

# A Plan to Exclude Ethnic Groups and Implement Partial Development Programme Under ‘Pradhan Mantri Ujjwala Yojana’ in the Indian Subcontinent: A Case Based on Madurai District in Tamil Nadu

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## Abstract

Madurai district in Tamil Nadu consists of three forestry regions such as Kurinji Nagar, Alagammalpuram and Mokathanparai as the residence of ethnic groups. The central scheme Pradhan Mantri Ujjwala Yojana (PMUY) found that it has no beneficiaries from the regions, and as usual the ethnic groups consume firewood with several difficulties. Hence, the study focuses on cooking energy consumers among ethnic groups as beneficiaries in detail under PMUY. A total of 108 households were chosen for the analysis which is the actual total number of households of ethnic groups in the district. Collected data have been tested by statistical tools, such as Chi-square and ANOVA, to know the relationship and the efficiency of factors, which influences the results that a majority of ethnic groups are expected to benefit under PMUY with free of cost, and they face climatic difficulties in traditional energy consumption.

## Keywords

Ethnic groups, LPG, occupation, consumption, climate

## Introduction

Cooking habits became indispensable from a great genesis of human development in looking for healthiest and tasteful grubs. Since the beginning of human development in cooking process, mankind has utilized related cooking energy in making meals at appropriate desire. Our pioneers have related with natural cooking fuels which scattered into different cooking energies nowadays. However, a group of people known as ‘Ethnic’ still consume such traditional energy for cooking purposes. Most of the ethnic communities still depend on forestry resources even though they have been evicted from the jungle. Their actual behaviours still enlighten them to consume forest produce for all their wants. So, the ethnic groups are not aware of advanced cooking energy related to technology-adopted household appliances.

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And even now too, the communities are far away to know the health impacts of continuous consumption of firewood, which is their habitual cooking energy from the origin. As the ethnic groups lack education and are efficient in wrong beliefs, they still follow traditional habits and push out healthy and wealthy life to live like other groups. Generally, the lifestyle of rural and forestry people has a minor analogy to one another due to a perfect association of socio-economic conditions. Hence, firewood, biomass and cow dung cake are the most prominent cooking energy, which results in a high consumption level among the ethnic groups (Tribal) than the rural people. The M.S. Swaminathan Research Foundation (2021) reports that about 77% of rural households still rely on firewood, while 7% to cow dung for cooking purposes (M.S. Swaminathan Research Foundation, 2021, p. 3). However, the total consumption of firewood in India is about 85,000 tonnes (Upadhyay, 2020). Continuous consumption of firewood exposes two various results. Primarily, (i) it emits a burning smoke that creates household pollution and affects the health of women and children to severe respiratory diseases. Inhaling such a burning smoke becomes a cause of premature death. India recorded the death of more than about 100,000 people. (ii) An unstable harvest of fuel wood to be used as firewood for cooking is a key driver of forest degradation, which impacts the lack of forest produce. India is a country that is adversely impacted by more than 30 million hectares of forests because of firewood consumption apart from cooking purposes in urban India (Sharma, 2021). Hence, the study objectively focuses to enumerate the flaws of Pradhan Mantri Ujjwala Yojana (PMUY) and its necessity to reintroduce the scheme to be benefited by ethnic groups and also to clarify the impacts of increasing the supply of LPG with affordable and unaffordable price.

## **A Narrow Scheme Leads to a Spacious Demand**

As we are aware, the demand for cooking energy among the consumers economically influences the significance of sufficient supply and production of energy. Hence, firewood is the most important cooking energy source among people for various purposes, especially ethnic groups. They consume firewood for different purposes without knowing its health-related consequences. Meanwhile, such health-related issues have been taken into vast consideration among the rural and urban people, because of easy access to welfare schemes and benefits. This means the ethnic group of people, from the consideration of the government, is excluded to access all the benefits of welfare schemes except the right to vote. However, government of India has initiated a social-welfare scheme 'Pradhan Mantri Ujjwala Yojana' on 1st May of 2016 under the leadership of honourable Prime Minister Narendra Modi. An overall objective of the scheme was to make smoke-free rural India by 2019 and to provide concessional LPG connections for five crore families living below poverty line (BPL). The PMUY scheme is expected to rectify the problems such as health-related disorders, air pollution and deforestation. Moreover, the scheme has planned to improve women empowerment, to provide healthy cooking fuel and to prohibit health-related issues. It also emphasized the necessary criteria that the applicants should be above the age of 18, should be from rural with BPL card, holding a savings account in the bank and should not have LPG connection previously (PMUY, National Portal of India, 2021). The study further develops a concept by scrutinizing the scheme PMUY in view of illusion benefits and its obvious disadvantages.

### *Obvious Disadvantages*

The welfare schemes should bound up the overall weaker section of the country, but the guidelines and process to be benefited under PMUY clearly show visible disadvantages that the scheme is for only rural

people, while a total number of ethnic groups account about 104 million (Chakma & Martemjen, 2020), especially the total percentage of BPL population is about 45.3 in rural and 24.1 in urban India (<https://tribal.nic.in>; The Gross Enrolment Ratio for Scheduled Tribes—Ministry of Tribal Affairs). However, the PMUY has ignored the ethnic groups to get the benefits and aimed to rectify the deforestation which is probably not successful until the ethnic groups are directed to alternative energy consumption. Moreover, the scheme has focused on to provide clean cooking energy to create pollution-free households to maintain good health. But, health and safety authority reports that a continuous consumption of LPG can cause burns to the skin, and it can act as an asphyxiant at high concentrations (Health & Safety Authority, 2021). Hence, LPG for cooking purposes is not purely certified as safe energy. And the PMUY is strongly trifling the ethnic groups because it prioritized families with BPL card and from rural India. Moreover, holding bank accounts is mandatory for further process. Thus, the given criteria are far away to reach in the lifestyle of ethnic groups. Hence, many weaker sections are still not covered with the benefits of such a social-welfare scheme. Economically, PMUY led to a high demand for LPG, which is a major cause for hiking LPG prices nowadays.

### *Illusion Benefits*

PMUY has stated that five crore households under BPL will be benefited from the scheme. It concentrated only about 50 million people, while a total of 269.8 million people are under the poverty line (Gaur & Rao, 2020) among the total population of 1.366 billion according to the report of 2019 in India (UN World Population Prospects 2019, 2020). The LPG connection with a concession rate may facilitate 18.53% of the BPL population, which accounts for 50 million but neglects 81.47% of the BPL population, which accounts for about 219.8 million. Hence, the selected size of the population is very less, which cannot make smoke-free rural India and spring up to maximum attainment of the purpose of the scheme. Sharma reports that the PMUY has made a success for about only 30 million households (Sharma, 2021). Moreover, an article from NITI Aayog says that women can save up to 1.5 hours in a day, which created some more time for education, self-employment and community activities (Yellappa, 2020). Thus, PMUY targets to improve the women's empowerment to only 50 million people among a total of 269.8 million. However, there is no surety that BPL women will utilize the saved time for the purpose as the eligibility criteria for the success of the benefits of PMUY strongly rejected the age group of below 18. So, women ages above 18 years may not utilize the saved time for education and intensively for others also. Thereby, there is no anticipated economic development in each and every benefited household and to the country.

### *Actual Trend of the Scheme PMUY*

The overall results of PMUY to the BPL people are not satisfactory, due to the fewer number of selected households and the absence of constitutional management. As a result, Sharma describes that the PMUY failed to fulfil its objectives because of withdrawal of subsidy on the sale of LPG, which increased firewood consumers (Sharma, 2021). Although the revised PMUY scheme in February 2018 has prepared the recent BPL list for the selection of beneficiaries from the total applicants in 2021 that accounts for about 8 crores of LPG connections, which increased from 5 crores (Admin, 2021). However, 8 crore BPL people are about only 29.65%, which means 80 million among the total of 269.8 million BPL households. Also, the revised PMUY scheme included the SC/ST people, but there is no sufficient effort taken in

South India, and still most of the ethnic communities rely on firewood for cooking. *The Economic Times* reports that as on 31st of January 2021, LPG connection has been distributed to 83 million people (Kumar, 2021). As a result, these observations about the statistics of PMUY contradict with the official figures. However, the first-hand information clearly states that the selected ethnic groups are not benefited and also they have no awareness about PMUY as they are consuming firewood as their only energy.

## **The Restructuring of PMUY and the Need for Re-implementation Are Essential**

Women in the households handle innumerable efforts to accomplish daily processes for making everyone satisfied. Especially, the truth is that just to have breakfast, lunch and dinner for ten minutes, their efforts are for more than an hour. A research describes that women from rural India spend nearly 374 hours a year for the collection of firewood. As a result, more than 4 million people faced death due to sickness emerging due to pollution in cooking energy. They highly suffer because of unclean cooking energy sources, which cause heart diseases and lung cancer (Yellappa, 2020). The investigators have visited the dwelling areas of ethnic groups (tribals), namely Kurinji Nager, Alagammalpuram and Mokathanparai, in Madurai district of Tamil Nadu. The actual socio-economic conditions of the ethnic groups are holistically different from the life pattern of rural and urban India. To control forest exploitation, ethnic groups within the forest have been evicted, and the government made an allotment for free housing facilities nearby the forest. Thus, Kurinji Nagar has 70, Alagammalpuram 18 and Mokathanparai has 20 houses along with a toilet facility which is not in practice. Housing allotment is only one portion including the kitchen, which is so difficult to manage, and they are demanding a minimum of one more portion that must be restructured. Most of them collect forest produce while only a few of them depend on agricultural activities, thereby forests and agri-field are the major income sources. The investigators found that the monthly income group of selected ethnic groups is based on the practical responses of the respondents that is minimum income is about only ₹4,000 and the maximum is above ₹8,000. Thus, income group classification is developed for this study as low, middle and higher. The investigators observed the lifestyle structure and found that the reason for the economic backwardness of ethnic groups is the absence of media penetration, such as television, newspapers and advanced mobile phones, which is necessary to be aware of the welfare programmes and take steps to be benefited. As a result, the PMUY scheme has not reached any of the households, and when the investigators asked about the scheme PMUY, they reported that they do not have any idea about the scheme. Hence, the lack of such advanced facilities is a notable bar among the ethnic groups. Thereby, revision and re-implementation of PMUY is essential in maximizing their standard of living. So, the study has been undertaken by obtaining first-hand information regarding the status of ethnic groups in the study area.

## **Methodology**

Cooking energy is important as we consume it every day, and that makes a global change in production and distribution. Apart from rural and urban life patterns, ethnic groups' lifestyle is different, which makes slow changes in the economic condition of the country as numerically ethnic groups are very meagre. The study chose Madurai district in Tamil Nadu, which encapsulated three forest areas, namely

Kurinji Nager, Alagammalpuram and Mokathanparai. Each forest area has dwelling places for ethnic groups such as Kurinji Nager has 70, Alagammalpuram has 18 and Mokathanparai has 20 households. Thus, only 108 households reside in Madurai district. Primary data have been chosen on the basis of the census method and collected by structured interview schedule from 108 households and analysed by Chi-square test which is expressed as follows:

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

where  $\chi^2$  is the Chi-square,  $O_i$  is the observed value,  $E_i$  is the expected value.

Phi and Cramer's  $V$  denoted is as  $\phi_c$ , to measure the association between two nominal variables, and one-way ANOVA to compare the relationship and variations among the factors which can be expressed as follows:  $F = \frac{MS_{\text{between}}}{MS_{\text{within}}}$

$$MS_{\text{between}} = \frac{SS_{\text{between}}}{df_{\text{between}}} \quad MS_{\text{within}} = \frac{SS_{\text{within}}}{df_{\text{within}}}$$

$$SS_{\text{between}} = \sum \frac{(\sum x)^2}{n} - \frac{(\sum \sum x)^2}{n_r} \quad SS_{\text{within}} = \sum \sum (x^2) - \sum \frac{(\sum x)^2}{n}$$

$$df_{\text{between}} = k - 1 \quad df_{\text{within}} = n_r - k$$

Moreover, the study contributes theoretical analysis on the aspects of economic studies to enrich the findings of the work.

## Data Analysis

Data in the research work should not be mere in finding facts towards recommendations for the recovery of problems. There is a need to compare and correlate the collected data by statistical tools to prove the data worth. Moreover, it is focused on strong socio-economic conditions of the tribal communities. Table 1 explains that among the three selected areas, 'Kurinji Nager' only has a high number of households as it contributes mode of the data results. Most of the data collected from women respondents while men were at work. The age group of the respondents has been classified on the basis of working and dependent people, here, the two age groups of respondents, below 18 and above 50, are represented as belonging people and the remaining group of people titled as working people. Thus, 72.3% of people from working people and remaining 22.3% and 2% of them are dependent age groups. More than half of the total respondents are illiterate, not because of a lack of schools instead, a lack of awareness about education and jobs. However, soundless educational status is from primary to higher secondary levels due to free education.

**Table 1.** Socio-economic Conditions of the Ethnic Groups.

Particulars	Classifications	No. of Respondents	Percent	Explanation
Study area	Kurinji Nagar	70	64.8	Mode: Name of the area and location
	Alagammalpuram	18	16.7	
	Mokathanparai	20	18.5	
Gender	Male	12	11.1	Mode: Yes/No
	Female	96	88.9	
Age	Below 18	2	1.8	Mean: 2.2130 SD: 0.45449
	18–50	81	72.3	
	Above 50	25	22.3	
Educational status	Primary level	12	11.1	Mode: Reading and writing Mean: 4.3611 SD: 1.38387
	High school level	5	4.6	
	Higher secondary level	3	2.8	
	Graduation	0	0.0	
	Illiterate	88	81.5	
Income category	Below ₹4,000	84	77.8	Mean: 1.2870 SD: 0.58086
	₹4,001–8,000	17	15.7	
	Above ₹8,001	7	6.5	
Occupational status	Agriculture	20	18.5	Mode: Skill and experience
	Wildlife collector	78	72.2	
	Marketing of forest produces	10	9.3	

**Source:** Primary data,  $N = 108$ .

A majority of the ethnic groups are wildlife collectors, and they sell their products to marketers who take the product to market at affordable market prices. Also they are agriculturists performing under the land owners, while few of them market the forest and agro-products to the wholesalers for profit maximization. Hence, their average monthly income is only about ₹4,000 and maximum above ₹8,000. In this situation, an additional expenditure on cooking fuel may cause a high economic burden, which has resulted in the dependence on primary cooking energy. Hence, PMUY recommended to supply LPG free of cost for the ethnic groups.

Reports from the ethnic community have been collected based on different regions, and response of the people varied by socio-economic backgrounds. Table 2 depicts the location-based reports of the respondents, which shows that nearly half of about 49 respondents in Kurinji Nager are expecting LPG connection free of cost, while 20 of them refused to benefit from PMUY. Because people are closely associated with natural produces such as firewood for cooking. And, they felt that the consumption of LPG for cooking is an additional burden in the current economic condition. More than half of about 54 respondents from Kurinji Nager have no idea about LPG consumption due to lack of application of advanced appliances, but only one respondent from Alagammalpuram was experienced in using LPG due to experience in operating from relative's home. 77.1% of respondents from Kurinji Nager reported that the climate change is a major cause of difficulty to consume firewood, while 11 of them reported animal attacks. And very few, about two and three respondents, say health and market price for firewood are the causes for demanding LPG. And 36 respondents out of 70 households from Kurinji Nager highlighted that consumption of LPG will be comfortable for us during the changes in climates, and 26 respondents have reported that the LPG will free them from worries of firewood demand for a few months. Thus, due to such significant reasons, the ethnic groups are demanding LPG connection. And more than half of about 80% of ethnic groups from Kurinji Nager are ready to contribute below ₹400 as

**Table 2** Location-based Reports of the Tribals of Demand for LPG.

Classifications	Study Areas.					
	Kurinjil Nager		Alagammalpuram		Mokkathanparai	
	Respondents	Percent	Respondents	Percent	Respondents	Percent
How do you want to be benefited under PMUY?	1	33.3	1	33.3	1	33.3
LPG for free of cost	49	67.1	12	16.4	12	16.4
No need to be benefited	20	28.6	5	27.8	7	35.0
How were you aware of using LPG?	0	0.0	1	5.6	0	0.0
Friends/Relatives	13	18.6	4	22.2	5	25.0
Media sources	3	4.3	0	0.0	0	0.0
No aware	54	77.1	13	72.2	15	75.0
Climate change	54	77.1	14	77.8	11	55.0
Animal attacks	11	15.7	2	11.1	7	35.0
In which condition you were affected to consume firewood and demanded LPG?						
Health issues	2	2.9	1	5.6	0	0.0
Market price for firewood	3	4.3	1	5.6	2	10.0
Clean and safe energy	1	1.4	1	5.6	1	5.0
Ethnic groups' opinion about LPG?						
Comfortable at any Climates	34	48.6	11	61.1	5	25.0
Quickly heating pickup	3	4.3	0	0.0	0	0.0
Constrains energy Demand for few months	26	37.1	5	27.8	9	45.0
Amount of contribution for concession rate of LPG						
Easy to operate	6	8.6	1	5.6	5	25.0
Below ₹400	56	80.0	14	77.8	14	70.0
₹401-800	9	12.9	3	16.7	4	20.0
₹801-1,200	11	1.4	1	5.6	1	5.0
Above ₹1,200	4	5.7	0	0.0	1	5.0

**Source:** Primary data.



a concession rate for LPG connection under PMUY. But, one respondent from Alagammalpuram and Mokathanparai is willing to bestow ₹1,200, who gains more than ₹8,000 as their monthly income.

The statistical description of differentiating factors in Table 3 shows mean, mode, variance, standard errors of means and standard Deviation, which helps in estimating the statistical reports for the total sample size. A majority of about 65 (58%) respondents out of 108 households requested to supply LPG connection for free of cost and nearly half of about 46 respondents (41.1%) are aware of using LPG by friends/relatives support. Maximum of about 53 (47.3%) respondents reported that consumption of firewood for cooking is difficult during climate changes, and it caused to raise demand for LPG. An opinion of 45.5% of ethnic groups about LPG is that it will be comfortable at any climatic conditions while only one respondent is aware of quick heating.

Data comparison in the research work provides a strong base for further discussion in findings and policy recommendations. To compare the relationship between the variables and to give findings, the study has attempted to apply the Chi-square test along with Phi and Cramer's  $V$  tests, which is shown in Table 4. Null and alternative hypotheses have been framed to compare the variable factors.

### *Hypothesis and Results*

(i)  $H_0$  = There is no perfect relationship between occupational status and opinion to be benefited by PMUY.

$H_1$  = There is a perfect relationship between occupational status and opinion to be benefited by PMUY.

A strong economic puissance push-up by income and occupation of a family guides them to not get benefited by free goods and services. Even though some people are not economically well off, they are ready to sacrifice for the welfare of the weaker society. Statistical reports state that 58% of people in ethnic groups like to get LPG free of cost, while 11.6% at concessional rates (reported in Table 3 description). Thereby, occupational status and opinion to be benefited by PMUY have perfect relationship with each other. The calculated value 10.222 is higher than the table value 9.48, and the significant level is 0.37. Hence, the study accepted the alternative hypothesis  $H_1$  and rejected the null hypothesis  $H_0$ . So, the government needs to take a step to provide LPG connections free of cost, thereby socially and economically empowering ethnic groups under the PMUY.

(ii)  $H_0$  = There is no perfect relationship between occupational status and awareness about using LPG.

$H_1$  = There is a perfect relationship between occupational status and awareness about using LPG.

Occupation determines the welfare of a family which is essential to calculate the income of the people. A statistical report between the variables is significant because the calculated value is (72.439 > 12.59), which is greater than the table value and significant with 0.000 at the 5% level. Hence, the study accepted the alternative hypothesis  $H_1$  and rejected the null hypothesis  $H_0$ .

(iii)  $H_0$  = There is no perfect relationship between occupational status and conditions of ethnic groups affected to consume firewood.

$H_1$  = There is a perfect relationship between occupational status and conditions of ethnic groups affected to consume firewood.



**Table 3.** Statistical Description of Differentiated Factors.

Particulars	Classifications	No. of Respondents	Percent	Mean	Mode	Variance	Std. Error of Mean	Std. Deviation
How do you want to be benefited under PMUY?	LPG for concession rate	13	11.6					
	LPG for free of cost	65	58.0	2.1667	2.00	0.402	0.06100	0.63393
How were you aware of using LPG?	No need to be benefited	29	25.9					
	Experience	16	14.3					
	Friends/Relatives	46	41.1					
	Media sources	3	2.7	2.6759	2.00	1.324	0.11072	1.15061
Which condition affected consuming firewood and demanded LPG?	Not aware	43	38.4					
	Climate change	53	47.3					
	Animal attacks	15	13.4	2.1574	1.00	1.685	0.12492	1.29818
	Health issues	10	8.9					
	Market price for firewood	30	26.8					
	Clean and safe energy	4	3.6					
Ethnic groups' opinion about LPG?	Comfortable at any climates	51	45.5					
	Quick heating pickup	1	0.9					
	Constrains firewood Energy demand for few months	40	35.7	3.0463	2.00	1.446	0.11573	1.20268
	Easy to operate	12	10.7					

**Source:** Primary data, N = 108.

**Table 4.** Chi-square, Phi and Cramer's V Test on Differences of Factors.

Particulars	$\chi^2$ – Tests				Phi		Cramer's V	
	Value	df	Table Value	Asymp. Sig. (2-sided)	Value	Approx. Sig.	Value	Approx. Sig.
$X_1$	10.222 <sup>a</sup>	4	9.48	0.037	0.308	0.037	0.218	0.037
$X_2$	72.439 <sup>a</sup>	6	12.59	0.000	0.819	0.000	0.579	0.000
$X_3$	35.450 <sup>a</sup>	6	12.59	0.000	0.573	0.000	0.405	0.000
$X_4$	20.165 <sup>a</sup>	9	16.92	0.017	0.432	0.017	0.249	0.017
$X_5$	58.548 <sup>a</sup>	12	21.03	0.000	0.736	0.000	0.425	0.000
$X_6$	201.479 <sup>a</sup>	6	12.59	0.000	1.366	0.000	0.966	0.000

**Source:** Computed from primary data.

**Note:** 5% level of significance.

$X_1$ : Occupational status and how do you want to be benefited under PMUY?

$X_2$ : Occupational status and how were you aware of using LPG?

$X_3$ : Occupational status and in which condition you were affected to consume firewood and demanded for LPG?

$X_4$ : Educational status and how were you aware of using LPG?

$X_5$ : Educational status and ethnic groups' opinion about LPG?

$X_6$ : Income category and amount of contribution for concession rate of LPG.

Occupational status is a factor that observes and analyses the problems of family development, and it also supports to overcome the economic backwardness to improvements. Hence, the result in Table 4 shows a perfect relationship between occupational status and conditions of ethnic groups affected to consume firewood by increased calculated value than the table value ( $35.450 > 12.59$ ). Thereby, the study has accepted alternative hypothesis  $H_1$  and rejected the null hypothesis  $H_0$ .

(iv)  $H_0$  = There is no perfect relationship between educational status and awareness about using LPG.

$H_1$  = There is a perfect relationship between educational status and awareness about using LPG.

Information about the implementation of welfare programmes is primarily proclaimed by various media sources, which is lacking among the tribal communities. However, people who can read will communicate the needed information. Hence, educational status is a factor that supports to get awareness about any welfare programmes and technology-adopted appliances for the households. The Chi-square test reports that the table value ( $16.93 < 20.165$ ) is less than the calculated value and significant with 0.17 at the 5% level. Hence, the study has chosen alternative hypothesis  $H_1$  and rejected the null hypothesis  $H_0$ .

(v)  $H_0$  = There is no perfect relationship between educational status and ethnic groups' opinion about LPG.

$H_1$  = There is a perfect relationship between educational status and ethnic groups' opinion about LPG.

Usually, beneficial characteristics of goods and services are experienced by the consumers who are experienced by various opportunities. Likewise, ethnic communities also have sufficient awareness about LPG but not a commercial and consumption point of view. Although educational status creates awareness about goods and services like LPG consumption, the relationship between educational status and ethnic groups' opinion about LPG is strongly significant with 0.000 at the 5% level, where the

**Table 5.** One-way ANOVA on Differences of Factors.

Particulars	Differences of One-way ANOVA				
	Sum of Squares	df	Mean Square	F	Sig.
Occupational status and how do you want to be benefited under PMUY?	2.441	2	1.221	5.174	0.007
Occupational status and how were you aware of using LPG?	28.498	2	14.249	30.942	0.000
Occupational status and which condition affected to consume firewood and demand for LPG?	12.306	2	6.153	11.585	0.000
Educational status and how were you aware of using LPG?	3.147	3	1.049	1.480	0.224
Educational status and ethnic groups' opinion about LPG?	8.552	3	2.851	2.105	0.104
Income category and amount of contribution for concession rate of LPG	57.954	2	28.977	1,283.935	0.000

**Source:** Computed from primary data.

**Note:** The 5% level of significance.

calculated value ( $58.548 > 21.03$ ) is greater than the table value, which forced us to accept the alternative hypothesis  $H_1$  and reject the null hypothesis  $H_0$ .

(vi)  $H_0$  = There is no perfect relationship between income categories and willingness to pay concessional rate for LPG.

$H_1$  = There is a perfect relationship between income categories and willingness to pay concessional rate for LPG.

Table value 12.59 is less than the calculated value 201.479 in a comparative analysis between income categories and willingness to pay a concessional rate for LPG. As a result, the test is significant with 0.000 at the 5% level and directs it to accept the alternative hypothesis  $H_1$  and reject the null hypothesis  $H_0$ . The income of a family is a major determinant to expand or condense the family expenditure to maintain economic efficiency. So, the income level of the ethnic groups takes into account the expenditure aspect as willingness to pay concessional rate for LPG.

Variations or differences between the groups in ANOVA analysis signified the influential power to strengthen dependent variables. Income, occupation and education are the major socio-economic determinants for the development of a family. However, some external factors may affect the base of social characters towards development.

(i)  $H_0$  = There is no difference between the occupational status and opinion to be benefited by PMUY.

$H_1$  = There is an expected difference between occupational status and opinion to be benefited by PMUY.

Demand for a commodity among households depends on the efficiency of occupational status. Simultaneously, occupation determines, the need of alternative wants whether it is basic necessity or

not? Likewise, benefits under PMUY also depend on the occupation of the ethnic groups. Statistical reports in one-way ANOVA which represented in Table 5 state that there is an expected difference between occupational status and opinion to be benefited by PMUY. The pair has been signified with 0.007 and accepted the alternative hypothesis  $H_1$  and rejected the null hypothesis  $H_0$ .

- (ii)  $H_0$  = There is no difference between occupational status and awareness about using LPG.  
 $H_1$  = There is an expected difference between occupational status and awareness about using LPG.

Fieldwork (occupation) determines the exposure position of the respondents. Ethnic groups are mostly nomadic, and they are usually unaware of the social-welfare benefits given to society. Even though consumption of LPG is dependent on household sector, ethnic groups are aware to operate LPG by various sources. It is signified with 0.000 at the 5% level, which rejects the null hypothesis  $H_0$  and accepts the alternative hypothesis  $H_1$ . Hence, there is an expected difference between occupational status and awareness about using LPG.

- (iii)  $H_0$  = There is no difference between occupational status and conditions that affected to consume firewood.  
 $H_1$  = There is an expected difference between occupational status and conditions that affected to consume firewood.

Ethnic groups have experienced difficult situations in cooking, which commonly prevail among households. As we know, that they are dependent on nature for all livelihoods, a change in nature directly affects them and leads to energy poverty. It is proved with the statistical result for this pair that there is an expected difference between occupational status and conditions of ethnic groups affected to consume firewood and signified with 0.000 at the 5% level. Hence, the study accepted the alternative hypothesis  $H_1$  and rejected the null hypothesis  $H_0$ .

- (iv)  $H_0$  = There is no perfect relationship between educational status and awareness about using LPG.  
 $H_1$  = There is a perfect relationship between educational status and awareness about using LPG.

Ethnic communities get awareness about social conditions by occupational status, but they are very far from education which currently dominates rural and urban people. So, they are not affordable with educational status, thereby, the result states that it is insignificant with 0.224, and there is no perfect relationship between educational status and awareness about using LPG. Hence, it accepted null hypothesis  $H_0$  and rejected alternative hypothesis  $H_1$ .

- (v)  $H_0$  = There is no difference between educational status and ethnic groups' opinion about LPG.  
 $H_1$  = There is an expected difference between educational status and ethnic groups' opinion about LPG.

Due to improper educational strength, ethnic groups are not having a clear knowledge about alternate household appliances. Therefore, the statistical report says that it is insignificant with 0.104 at the 5% level of significance. So, the study strongly rejected the alternative hypothesis  $H_1$  and accepted the null hypothesis  $H_0$  as there is no difference between educational status and ethnic groups' opinion about LPG.

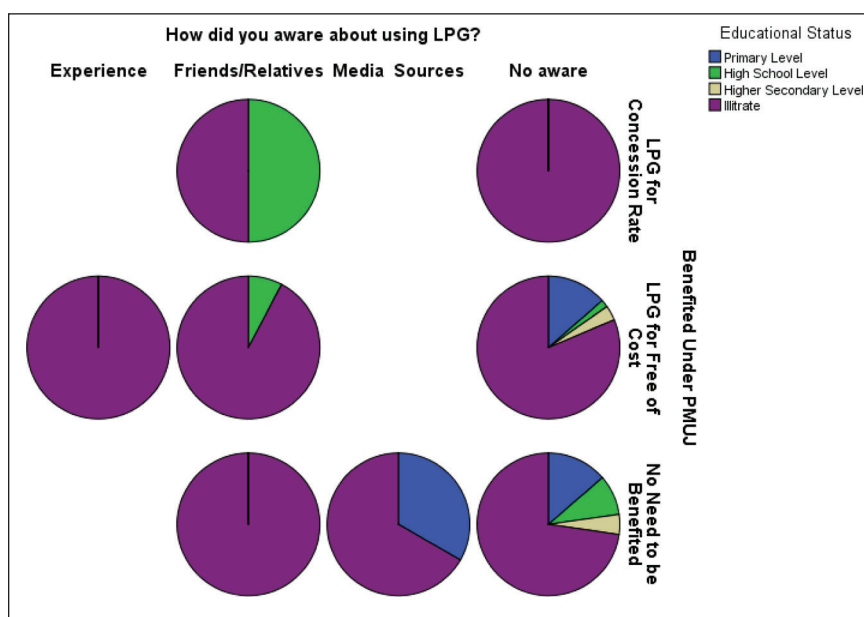
(vi)  $H_0$  = There is no difference between income categories and willingness to pay concessional rate for LPG.

$H_1$  = There is an expected difference between income categories and willingness to pay concessional rate for LPG.

Income and expenditure have a positive correlation, and each influences other for the welfare of people. So, the test report accepts that there is an expected difference between income categories and willingness to pay concessional rate for LPG, and it is signified with 0.000 at the 5% level of significance.

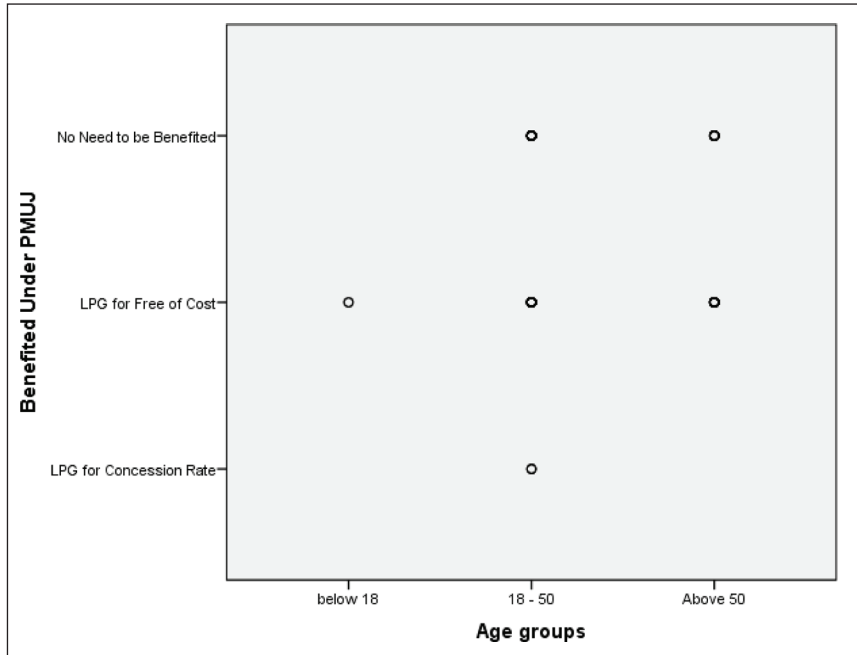
Figure 1 explains the participation of respondents in demanding LPG under PMUY by the influence of educational status. Four factors help to know the using LPG. Here, friends/relatives and no aware became most dominant in knowing the LPG usage. And ethnic groups like to be benefited under PMUY in terms of concession rate and free of cost. Most of the illiterate people who were aware by experience, friends/relatives and not aware expressed their willingness to get LPG for free.

Figure 2 depicts the participants of age group in accessing benefits under PMUY. Three types of age groups were suggested to be benefited. The figure says that, among the age group, the working-age group of people from 18 to 50 suggests all the options under PMUY. However, under PMUY, getting LPG connection free is preferable by all age groups.



**Figure 1.** Educational Influences on Differences of Factors.

**Source:** Computed by SPSS (Ver.20).



**Figure 2.** Influences of Age Group on Willingness to Benefited Under PMUY.

**Source:** Computed by SPSS (Ver.20).

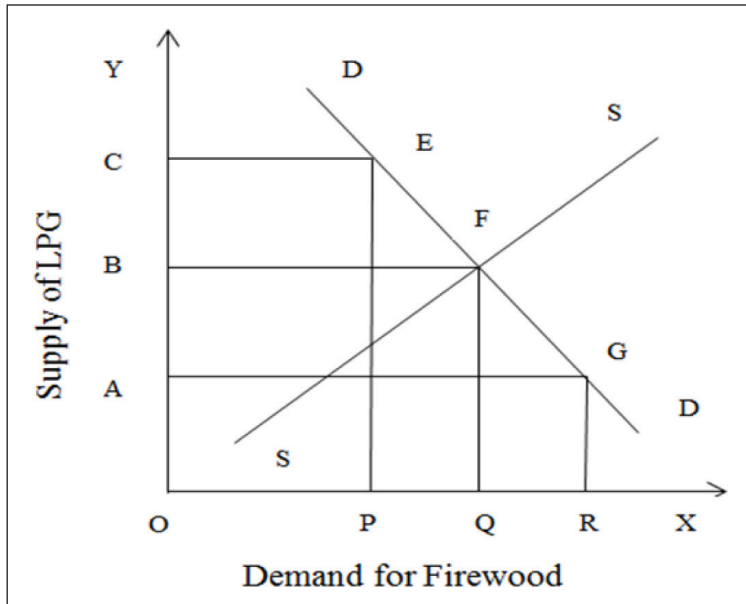
### Concept Analysis

Supply of LPG under the welfare scheme is meant as a developmental step to recover the loss of natural resources. However, the increasing demand for firewood is alarming, which must be mitigated and pave way for alternative energy consumption among households. Rural and ethnic groups cannot afford to pay for service utilization, but free and concessional price for any commodities and services may empower them towards an advanced lifestyle. Hence, demand and supply of commodities in aggregate wants of rural and ethnic groups is not maximized towards fulfilment. So, the policymakers must deal with supply and demand for alternative cooking energy in the execution of welfare programmes. Moreover, the study put forth a concept analysis dealing with the supply of LPG and demand for firewood to bring out necessary development under PMUY.

#### Assumptions:

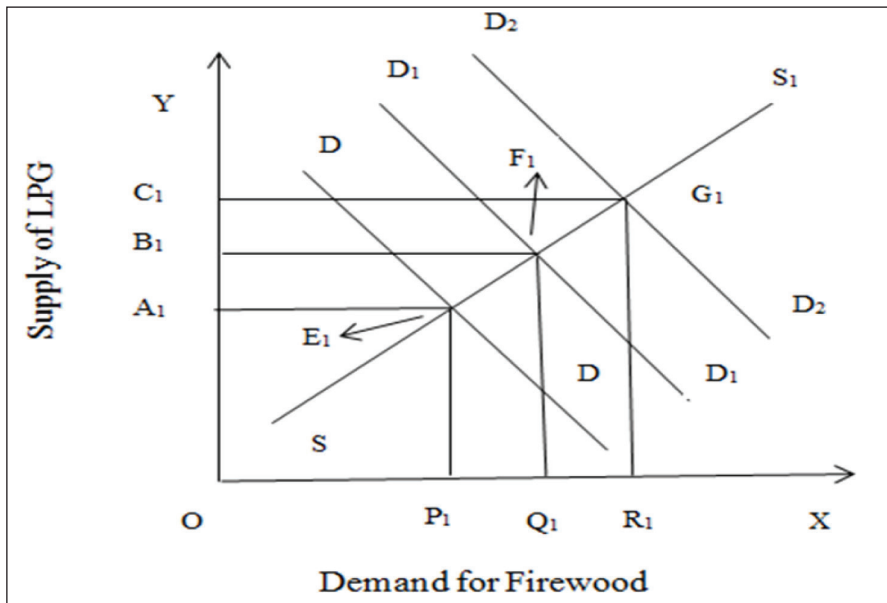
1. Supply of the commodity should increase.
2. Increasing the supply of a commodity must decrease the demand for other commodity.
3. Demand for a commodity is increasing as the increasing ratio of supply of alternative commodity.

Diagrams A and B partially explain different concepts of the consumed and demanded energy among the rural and ethnic groups (Figures 3 and 4). Mainly, cooking energy LPG and firewood are focused as its demand and consumption are at increasing ratio.



**Figure 3.** Diagram A: Supply of LPG and Demand for Firewood.

**Source:** The authors.



**Figure 4.** Diagram B: Impacts of Increasing Price and Supply of LPG on Demand for Firewood.

**Source:** The authors.



An increasing supply of LPG leads to decreased firewood consumption that is explained in diagram 'A'. The 'OX' axis focuses on the demand for firewood while the 'OY' vertical axis deals with the supply of LPG. 'SS' is the supply curve that slopes upward from left to right, and 'DD<sub>1</sub>' is the demand curve that slopes down from left to right. The supply of LPG at the 'OA' level shows that people are not under the PMUY and demanding 'OR' level of firewood which starts at the point 'G' on the 'DD<sub>1</sub>' demand curve. And, as the government extends such social policies that support to increase the supply of LPG at 'OB' from the 'OA' level, resulting that the demand for firewood decreases at 'OQ' level in the point 'F' which intersects the 'DD<sub>1</sub>' and 'SS' curves. Moreover, the point 'E' on the 'DD' curve reports the increased level of LPG supply at the 'OC' level, and the demand for firewood declined at the 'OP' level in the 'OX' axis. Thus, diagram 'A' shows that increasing supply of LPG can decrease the demand for firewood among the rural and ethnic group of people. Hence, the government should take necessary steps to supply LPG under PMUY for all economically weaker sections of the country.

A continuous supply of LPG may not bring a sufficient outcome on the demand for firewood while the price of LPG increases as demand increases that is exposed in the diagram 'B'. The 'OX' horizontal axis describes the level of demand for firewood and the 'OY' vertical axis for supply of LPG. 'SS<sub>1</sub>' is the supply curve that denotes the level of supply of LPG and demand for firewood by intersecting each demand curve. The point 'E<sub>1</sub>' is from the intersection of the supply curve, and the 'DD' demand curve shows the supply of LPG at 'OA<sub>1</sub>' demand for firewood at the 'OP<sub>1</sub>' level. Again, the demand line shifts from 'DD' to 'D<sub>1</sub>D<sub>1</sub>' and reports the increasing level of supply of LPG at 'OB<sub>1</sub>' and demand for firewood at the 'OQ<sub>1</sub>' level at the point 'F<sub>1</sub>'. And the same, the point 'G<sub>1</sub>' on the demand line 'D<sub>2</sub>D<sub>2</sub>' shows that the increased level of LPG supply at 'OC<sub>1</sub>' increased the level of firewood demand at the 'OR<sub>1</sub>' level. Thus, diagram 'B' shows that increasing supply of LPG causes to increase the demand for firewood due to the shifting character of demand as increasing prices of LPG. Price is a major factor that determines the demand for alternative energy LPG. Nowadays, the price of LPG hiking every month results in increased demand for firewood among rural and ethnic groups. Hence, to reduce the demand for firewood among the ethnic groups, the government needs to regulate the increasing price of LPG as increasing supply under PMUY.

## Policy Recommendations

Necessary action should be taken for the welfare of the ethnic society as many of them are not aware of any welfare scheme implemented for their economic development. And also there is no concern about their demand for welfare services even if they bring it to the notice of the respective officials, and there is no one on behalf of the ethnic groups in the government office. Based on the observations of the investigators, for the improvements of standard of living among the ethnic groups, the study has put forth several recommendations.

1. Unceasing media communication is necessary to make them aware of any announcement of state and central government, this can be attained by providing advanced education.
2. The government should restructure the process of PMUY to provide free LPG connections to ethnic groups to empower their lifestyle and their economic level.
3. Officials from the local government need to inspect the area often to enrich the level of welfare services.
4. Maintaining the actual behaviour of the ethnic groups that should not be against the aims of welfare schemes is required.

5. The welfare scheme PMUY should be implemented among ethnic groups.
6. Public awareness must be provided on the impacts of continuous firewood consumption.
7. The government should provide free LPG connection under the PMUY scheme.
8. An adequate doctrine of energy management in consumption should be given.
9. To access the basic necessities, the services should be made nearer to the dwelling place.
10. To eliminate deforestation, special instructions need to be given to the importance of forests and their properties to be managed for long.
11. Increasing the supply of LPG without any changes in price will lead to a decrease in the consumption of firewood among ethnic groups. So, PMUY should be implemented free to reduce firewood consumption and make pollution-free households.
12. Increasing supply of LPG with unaffordable prices will lead to an increase the demand for firewood. Hence, necessary steps need in the LPG pricing policy to ensure the affordable price for ethnic groups.

## Conclusion

Welfare policies must not classify people on the basis of other than socio-economic components. Poor people are always at the stage of weak economic conditions and have been unaware of developmental aspects in order to their standard of living. Initiated schemes should be focused to develop the individuals and society which need to reach all the weaker sections of the community to maintain the process of growth. By supplying LPG among the ethnic groups (traditional energy consumers), the PMUY scheme has aimed to eradicate health-related issues. Hence, the expected demand of ethnic groups that provide LPG connection for free of cost is to implement among them for a better future. However, the targeted number of beneficiaries under PMUY is very narrow, which cannot fulfil the aim of PMUY throughout India. So, the government needs to restructure it and extend the number of beneficiaries including ethnic groups.

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