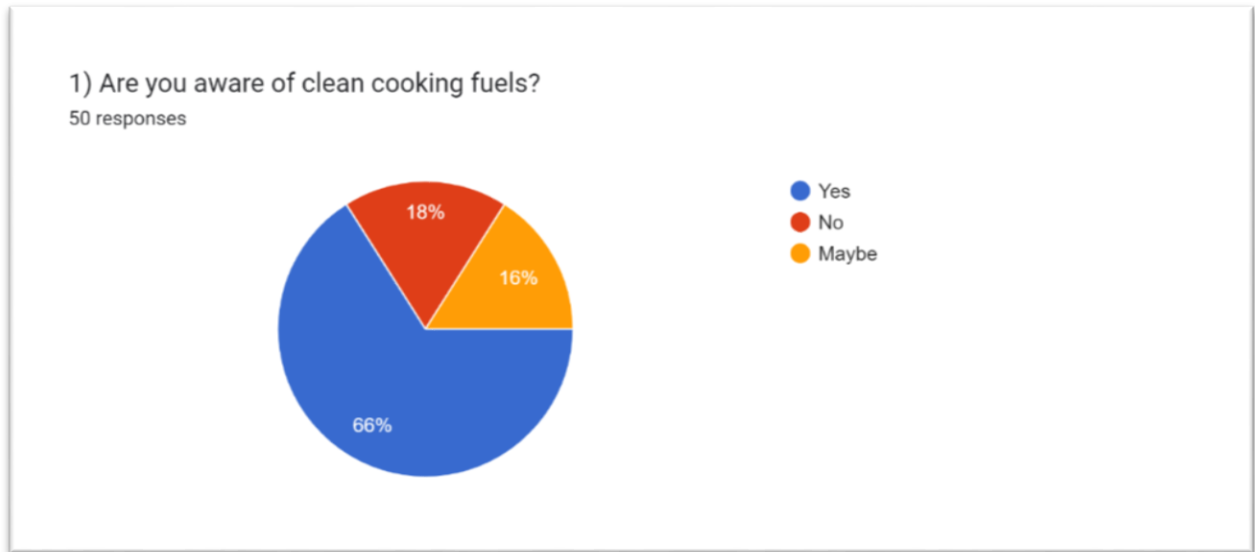
Chart 2: Knowledge of respondents about clean cooking fuel

¹⁰Press Trust of India, Government launches programme for converting used cooking oil into biodiesel in 100 cities, The economic times, August 10, 2019, at 1.

¹¹ Government of Tamilnadu, Karur District, (Aug 17, 2018, 10.50 AM) karur.nic.in/scheme-for-convert-used-cooking-oil-into-fuel-by-recycling-17-08-2021/

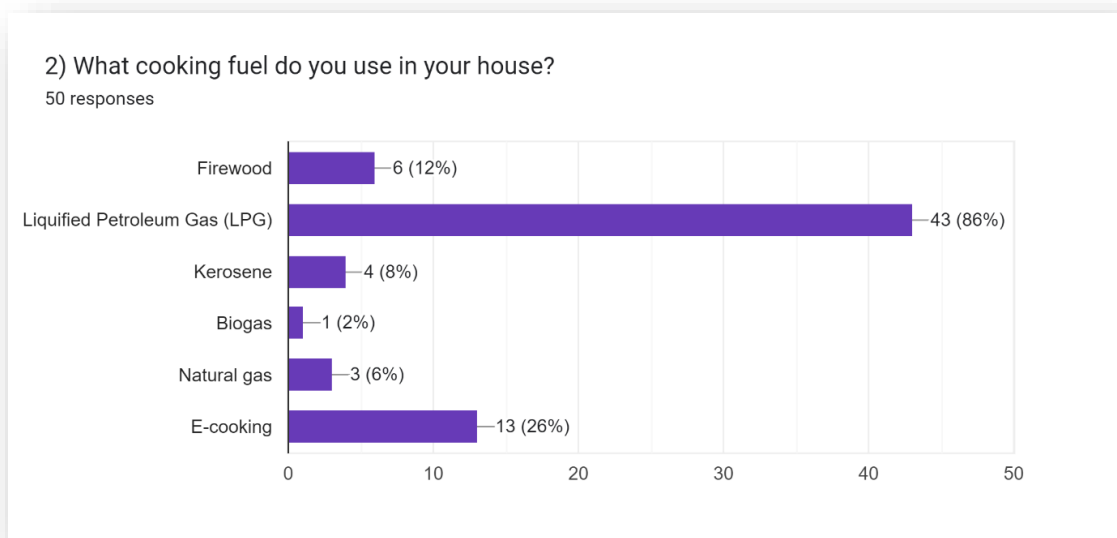
¹² Energy access outlook of 2017, International energy agency, (Oct 19, 2017, 09.45 AM), [iea.blob.core.windows.net/assets/9a67c2fc-b605-4994-8eb5-29a0ac219499/WEO2017SpecialReport_EnergyAccessOutlook.pdf](https://www.iea.org/assets/9a67c2fc-b605-4994-8eb5-29a0ac219499/WEO2017SpecialReport_EnergyAccessOutlook.pdf), at 61

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From the above chart, we can infer that majority of respondents (66%) are aware about what a clean cooking fuel is. Some respondents (18%) do not know about it and few respondents (16%) are not certain on what a clean cooking fuel is. It can further be inferred that around 24% respondents lack the required awareness which supports our hypothesis.

Chart 3: Usage of different kinds of cooking fuel in households

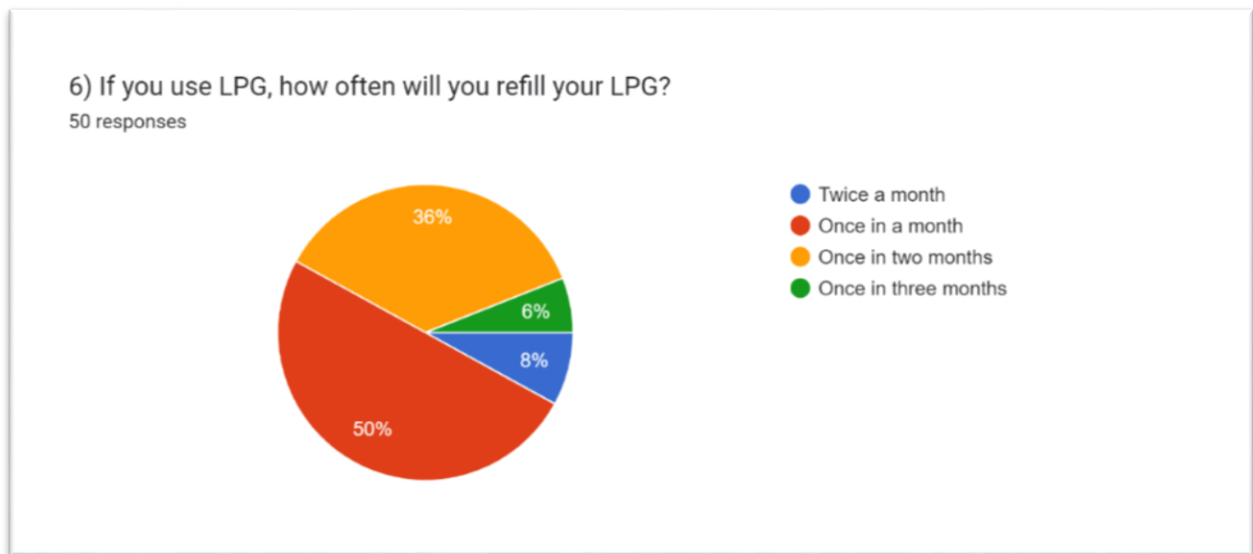


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Nearly 86% of the respondents do use LPG as the cooking fuel in their households. 2% of respondents use biogas, 6% use natural gas and 26% use e-cooking as their cooking fuels. Therefore 4 in 5 person use clean cooking fuel for cooking. But, 12% of respondents still use firewood and 8% of respondents use kerosene as their cooking fuels which supports our hypothesis that traditional sources of cooking fuels are still preferred and used by the people.

Chart 4: Knowledge of LPG, a clean cooking fuel among the respondents:

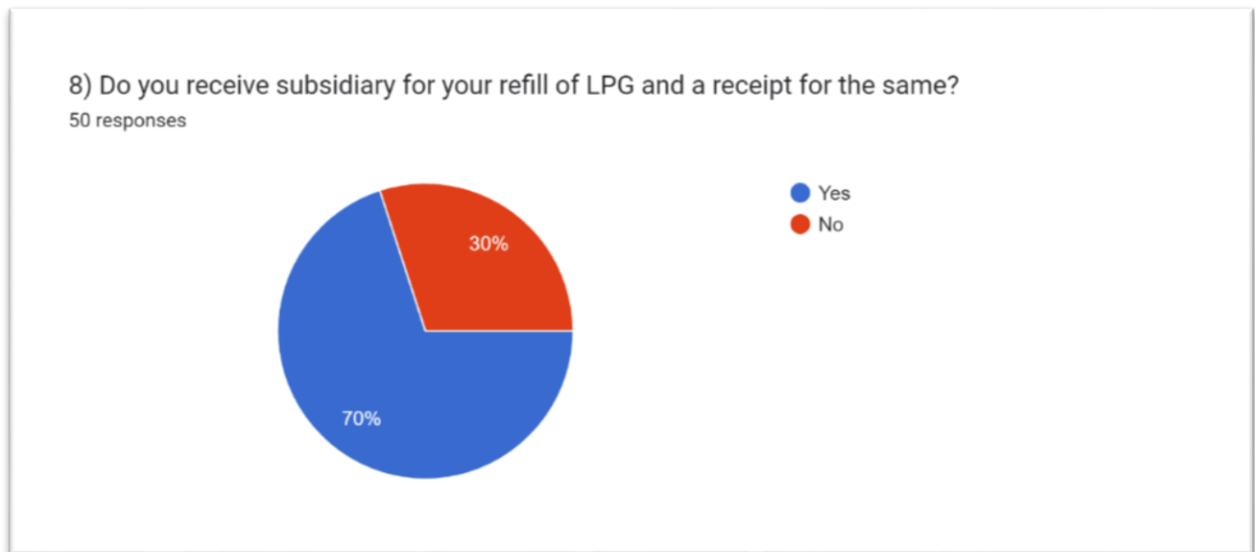


About half of the respondents (50%) refill their LPG's once in a month. 36% of respondents refill their LPG's once in two months, 6% of respondents refill their LPG once in three months and 8% of respondents refill their LPG's twice a month.

Chart 5: Awareness of respondents to collect receipt and subsidiary for LPG:

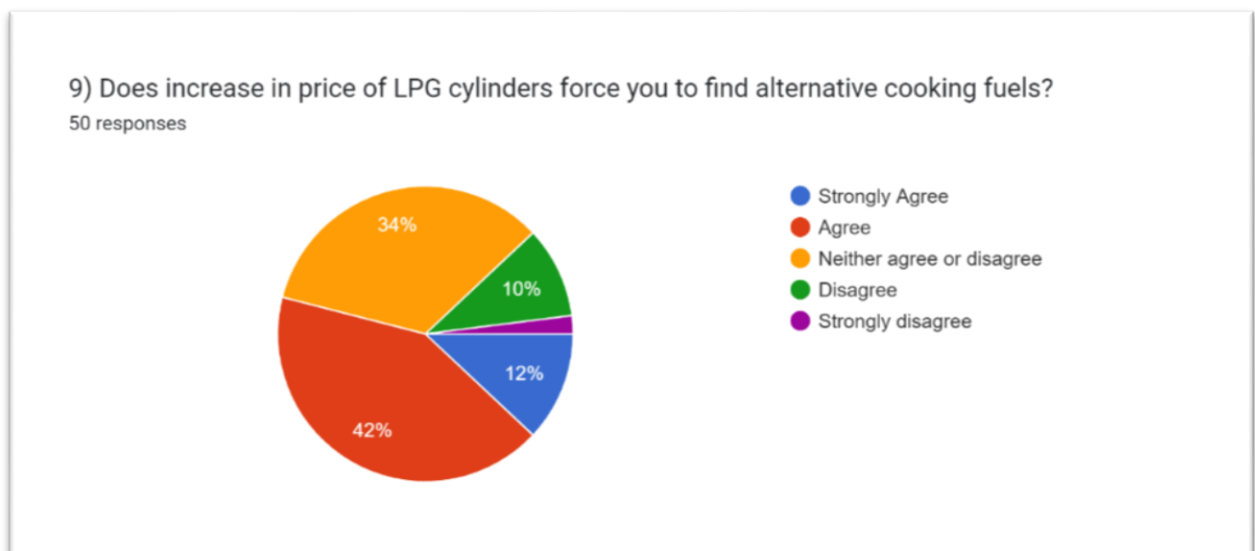
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From the above chart, we can infer that 70% of the respondents are aware to collect their receipt of LPG when refilling and about the subsidiary amount. But, 30% of the respondents are not aware about it.

Chart 6: Need for alternative cooking fuels



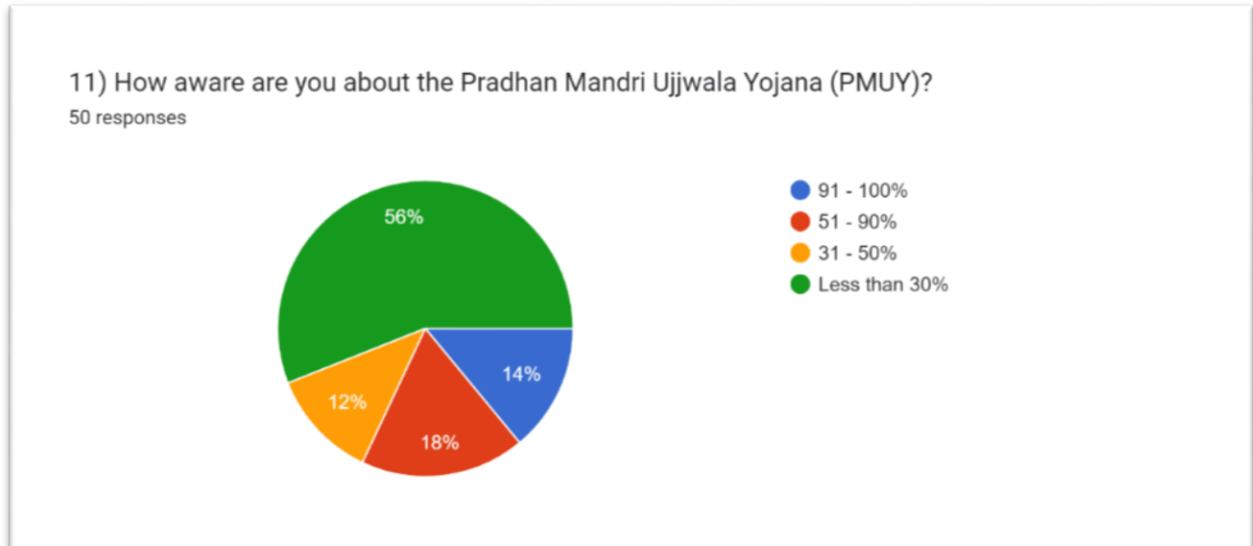
About 12% of the respondents strongly agree that increase in the price of LPG cylinders force them to find alternative cooking fuels. Also, 42% of the respondents do agree the same. However, 2% respondents strongly disagree that increase in price of LPG force

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them to find new alternatives, 10% of the respondents disagree the same. 34% of respondents neither agree nor disagree with the same.

Chart 7: Awareness about Pradhan Mandri Ujjwala Yojana (PMUY):

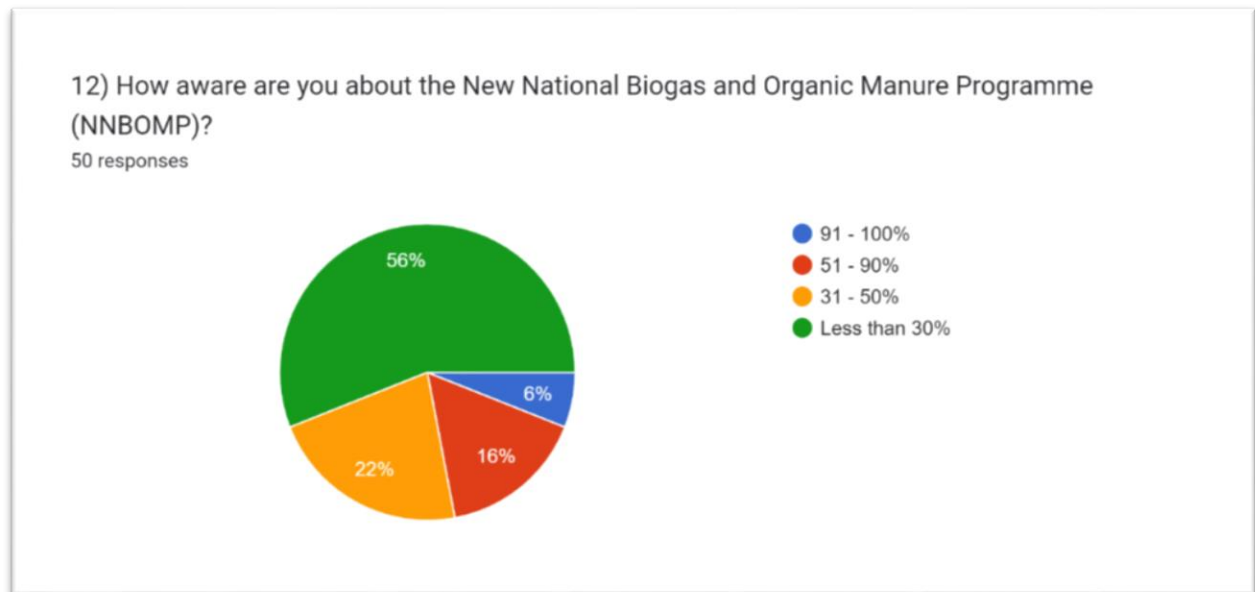


With regard to the government scheme PMUY, 14% of respondents strongly know about the scheme and aware of it and 18% of respondents has awareness. However, 12% of respondents are aware to a certain low extent and more than half of the respondents, that is, 56% are not aware about it.

Chart 8: Awareness about New National Biogas and Organic Manure Programme (NNBOMP):

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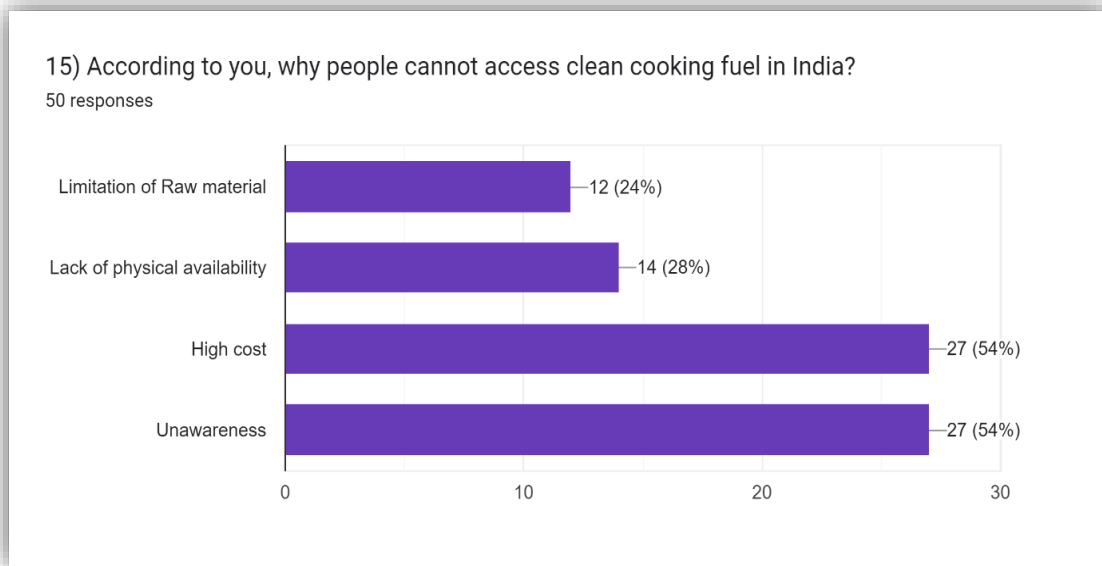
With regard to the government scheme NNBOMP, 6% of respondents strongly know about the scheme and aware of it and 16% of respondents has awareness. However, 22% of respondents are aware to a certain low extent and more than half of the respondents, that is, 56% are not aware about it.

From charts 7 and 8, it can be inferred that majority of the respondents lack the awareness regarding the programmes which shows that they are not implemented effectively. Hence, this data supports our hypothesis that the various schemes and projects introduced by the Government to provide clean cooking fuel to its citizens are not being implemented effectively.

Chart 9: Factors that limit the access to clean cooking fuel in India:

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According to the above chart, many respondents (27) are of the opinion that high cost of the clean cooking fuel is the reason for its non – accessibility. They (27) also opine that unawareness is a reason too. Also, 14 respondents state that lack of physical availability of clean cooking fuel is a factor affecting its accessibility and 12 respondents state that limitation of raw materials could be a limiting factor. The above data is in clear support of our hypothesis that socio economic factors are the major reasons for non-accessibility to clean cooking fuels in India.

MAJOR FINDINGS:

- 1) Though a considerate number of people know about clean cooking fuel, there are still few who are not aware about it.
- 2) Many households are having more than one type of clean cooking fuel owing to its convenience and effectiveness, tediousness, less time consumption, easy accessibility, less impact on environment as they release no harmful pollutants, smoke free nature and low cost.
- 3) Few people still use traditional cooking fuels without knowing how it pollutes the environment
- 4) People are using modern clean cooking fuel as a result of easy accessibility and high efficiency.

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- 5) More people are becoming aware of the pollution caused by clean cooking fuels.
- 6) People using firewood as their cooking fuel spends a considerable time inhaling the smoke thus affecting their health.
- 7) Many people are aware about LPG connections and about the subsidiary and receipt of the same.
- 8) Half of the respondents tend to change to alternative source of cooking fuel due to increase in price of LPG.
- 9) Only half of the respondents are aware about the governmental schemes and policies such as PMUY, NNBOBP and Scheme for Convert Used Cooking Oil into Fuel by Recycling in Tamil Nadu.
- 10) Many people think that high cost of clean cooking fuel and unawareness is the reason we cannot achieve for 100% access to clean cooking fuel.
- 11) Many people think that other developed or developing nations achieved a 100% access to clean cooking fuel due to their good economic condition, good governance and their effective implementation of governmental schemes and policies. In addition to this, they stated that accessibility of resources, low population and the people's high economic condition there might be a reason.
- 12) The respondents suggest that the government of India should reduce the taxes imposed on clean cooking fuel, make awareness of the harmful effects of using traditional cooking fuel to the environment, among the citizens, and make clean cooking fuel available in the Public Distribution System (PDS), make a separate budget on clean cooking fuels and promote the same especially in rural areas.

SUGGESTIONS:

India is yet to achieve 100% access to clean cooking fuel¹³. The following are some suggestions given by the authors of the paper:

1. The government of India has taken great measures to promote clean cooking fuel. The major drawback would be that the citizens are unaware about the various schemes and programmes brought forth by the government. Hence, more awareness

¹³Access to clean cooking fuels and technologies for cooking, World Bank data, (Oct 20, 2022, 10.15 AM), data.worldbank.org/indicator/EG.CFT.ACCS.ZS,

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and better implementation of programmes such as Pradhan Mandri Ujjwala Yojana, New National biogas and organic Manure programme, Programme for converting used cooking oil into fuel etc., are required.

2. Addressing another major concern of using clean cooking fuels more effectively is its high cost. Access to clean cooking fuels are expensive and are not affordable to every citizen of the country. Hence, to move towards a 100% access to clean cooking fuel the price of such fuel needs to be reduced.
3. On comparison, it is found that other nations were able to achieve 100% usage of clean cooking fuel due to their small population size. India is a heavily populated country and bringing various schemes alone are not enough to achieve the goal. Hence, there must be better planning by the government of India in providing clean cooking fuel and making them more accessible, affordable and sustainable.
4. Usage of other cooking fuels such as firewood cause numerous health hazards and heavily pollutes the environment. The citizens of India must be made aware of the effects of using such fuels and must be shown way to use alternative cooking fuels that wouldn't harm themselves or the environment.
5. A major problem that would arise in using clean cooking fuels is its accessibility. A heavily populated country like India with its excessive corruption makes it impossible for clean cooking fuels to reach each and every citizen. Hence, preventing or keeping a regular check on corruption would provide easy accessibility of clean cooking fuel.
6. The movement towards 100% clean cookingfuel cannot occur without the active participation of the public. The government should encourage its citizen to actively take part and enable them to take conscious efforts to use clean cooking fuel.

CONCLUSION:

India is a developing country and there is a long way to go to achieve the 100% usage of clean cooking fuel. From this research study, we have put forth the difficulties faced by the citizens in accessing clean cooking fuels and certain drawbacks have been analysed after comparing India with other nations that have achieved 100% access to clean cooking fuel. Traditional cooking fuels are still used by the people due to its abundant availability, cost free and conventional thought that food tastes better when cooked using solid fuels.

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Also, the citizens of India find clean cooking fuels expensive and not easily accessible. The implementation of the suggestions put forth by the authors of the papers could pave way to achieve the 100% goal.



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