Opinion, satisfaction level and suggestions regarding improved biomass stoves in rural households of Dharwad and Vijayapur districts, Karnataka

SHOBHA KASAR and RENUKA SALUNKE

Department of Family Resource Management, College of Community Science
University of Agricultural Sciences, Dharwad 580005 Karnataka, India
Email for correspondence: shobhadkasar@gmail.com

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ABSTRACT

A study in rural households of one village each of Dharwad and Vijayapur districts, Karnataka was conducted during the year 2016-17 to analyze the socio-economic status of the rural women and to know their opinion about usage and suggestions regarding improved biomass stove. The sample of the study comprised 120 rural women. The personaal interview method was used for collecting the data. The findings revealed that in both the villages majority of the rural women belonged to middle age group. Majority of the women were illiterate, agricultural labourers with medium income. Majority of the women belonged to small farmer category. Majority of them opined that improved biomass stove reduced time consumption and fuel consumption, lead to less smoke in the kitchen, more cleanliness and no fire coming out of the stove. It also enabled faster cooking. Based on the usage pattern and characteristics of stove majority of the women suggested that there should be subsidy on the stove, wider space to feed fuelwood in the stove and it should be brought within the reach of all the families.

Keywords: Opinion; satisfaction level; suggestions; biomass stove; rural women

INTRODUCTION

Since about 1.5 billion people in the world use traditional stoves for cooking (and heating) efforts to improve the efficiency of cooking stoves have been increasingly made in the developing world. Traditional stoves can range from three-stone open fires to substantial brick-and-mortar models and ones with chimneys. In addition the nature of the improved status has various dimensions. For example stoves can be designed to improve energy efficiency and remove smoke from the indoor living space.

For people in developed countries burning fuelwood in an open hearth evokes nostalgia and romance. But in developing countries the harsh reality is that several billion people, mainly women and children, face long hours collecting fuelwood which is burned inefficiently in traditional biomass stoves. The smoke emitted into their homes exposes them to pollution levels 10-20 times higher than the maximum standards considered safe in developed countries (Barnes et al 2012).

From an early age many rural women across the developing world learn to cook for their families using open-fire stoves in poorly-ventilated kitchens.

Over the years they become accustomed to incessant coughing and watering of the eyes which are symptomatic of overexposure to indoor cooking smoke. Also affected are their young children who spend many hours a day in or near the indoor cooking area. Rural families typically spend a significant number of hours each week collecting biomass fuels such as dried wood lying on the ground, small trees and branches, agricultural residue, animal dung etc.

Such a pattern of household energy use and local fuel collection is linked to poor health and local environmental pressure is more similar to a syndrome that continues using biomass as their main cooking source for decades to come. While the world's rural poor may use improved biomass stove, the more urgent need is to improve their current household energy use. Many symptoms of this invisible syndrome can be treated effectively with improved stoves using existing

biomass fuels. As a result indoor pollution from cooking smoke will be reduced helping to mitigate respiratory and other diseases. In addition less time will be required for cooking meals and collecting biomass fuels.

METHODOLOGY

The present study was conducted in Timmapur and Bhaganagar villages of Dharwad and Vijayapur districts of Karnataka respectively. The total sample size was 120 with 60 samples each from Timmapur and Bhaganagar villages. Multistage random sampling technique procedure was adopted for selection of the samples.

The data were collected regarding usage pattern of improved biomass stove in rural households. The interview schedule was used for collecting the data that were analysed with the help of percentage, frequency, mean score and t-test.

RESULTS and DISCUSSION

Socio-economic profile of the respondents

Table 1 shows that in both Timmapur and Bhaganagar villages majority (54.16%) of the women belonged to middle age group (31 to 50 years), were illiterate (78.33%) and agricultural labourers (60.83%). Majority of them had medium family size (51.66%). In overall majority of them were in the medium income group (55.83%).

Satisfaction level of women while using improved biomass stove vs traditional stove

Data given in Table 2 show that in Timmapur extreme satisfaction was expressed by 50.00 per cent women with overall satisfaction on improved stove followed by 46.70 per cent who expressed that there was less soot on walls and reduced workload for fuelwood collection (26.70%) due to the use of improved stove. Under the satisfaction level 88.30 per cent women expressed that improved stove consumed low fuel followed by 83.30 per cent expressing that it had low time consumption and 78.30 per cent stating that it did faster cooking. Under good category majority of the women (66.70%) stated that it gave free time for other activities. Majority women (96.70%) were dissatisfied with the statement that it did not require constant supervision.

In Bhaganagar extreme satisfaction was expressed by 70.00 per cent women wrt overall satisfaction followed by 53.30 per cent who opined that the stove was safe to the children. Under satisfaction level 65.00 per cent women mentioned that it lead to cleanliness followed by 61.70 per cent who expressed that no fire comes out of the stove. Under the good category majority (95.00%) opined that it gave free time for other activities followed by 80.00 per cent who expressed that the stove was suitable for all cooking vessels. In this case all respondents were

Table1. Socio-economic profile of the rural women (n= 120)

Variable	Category	Timmapur (n= 60)	Bhaganagar (n= 60)	Total (n= 120)
Age (years)	Young (<30)	9 (15.00)	17 (28.30)	26 (21.66)
	Middle (31-50)	31 (51.70)	34 (56.70)	65 (54.16)
	Old (>51)	20 (33.30)	9 (15.00)	29 (24.16)
Education (standard)	Illiterate	48 (80.00)	46 (76.70)	94 (78.33)
	Primary school (1-4)	7 (11.70)	7 (11.70)	14 (11.66)
	Middle school (5-7)	5 (8.30)	6 (10.00)	11 (9.16)
	High school (8-10)	-	1 (1.70)	1 (0.83)
Occupation	Agricultural labourer	59 (98.30)	14 (23.30)	73 (60.83)
	Agriculture	1 (1.70)	46 (76.70)	47 (39.16)
	Subsidiary	-	-	-
	Salaried job	-	-	-
Family size (number of family members)	Small (<3)	13 (21.70)	22 (36.70)	35 (29.16)
	Medium (4-6)	34 (56.60)	28 (46.60)	62 (51.66)
	Large (> 6)	13 (21.70)	10 (16.70)	23 (19.16)
Annual income of the family (Rs '000)	Low (<60)	30 (50.00)	4 (6.66)	34 (28.33)
	Medium (60 to 120)	27 (45.00)	40 (66.66)	67 (55.83)
	High (>120)	3 (5.00)	16 (26.70)	19 (15.83)

Figures in parentheses indicate percentage values

Table 2. Satisfaction level of women while using improved biomass stove vs traditional stove (n=120)

Benefit	ES		S		G		DS	
	TS	IS	TS	IS	TS	IS	TS	IS
Timmapur								
No fire comes out of the stove	-	2 (3.3)	-	38 (63.30)	7 (11.66)	20 (33.30)	53 (88.33)	-
Continuity of fire burning	-	-	-	30 (50.00)	19 (31.70)	30 (50.00)	41 (68.30)	-
Equal distribution of flame	-	-	-	40 (66.70)	21 (35.00)	20 (33.30)	39 (65.00)	-
No smoke problem	-	7 (11.70)	-	44 (73.30)	-	9 (15.00)	60 (100.00)	-
Less soot on walls	-	28 (46.70)	-	20 (33.30)	-	12 (20.00)	60 (100.00)	-
No off-smell in food	-	-	-	32 (53.30)	22 (36.70)	28 (46.70)	38 (63.30)	-
Low fuel consumption	-	2 (3.30)	-	53 (88.30)	-	5 (8.30)	60 (100.00)	-
Faster cooking	-	-	16 (26.70)	47 (78.30)	44 (73.30)	13 (21.70)	-	-
Low time consumption	-	2 (3.30)	-	50 (83.30)	17 (28.30)	8 (13.30)	43 (71.70)	-
Reduced workload for fuelwood collection	-	16 (26.70)	-	34 (56.70)	-	10 (16.66)	60 (100)	-
Free time for other activities	-	-	-	20 (33.30)	10 (16.70)	40 (66.70)	50 (83.30)	-
Constant supervision not required	-	-	-	-	-	2 (3.30)	60 (100)	58 (96.70)
Suitable for all cooking vessels	-	-	-	22 (36.70)	60 (100.00)	38 (63.30)	-	-
Cleanliness	-	5 (8.30)	-	44 (73.30)	-	11 (18.30)	60 (100.00)	-
Easy to maintain	-	2 (3.30)	-	46 (76.70)	16 (26.70)	12 (20.00)	44 (73.30)	-
Safe to small children	-	-	-	20 (33.30)	-	40 (66.70)	60 (100.00)	-
Overall satisfaction	-	30 (50.00)	-	30 (50.00)	60 (100.00)	-	-	-
Bhaganagar								
No fire comes out of the stove	-	-	-	37(61.70)	4 (6.70)	23 (38.30)	56 (93.30)	-
Continuity of fire burning	-	-	-	26 (43.30)	29 (48.30)	34 (56.70)	31 (51.70)	-
Equal distribution of flame	-	-	-	31 (51.70)	15 (25.00)	29 (48.30)	45 (75.00)	-
No smoke problem	-	17 (28.30)	-	28 (46.70)	-	15 (25.00)	60 (100.00)	-
Less soot on walls	-	28 (46.70)	-	17 (28.30)	-	15 (25.00)	60 (100.00)	-
No off-smell in food	-	12 (20.00)	-	31 (51.70)	11 (18.30)	17 (28.30)	49 (81.70)	-
Low fuel consumption	-	24 (40.00)	-	29 (48.30)	-	7 (11.70)	60 (100.00)	-
Faster cooking	-	-	-	22 (36.70)	51 (85.00)	38 (63.30)	9 (15.00)	-
Low time consumption	-	25 (41.70)	-	26 (43.30)	17 (28.30)	9 (15.00)	52 (86.70)	-
Reduced workload for fuelwood collection	-	16 (26.70)	-	25 (41.70)	-	19 (31.70)	60 (100.0)	
Free time for other activities	-	-	-	3 (5.00)	10 (16.70)	57 (95.00)	50 (83.30)	-
Constant supervision not required	-	-	-	-	-	-	60 (100.00)	60 (100.0)
Suitable for all cooking vessels	-	-	-	12 (20.00)	60 (100.00)	48 (80.00)	-	-
Cleanliness	-	8 (13.30)	-	39 (65.00)	-	13 (21.70)	60 (100.00)	-
Easy to maintain	-	2 (3.30)	-	30 (50.00)	17 (28.30)	28 (46.70)	43 (71.70)	-
Safe to small children	-	32 (53.30)	-	28 (46.70)	-	-	60 (100.00)	-
Overall satisfaction	-	42 (70.00)	-	18 (30.00)	60 (100.00)	-	-	-

ES: Extremely satisfied, S: Satisfied, G: Good, DS: Dissatisfied, TS: Traditional stove, IS: Improved stove

Table 3. Mean score of satisfaction level of women while using improved biomass stove vs traditional stove (n= 120)

Benefit	Timmapur (n= 60)			Bhaganagar (n= 60)		
	Traditional stove	Improved biomass stove	t-value	Traditional stove	Improved biomass stove	t-value
No fire comes out of the stove	2.11	3.70	19.00*	2.06	3.61	19.29*
Continuity of fire burning	1.68	2.50	9.18*	1.48	2.43	10.36*
Equal distribution of flame	1.35	2.66	15.08*	1.25	2.51	14.71*
No smoke problem	2.00	3.96	29.31*	2.00	4.03	21.40*
Less soot on walls	1.00	3.26	22.56*	1.00	3.21	20.80*
No off-smell in food	2.36	3.53	14.68*	2.18	3.91	14.92*
Low fuel consumption	2.00	3.95	44.32*	2.00	4.20	26.54*
Faster cooking	3.26	3.78	6.41*	2.85	3.36	6.15*
Low time consumption	2.28	3.88	21.07*	2.13	4.26	19.83*
Reduced workload for fuelwood collection	1.00	3.10	24.79*	1.00	2.95	19.65*
Free time for other activities	2.16	3.33	13.52*	2.16	3.00	15.05*
Constant supervision not required	2.00	2.03	1.42*	2.00	2.00	0.65**
Suitable for all cooking vessels	3.00	3.36	5.84*	3.00	3.20	3.84*
Cleanliness	2.00	3.90	28.80*	2.00	3.91	25.13*
Easy to maintain	2.26	3.83	16.81*	3.56	2.28	12.35*
Safe to small children	1.00	2.33	21.72*	1.00	2.53	26.60*
Overall satisfaction	3.00	4.50	23.04*	3.00	4.40	11.73*

*Significant at 0.05 level, **Significant at 0.01 level

dissatisfied with the statement that constant supervision was not required while using the improved stove.

Mean score of satisfaction level of women while using improved biomass stove vs traditional stove

As per the data given in Table 3 in Timmapur maximum mean score of satisfaction level (4.50) was given by the women to overall satisfaction followed by no smoke problem (3.96), low fuel consumption (3.95) and low time consumption (3.88). However in Bhaganagar maximum mean score was given to overall satisfaction (4.40) followed by low time consumption (4.26), low fuel consumption (4.20) and no smoke problem (4.03). This shows that though at two locations the scores differed the sequence of major benefits was the same. The differences between the scores given to the benefits of improved stove v/s traditional stove were significant with high scores given to the improved stove.

Suggestions given by the rural women

Data given in Table 4 show that majority of the women in Timmapur (93.33%) suggested that there should be provision of subsidy on the stove followed by 75.00 per cent suggesting that space in the stove should be wider to feed fuelwood, should be popularized (50.00%) and should be bigger in size (50.00%). As compared to Timmapur in Bhaganagar majority (86.66%) women suggested that there should be provision of subsidy on the stove followed by 76.66 per cent suggesting that space in it should be wider to feed fuelwood, should be available to the all households (51.66%) and should be popularized (31.66%).

In their studies Bhojvaid et al (2014) reported the variation in perceptions of and preferences for improved cook stoves in Uttar Pradesh and Uttarakhand as revealed through a series of semi-structured focus groups and interviews from 11 rural villages or hamlets. They found cautious interest in new improved cook stoves technologies and observed that preferences for them were positively related to perceptions of health and time savings. The results suggested that efforts to increase adoption and use of improved cook stoves in rural India would likely require a combination of supply-chain improvements and carefully designed social marketing and promotion campaigns and possibly incentives to reduce the up-front cost of stoves. Yadav et al (2009) did a study in Singran and Bhojraj villages

Table 4. Suggestions given by the rural women to further improve the improved biomass stove (n= 120)

Suggestion	Timmapur (n= 60)	Bhaganagar (n= 60)
Space should be wider to feed fuelwood	45 (75.00)	46 (76.66)
The stove should be bigger in size	30 (50.00)	17 (28.33)
The pot hole of the stove should be wider	17 (11.66)	16 (26.66)
The stove should be heavy to bear the load of heavy items	10 (16.66)	11 (18.33)
Stove should be available to all households	23 (38.33)	31 (51.66)
Stove should be popularized	30 (50.00)	19 (31.66)
There should be provision of subsidy on the stove	56 (93.33)	52 (86.66)

Multiple responses, Figures in parentheses indicate percentage values

of Hisar district, Haryana to assess the advantages of improved mud stove. The two direct advantages reported by quite high majority of the respondents were equal distribution of flame and decrease in soot deposition on utensils. Other direct advantages in descending order were consistency of fire burning, increased ease in cooking, better quality chapatis and decrease in fuel and time consumption In terms of reduction in smoke generation and feasibility of using any size utensils were top-ranked indirect advantages very closely followed by decrease in blowing frequency to burn fire and reduction in wavering of flame. Decrease in contact of flame with hands and reduced health hazards were other indirect advantages of improved mud stove.

CONCLUSION

Women in both the villages showed their interest in the improved stove as compared to traditional stove. In Timmapur extreme satisfaction was expressed by 50.00 per cent women with overall satisfaction on improved stove followed by 46.70 per cent who expressed that there was less soot on walls. In Bhaganagar extreme satisfaction was expressed by 70.00 per cent women wrt overall satisfaction followed by 53.30 per cent who opined that the stove was safe to the children. in Timmapur maximum mean score of satisfaction level (4.5) was given by the women to overall satisfaction followed by no smoke problem (3.96) and in Bhaganagar maximum mean score was given to overall satisfaction (4.4) followed by low time consumption (4.26).

Majority of the women in Timmapur (93.33%) suggested that there should be provision of subsidy on the stove followed by suggestion that space in it should be wider (75.00%) whereas in Bhaganagar majority (86.66%) women suggested that there should be provision of subsidy on the stove followed by suggestion that space should be wider to feed fuelwood (76.66%).

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