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Knowledge Level and Adoption Rate of Drudgery-Reducing Technologies among Farmers

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Abstract

The majority of India's population is engaged in agriculture, an occupation that is largely carried out through traditional methods and is therefore regarded as drudgery-prone. Vasantao Naik Marathwada Krishi Vidyapeeth (VNMKV), Parbhani, under the All India Coordinated Research Project (Women in Agriculture), has developed several drudgery-reducing technologies for farm women of the Marathwada region, namely the Cotton-Picking Apron, Gopal Khore, Revolving Milking Stool, Trishul Weeder and Mittens (Janai Hatmoje). The present study was conducted in the Parbhani district of the Marathwada region of Maharashtra during the year 2025, with the specific objective of assessing the knowledge level and adoption rate of these drudgery-reducing technologies among farmers. Six villages previously and currently covered under the AICRP (WIA) programme were selected randomly, and a sample of 120 respondents, comprising 60 beneficiaries and 60 non-beneficiaries of the technologies, was drawn at the rate of 20 respondents (10 beneficiaries and 10 non-beneficiaries) from each village. An ex-post-facto research design was used, and data were collected through a well-structured interview schedule. Frequency, percentage, mean and standard deviation were used to interpret the findings. The beneficiaries possessed consistently higher basic, technical and working knowledge (78 to 100%) about all five drudgery-reducing technologies as compared to the non-beneficiaries (50 to 92%). Technology-wise, the Revolving Milking Stool and Mittens recorded the highest adoption index (86.67% each), followed by the Cotton-Picking Apron (83.33%) and Trishul Weeder (80.00%), while the Gopal Khore recorded a markedly low adoption index (10.00%). At the overall level, two-thirds of the beneficiaries (66.67%) had a medium level of adoption, 20.00 per cent had a high level, and 13.33 per cent had a low level of adoption (mean adoption score = 3.47).

Keywords: Knowledge, Adoption, Drudgery, Technologies, Beneficiaries, Non-beneficiaries, VNMKV

Introduction

Agriculture plays the most significant role in the Indian economy, contributing 18.5 per cent of India's GDP and employing around 50 per cent of the workforce. Most places use traditional methods, so agriculture is considered a drudgery-prone occupation. This perspective emerged as a result of the absence of contemporary technology and better methods in the day-to-day operations of agriculture. Women have made a very significant contribution to agriculture, and only female farmers carry out more than 60 per cent of farm-related tasks among the three main farming communities in India, namely male, female and young (Bindeshwari Pandro, 2020) ^[2]. Farmers labour by hand in the majority of locations, which results in the waste of labour, money and time.

Manual work without improved technology creates drudgery. Conventional tools typically require bending or a high level of physical strength to operate, and farmers use these traditional tools due to unawareness or forced conditions. Drudgery-reducing technologies can help prevent long-term health issues and injuries, and they are crucial for reducing the time and effort required to complete daily tasks. Vasantao Naik Marathwada Krishi Vidyapeeth (VNMKV), Parbhani, under the All India Coordinated Research Project (Women in Agriculture), College of Community Science, has developed various drudgery-reducing technologies specifically suited to the needs of farm women of the Marathwada region, including the Cotton-Picking Apron, Gopal Khore, Revolving Milking Stool and Stand, Trishul

Weeder, and Mittens (Janai Hatmoje). These tools have been distributed and demonstrated among farmers in selected villages of Parbhani district; however, the extent of their knowledge and adoption among the farmers remains a question for investigation.

Although the benefits of drudgery-reducing technologies are well recognized, the adoption of these technologies varies widely across regions and demographic groups, and several factors affect adoption rates, including access to finances, educational attainment, the presence of technical support, and cultural attitudes towards innovation. Bhushan *et al.* (2016) [1]. reported that awareness about improved farm tools was lacking among most respondents and that 94.7 per cent were willing to use improved tools if made available. Knowledge is the foundation for the adoption of any new technology, and the extent of knowledge and adoption among farmers therefore has a considerable bearing on the effectiveness of technology dissemination. Keeping this background in view, the present study was undertaken with the specific objective of assessing the knowledge level and adoption rate of drudgery-reducing technologies developed by VNMKV, Parbhani, among farmers.

Objective

To assess the knowledge level and adoption rate of drudgery-reducing technologies among farmers.

Methodology

The present study was purposively confined to the Parbhani district of the Marathwada region of Maharashtra state, since it is in this district that the College of Community Science of Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, and the AICRP on Home Science (Women in Agriculture) unit have been engaged for several years in developing and popularizing drudgery-reducing tools among farm families. Six villages that had been covered, either currently or in the recent past, under the outreach and demonstration activities of the AICRP (WIA) unit were identified from within Parbhani taluka and selected by simple random sampling. The villages so selected were Daithana, Pokharni, Brahmangaon, Singanapur, Kumbhkaran Takli and Indewadi.

Within each village, the sampling frame was divided into two groups on the basis of technology-use status: farm women who had adopted one or more of the five drudgery-reducing technologies developed by the College of Community Science (beneficiaries), and farm women from the same village who had not adopted any of these technologies (non-beneficiaries). Ten respondents were selected at random from each of these two groups per village, giving a final sample of 60 beneficiaries and 60 non-beneficiaries, i.e., 120 respondents in all. An ex-post-facto research design was used for the study, and data were collected through personal interviews using a well-structured, pre-tested interview schedule during September 2025. The data so collected were classified, tabulated and analysed using frequency,

percentage, mean and standard deviation to draw meaningful conclusions.

Knowledge was operationally defined as a person's personal understanding of drudgery-reducing technology, and was assessed under three heads, namely basic knowledge, technical knowledge and working knowledge, in respect of five drudgery-reducing technologies: Cotton-Picking Apron (C.P.A.), Trishul Weeder (T.W.), Gopal Khore (G.K.), Revolving Milking Stool (R.M.S.) and Mittens (M). Basic knowledge covered aspects such as having heard about the technology, its drudgery-reducing potential, time and energy saving, ease of use, and knowledge of cost, and was assessed among both beneficiaries and non-beneficiaries. Technical knowledge covered the procedure of use, purpose, functions of equipment, advantages, and source/place of purchase and was likewise assessed among both groups. Working knowledge, comprising proper operation, signs of malfunction, precautionary measures, cleaning frequency, and technology life span, was assessed only among the beneficiaries, since it involved practical knowledge gained from the actual use of the technology. For all three components, a two-point scale of Yes (1) and No (0) was used, and the score obtained by each respondent was calculated.

Adoption referred to the degree to which beneficiaries accepted and used the selected drudgery-reducing technologies. The respondent was asked about each technology and whether she had used it; adoption was scored one (fully adopted), while non-adoption received a zero, giving each respondent a score ranging from 0 to 5. The technology-adoption index was calculated separately for each technology using the formula:

Adoption Index (%) = (Number of respondents who adopted the technology / Total number of respondents) × 100

Each respondent's scores for the five technologies were summed to obtain the overall adoption score (ranging from 0 to 5), and respondents were categorised into low, medium and high adoption levels on the basis of mean and standard deviation (mean = 3.47, S.D. = 0.98), as shown below.

Categorization of beneficiaries according to overall adoption level

Table 1: Categories of Adoption Level

Adoption Level	Score Range
Low	0-2
Medium	3-4
High	5

Results and Discussion

1. Basic knowledge about drudgery-reducing technologies

Table 2 shows the extent of basic knowledge possessed by both beneficiaries and non-beneficiaries about the five drudgery-reducing technologies.

Table 1: Assessment of basic knowledge about drudgery-reducing farm technologies from the farm women (n=120)

Basic Knowledge	C.P.A	T.W	G.K	R.M.S	M
Beneficiaries (n=60)					
Heard about technology	58 (96.67)	55 (91.67)	60 (100.00)	54 (90.00)	57 (95.00)
Drudgery reducing	56 (93.33)	53 (88.33)	57 (95.00)	53 (88.33)	55 (91.67)
Time and energy saving	56 (93.33)	50 (83.33)	52 (86.67)	54 (90.00)	56 (93.33)
Easy to use	54 (90.00)	52 (86.67)	56 (93.33)	50 (83.33)	54 (90.00)
Knowledge of cost	52 (86.67)	48 (80.00)	57 (95.00)	42 (70.00)	50 (83.33)
Non-Beneficiaries (n=60)					
Heard about technology	53 (88.33)	44 (73.33)	55 (91.67)	47 (78.33)	51 (85.00)
Drudgery reducing	44 (73.33)	38 (63.33)	40 (66.67)	43 (71.67)	51 (85.00)
Time and energy saving	52 (86.67)	40 (66.67)	52 (86.67)	38 (63.33)	40 (66.67)
Easy to use	50 (83.33)	32 (53.33)	36 (60.00)	35 (58.33)	47 (78.33)
Knowledge of cost	48 (80.00)	40 (66.67)	32 (53.33)	30 (50.00)	37 (61.67)

Figures in parentheses indicate percentages

Table 1 shows that a large proportion of the beneficiaries (83 to 100%) had basic knowledge, i.e., they had heard about the technology and were aware of its purpose, potential for time and energy saving, ease of use, and cost in relation to all five technologies. A fairly high proportion of non-beneficiaries (50 to 92%) had heard about the technologies and had some basic knowledge, but their level of knowledge was consistently lower than that of the beneficiaries for every item and technology, with the gap being most pronounced for the Trishul Weeder and Gopal Khore. This could be because the beneficiaries received the technologies through the AICRP

(WIA) programme, along with orientation and demonstration, which reinforced their basic knowledge, whereas non-beneficiaries received only incidental exposure through fellow farm women or extension functionaries. Similar findings were reported by Bhushan *et al.* (2016) ^[1] and Bindeshwari P. (2020) ^[2].

Technical knowledge about drudgery-reducing technologies

Table 2 shows the respondents' technical knowledge regarding the procedure of use, purpose, functions of equipment, advantages, and source of purchase.

Table 2: Assessment of technical knowledge about drudgery-reducing farm technologies from the farm women (n=120)

Technical Knowledge	C.P.A	T.W	G.K	R.M.S	M
Beneficiaries (n=60)					
Procedure of use	57 (95.00)	55 (91.67)	60 (100.00)	54 (90.00)	57 (95.00)
Purpose	54 (90.00)	52 (86.67)	57 (95.00)	50 (83.33)	52 (86.67)
Functions of equipment	56 (93.33)	48 (80.00)	52 (86.67)	46 (76.67)	54 (90.00)
Advantages	55 (91.67)	47 (78.33)	50 (83.33)	52 (86.67)	55 (91.67)
Source/place of purchase	52 (86.67)	48 (80.00)	57 (95.00)	42 (70.00)	50 (83.33)
Non-Beneficiaries (n=60)					
Procedure of use	45 (75.00)	40 (66.67)	48 (80.00)	36 (60.00)	40 (66.67)
Purpose	44 (73.33)	38 (63.33)	42 (70.00)	31 (51.67)	35 (58.33)
Functions of equipment	40 (66.67)	36 (60.00)	42 (70.00)	32 (53.33)	38 (63.33)
Advantages	36 (60.00)	32 (53.33)	30 (50.00)	29 (48.33)	32 (53.33)
Source/place of purchase	40 (66.67)	30 (50.00)	44 (73.33)	30 (50.00)	37 (61.67)

Figures in parentheses indicate percentages

Table 2 shows that beneficiaries had a relatively higher level of technical knowledge about the selected technologies. Beneficiaries' knowledge of the purpose ranged from 83.33 to 95.00 per cent, knowledge of the procedure of use from 90.00 to 100.00 per cent, knowledge of equipment functions from 76.67 to 93.33 per cent, knowledge of advantages from 78.33 to 91.67 per cent, and knowledge of the source/place of purchase from 70.00 to 95.00 per cent. Technical knowledge was significantly lower among non-beneficiaries, whose knowledge of the purpose ranged from 51.67 to 70.00 per cent, knowledge of the procedure of use from 60.00 to 80.00 per cent, knowledge of benefits from 48.33 to 60.00 per cent, knowledge of functions from 53.33 to 70.00 per cent, and

awareness of the source/place of purchase from 50.00 to 73.33 per cent. Thus, the findings indicate a clear knowledge gap between beneficiaries and non-beneficiaries, especially in terms of the technical aspects of the technologies. Bindeshwari P. (2020) ^[2] reported similar results.

Working knowledge about drudgery-reducing technologies

Working knowledge requires actual possession and regular use of the technology. This aspect was evaluated only among beneficiaries (n=60); none of the non-beneficiaries could respond to these items, as they had never used the technologies. The results are presented in Table 3.

Table 3: Assessment of working knowledge about drudgery-reducing farm technologies among beneficiaries (n=60)

Working Knowledge	C.P.A	T.W	G.K	R.M.S	M
Beneficiaries (n=60)					
Proper working	58 (96.67)	55 (91.67)	60 (100.00)	57 (95.00)	57 (95.00)
Signs of improper functioning	54 (90.00)	50 (83.33)	58 (96.67)	54 (90.00)	55 (91.67)
Precautionary measures	52 (86.67)	48 (80.00)	54 (90.00)	50 (83.33)	54 (90.00)
Frequency of cleanliness	55 (91.67)	47 (78.33)	56 (93.33)	52 (86.67)	55 (91.67)
Life span of technology	50 (83.33)	49 (81.67)	58 (96.67)	50 (83.33)	56 (93.33)
Non-Beneficiaries: Nil (not assessed, as none had used the technologies)					

Figures in parentheses indicate percentages

Table 3 shows that the beneficiaries had a high level of working knowledge. Knowledge of proper working procedures ranged from 91.67 to 100.00 per cent, knowledge of signs of improper functioning from 83.33 to 96.67 per cent, knowledge of precautionary measures from 80.00 to 90.00 per cent, knowledge of the frequency of cleanliness from 78.33 to 93.33 per cent, and knowledge of the life span of technology from 81.67 to 96.67 per cent. This could be because the beneficiaries were oriented and trained by scientists from the AICRP (WIA) unit at the time of

technology distribution, and continued use over time solidified their practical knowledge of tool maintenance and safe operation. This finding is consistent with Patil and Surekha (2016) ^[4], who reported that intervention programs improve rural women's knowledge of the technologies introduced to them.

Technology-wise extent of adoption

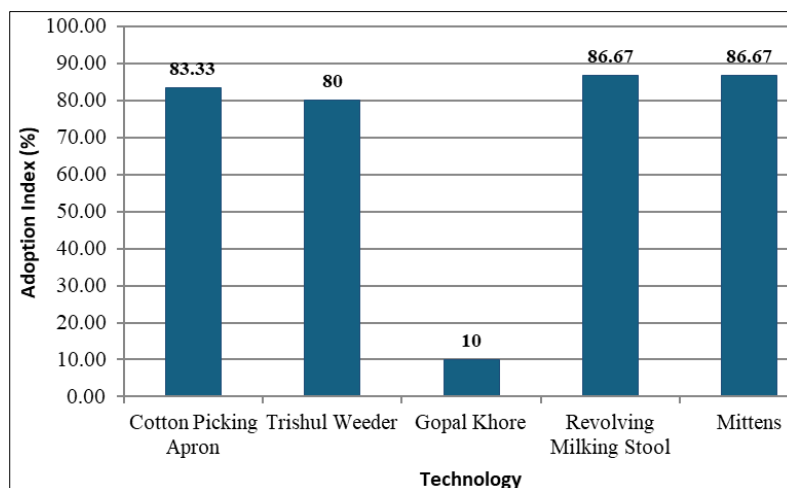
Table 4 shows the number of beneficiaries who fully adopted or did not adopt each of the five technologies, along with the adoption index and rank.

Table 4: Assessment of adoption of drudgery-reducing technologies among the beneficiary farm women (n=60)

Technologies	Fully Adopted	Not Adopted	Adoption Index (%)	Rank
Cotton Picking Apron (C.P.A.)	50	10	83.33	II
Trishul Weeder (T.W.)	48	12	80.00	III
Gopal Khore (G.K.)	6	54	10.00	V
Revolving Milking Stool (R.M.S.)	52	8	86.67	I
Mittens (M)	52	8	86.67	I

Table 4 shows that the Revolving Milking Stool and Mittens had the highest adoption index of 86.67 per cent each, followed by the Cotton-Picking Apron (83.33%) and Trishul Weeder (80.00%). The Gopal Khore had the lowest adoption

index of 10.00 per cent, with only 6 of the 60 beneficiaries fully adopting the technology. Surabhi *et al.* (2016) ^[5], found a similar variation in the extent to which different drudgery-reducing technologies were adopted.

**Fig 1:** Technology-wise adoption index of drudgery-reducing technologies**Overall adoption level**

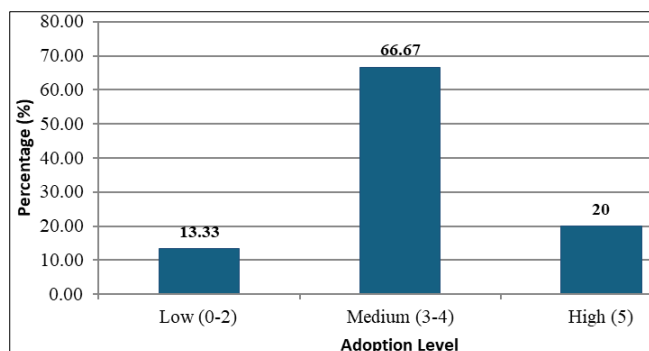
The overall adoption behavior of the beneficiaries was calculated using an adoption score, and the respondents were divided into low, medium, and high adoption categories

based on mean and standard deviation. The beneficiaries' average overall adoption score was 3.47, with a standard deviation of 0.98. The results are shown in Table 5.

Table 5: Distribution of beneficiaries according to overall adoption level (n=60)

Adoption Level	Score	Frequency	Percentage
Low	0-2	8	13.33
Medium	3-4	40	66.67
High	5	12	20.00
Total	-	60	100.00

Table 5 shows that nearly two-thirds of the beneficiaries (66.67%) had a medium level of overall adoption of drudgery-reducing technologies, 20.00 percent had a high level, and 13.33 per cent had a low level of adoption. This clearly shows that once technologies reach farm women, they tend to adopt and use the majority of them because they are simple, low-cost, and provide tangible relief from day-to-day farm and household drudgery. The relatively small proportion of respondents in the low adoption category can be attributed to individual technologies such as the Gopal Khore, which had a distinctly low adoption index, lowering some respondents' overall adoption score. Tiwari *et al.* (2021) [6], reported similar results, with a predominantly medium level of adoption of drudgery-reducing tools among farm women.

**Fig 2:** Distribution of respondents according to their overall adoption of drudgery-reducing technologies.

Conclusion

The beneficiaries of the drudgery-reducing technologies possessed a consistently higher level of basic, technical, and working knowledge (78 to 100%) about all five drudgery-reducing technologies as compared to the non-beneficiaries (50 to 92%); working knowledge could be assessed only among the beneficiaries, since it presupposes actual use of the technology. Technology-wise, the Revolving Milking Stool and Mittens recorded the highest adoption index (86.67% each, Rank I), followed by the Cotton-Picking Apron (83.33%, Rank II) and Trishul Weeder (80.00%, Rank III), while the Gopal Khore recorded a markedly low adoption index of 10.00 per cent (Rank V). At the overall level, two-thirds of the beneficiaries (66.67%) had a medium level of adoption, 20.00 per cent had a high level, and 13.33 percent had a low level of adoption (mean adoption score = 3.47). The majority of the beneficiaries thus had a medium to high level of adoption, and their knowledge was clearly higher than that of the non-beneficiaries; however, the degree of adoption varied greatly among the technologies, with the Gopal Khore having the lowest level of adoption and the Revolving Milking Stool and Mittens having the highest.

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