

Biogas Usage Among Families In Uttara Karnataka District

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Abstract

With the scarcity of natural resources burdening the environment, alternative energy sources are very indispensable. The present study was envisaged to find out the usage of biogas among selected families in Uttara Karnataka district of South India with objectives to assess the socio-demographic data among biogas users, determine the factors associated with the selection of biogas for household purpose, and determine the benefits regarding use of biogas. The sample size for the study comprised of 100 respondents from Uttara Karnataka. A self developed questionnaire was used to elicit information from respondents. Results of the study revealed that most of the respondents knew about the use of biogas while majority had sufficient knowledge on materials used in biogas. Also, most of the respondents considered the benefits of biogas being a non-polluting and renewable source of energy, as well as being an efficient mode of energy conservation.

Keywords: Biogas, renewable energy, environment, non-polluting, energy conservation

Introduction:

The current irrational use of fossil fuels and the impact of greenhouse gases on the environment was driving research into renewable energy production from organic resources and waste. The global energy demand was high, and most of this energy was produced from fossil resources. Recent studies reported that 'anaerobic digestion' (AD) was an efficient alternative technology that combined biofuel production with sustainable waste management along with various technological trends in the biogas industry that enhanced the production and quality of biogas. (Achinis et al., 2017)

Scarlat et al (2018) asserted that biogas development had increased its usage for electricity, heat and in transport in the European Union (EU) and its member states. Biogas production had increased in the EU, encouraged by the renewable energy policies, in addition to economic, environmental and climate benefits, to reach 18 billion m³ methane (654 PJ) in 2015, representing half of the global biogas production. In the EU, biogas delivered 127 TJ of heat and 61 TWh of electricity in 2015; about 50% of total biogas consumption in Europe was destined to heat generation.

Raha et al. (2014) stated that the Indian Government's National Biogas and Manure Management Programme (NBMMP) sought to deliver renewable energy services to households across the country by facilitating the deployment of family-sized (<6 m³) anaerobic (biogas) digesters. NBMMP policy was implemented at three levels, from government and state nodal agency, via private contractors to households, creating multiple institutional arrangements. The top-down, supply-side approach to policy enabled the government to set targets and required the individual states to deploy the scheme, which benefits households who could afford to participate. NBMMP delivered improved energy service outcomes to a majority of households, although the level of knowledge and understanding of the technology amongst users was limited. Training and education of householders, and particularly women, was needed in relation to the maintenance of digesters, feedstock suitability and the environmental and potential livelihood benefits of digestate.

Mittal et al. (2018) corroborated that biogas had emerged as a promising renewable technology to convert agricultural, animal, industrial and municipal wastes into energy. Biogas development could be integrated with strategies to improve sanitation as well as reduce indoor air pollution and greenhouse gases. Currently, the total biogas production in India was 2.07 billion

m³/year. This was quite low compared to its potential, which is estimated to be in the range of 29–48 billion m³/year. Biogas dissemination in India was affected by various waste, renewable energy, and urban policies. Barriers were therefore identified individually for rural and urban biogas systems existing in India using decomposition analysis.

Aim: This study was undertaken to appraise the usage of biogas among families in Uttara Karnataka district, South India.

Objectives:

- ❖ To assess the socio-demographic data among biogas users.
- ❖ To determine the factors associated with the selection of biogas for household purpose.
- ❖ To gauge the benefits regarding the use of biogas.

Hypotheses:

H₀₍₁₎ The families in Uttara Karnataka did not consider any factors when selecting the usage of biogas for their household purpose.

H₀₍₂₎ The families are not aware of the benefits regarding the use of biogas.

Limitation of The Study: The study was limited to 100 families in Uttara Karnataka district of South India.

Methodology:

The study was structured to elicit data on biogas usage among families in Uttara Karnataka district of South India. A questionnaire was formulated to obtain information on the families' knowledge regarding use of biogas for household activities. The survey method was used and questionnaire cum interview schedule was the tool used. Random sampling technique was selected for this study. The data collected was compiled; analyzed, interpreted and statistical tests were applied to draw significant interference.

Results and Discussion:

The analyzed data and corresponding discussions are presented below:

Socio-demographic data revealed that most (41%) of the respondents belonged to the age group of 30-40 years; with majority of them being women. Most (43%) of the respondents' families earned between Rs 10,000-20,000 per month. Most (51%) of the respondents' occupation was agriculture, 22 percent of the respondents were self employed, 12 percent of the respondents worked in the private sector, with a smaller percentage being from the government sector and animal husbandry work spheres.

Fig-1 shows that majority (76%) of the respondents knew about the usage of biogas, while only 24 percent of the respondents were not aware of it. Also, majority of the respondents (76%) had knowledge on the use of biogas for various household purposes.

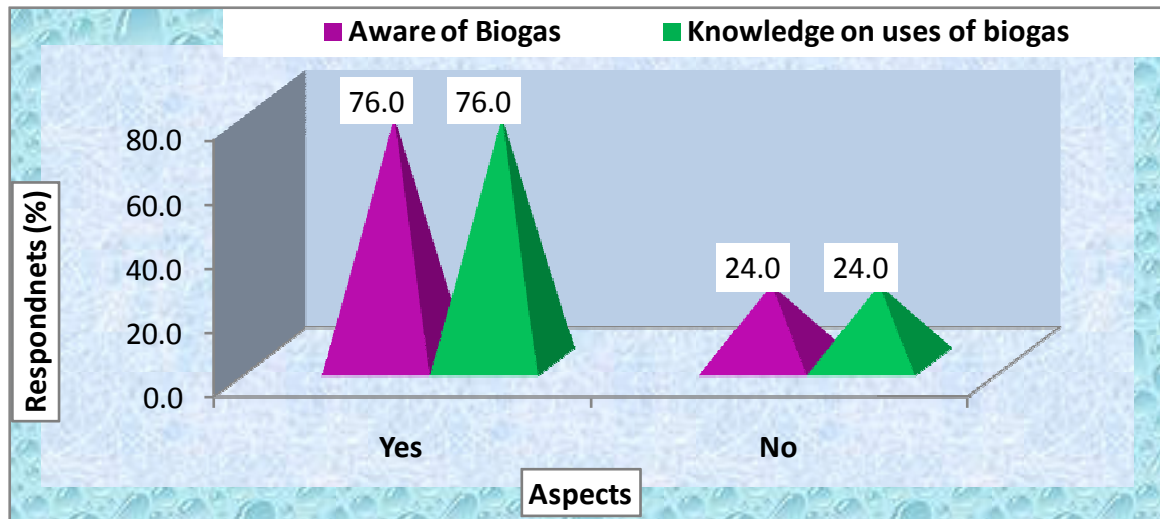


Fig.1: Awareness and Knowledge on Biogas Usage

Table-1: Classification of Respondents by Use of Biogas for Household Purposes
N=76

No.	Uses	Respondents			
		Yes		No	
		Number	Percent	Number	Percent
1	Cooking	34	44.7	42	55.3
2	Heating	04	5.3	72	94.7
3	Cooking & Heating	38	50.0	38	50.0

Table-1 depicts that most (50%) of the respondents knew that biogas could be used both for cooking and heating, 44.7 percent of the respondents knew that biogas was used for cooking, while only 5.3 percent stated that they used biogas only for heating purpose.

Table-2: Response on Preferential Ranking in Selecting Biogas

N=76

No.	Aspects	Preferential Ranking (%)				Average ranking	Response (%)
		I	II	III	IV		
1	Cost	17.1	13.2	10.5	59.2	2.64	66.0
2	Availability	28.9	25.0	22.4	23.7	2.79	69.8
3	Easy maintenance	26.3	31.6	34.2	7.9	2.89	72.3
4	Non-polluting	27.6	30.3	32.9	9.2	1.67	41.8

From Table-2 and Fig-2, it is clear that easy maintenance was considered first when selecting biogas for household use; second ranking was given to availability and third ranking given for cost factor. The fourth ranking was given for the non polluting nature of biogas by the respondents when selecting biogas for usage.

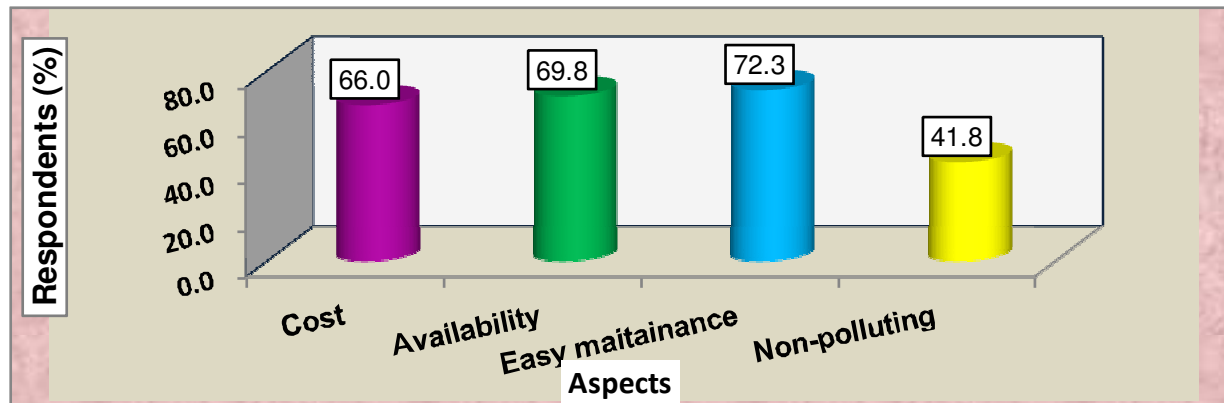


Fig. 2: Preferential ranking in selecting Biogas

Table-3: Response on Materials used in Biogas plants

N=76

No.	Raw materials	Respondents			
		Aware		Not aware	
		Number	Percent	Number	Percent
1	Animal dung	76	100.0	00	0.0
2	Animal urine	64	84.2	12	15.8
3	Kitchen waste	69	90.8	07	9.2
4	Human waste	46	60.5	30	39.5
5	Crop residue	50	65.8	26	34.2

@Multiple Response

Table-3 shows that all (100%) of the respondents were aware of animal dung being used as a raw material in a biogas plant, 90 percent knew that kitchen waste was being used with 84.2 percent knowing that animal urine was also used as a raw material. Also, 65.8 percent and 60.8 percent of the respondents were aware of crop residue and human waste being used as a raw material in biogas plants respectively.

Table-4: Classification of Respondents by Purpose of Slurry. Uses and Type of Biogas Used

N=76

Aspects	Response	Respondents	
		Number	Percent
Duration of Biogas usage	1 day	43	56.6
	2 days	24	31.6
	3 days	5	6.6
	4 days	4	5.3
Purpose of slurry	For agriculture use	43	56.6
	For gardening	26	34.2
	For both purposes	7	9.2
Type of biogas brands	Janatha	40	52.6
	KVIC	36	47.4
Total		76	100.0

It is seen from the above table that majority (56.6%) of the respondents knew that biogas could be used only for 1 day, while 31.6 percent, 6.6 percent and 5.3 percent of the respondents stated that it could be used for 2 days, 3 days and 4 days respectively.

Also, from Fig. 3, it is clear that majority (56%) of the respondents knew that slurry was used for agriculture, 34.2 percent of the respondents knew it could be used for gardening whereas only 9.2 percent stated they did not know either aspect. A larger number (52%) of the respondents knew about the Janatha brand of biogas, whereas only 47.4 percent knew about KVIC brand of biogas.

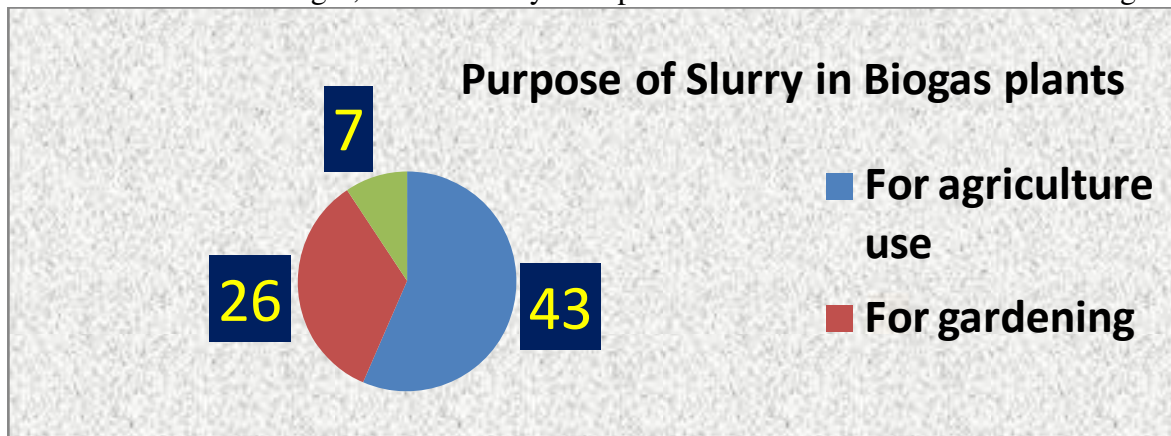


Fig-3: Classification of Respondents by Purpose of Slurry.

Table-5: Respondents by Source of Information on Use of Biogas

N=76

No.	Source	Source of Information			
		Yes		No	
		Number	Percent	Number	Percent
1	Magazine	11	14.5	65	85.5
2	Modal agencies	11	14.5	65	85.5
3	Newspaper	16	21.1	60	78.9
4	Demonstration	10	13.2	66	86.8
5	Pamphlets	3	3.9	73	96.1
6	Relatives/Friends	46	60.5	30	39.5

@Multiple Response

Table-5 shows that majority (60.5%) of the respondents' source of information regarding the usage of biogas was from their relatives and friends who had utilized it earlier, 21.1 percent from the newspapers, 14.5 percent from magazines and modal agencies, 13.2 percent from demonstration, whereas only 3.9 percent of the respondents' source of information was from the pamphlets.

Table-6: Aware of Benefits Regarding the Use of Biogas at Home

N=76

No.	Benefits of Biogas Usage	Awareness	
		N	%
1	Provides a non-polluting and renewable source of energy	74	97.4
2	Efficient way of energy conservation (saves fuel wood)	72	94.7
3	Saves women from the job of collection and carrying of firewood, exposure to smoke in the kitchen, and time consumed for cooking and cleaning of utensils.	70	92.1
4	Process produces organic manure, which can supplement or even replace chemical fertilizers.	66	86.8

5	Leads to improvement in the environment, and sanitation and hygiene.	43	56.6
6	Provides a source for decentralized power generation.	49	64.4
7	Leads to employment generation in the rural areas	51	67.1
8	Household waste and biowastes can be disposed of usefully and in a healthy	69	90.8

@Multiple Response

Table-6 reveals that almost all (97.4%) of the respondents knew about the benefits of biogas, like providing a non-polluting and renewable source of energy, 94.2 percent stated that it was an efficient way of energy conservation, and 92.1 percent knew that it saved the women from the job of collection and carrying of firewood, exposure to smoke in the kitchen and time consumed for cooking and cleaning of utensils and household wastes.

Also, 86.8 percent of the respondents knew that the biogas processing produced organic manure, which could be used as a supplement for or even replace chemical fertilizers, 67.1 percent felt that use of biogas led to employment generation in the rural areas, while 64.4 percent stated it provided a source for decentralized power generation. Also, 56.6 percent of the respondents opined that biogas usage led to improvement in environmental conditions as well as enhanced the sanitation and hygienic conditions of their households.

Conclusion:

Most of the respondents were from the age group of 30-40 years with majority of them being women. Most families earned between Rs 10,000-20,000 per month with agriculture being the primary occupation.

Majority of the respondents were aware of use of biogas, while most of them knew that biogas could be used for various household purposes; with majority stating that it could be utilized for both cooking and heating. A larger percentage of the respondents considered easy maintenance of biogas usage giving it first ranking when selecting biogas for household use along with other factors, thus the hypothesis that the families in Uttara Karnataka did not consider any factors when selecting the usage of biogas for their household purpose was rejected.

Almost all the respondents knew that animal dung was the raw material used in a biogas plant apart from kitchen waste and other agricultural crop wastage being used too. Also, most of them stated that biogas could be used only for 1 day mainly for household purposes. Regarding their source of information about biogas use, majority of the respondents stated they knew about it from their relatives and friends who had used biogas themselves.

A larger percentage of the respondents stated being aware of the benefits of biogas like providing a non-polluting and renewable source of energy, as well as being an efficient mode of energy conservation, thus the hypothesis that the families are not aware of the benefits regarding the use of biogas was rejected.

Acknowledgements:

I thank Prof. Surendra H.S., Associate Professor, GKVK, Bangalore, for his help with the statistical analysis. I also thank all the authors named below for their references on this research topic.

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