



# Retention Index: A Measure to Quantify the Retention of Rural Youth in Agriculture

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## **Authors' contributions**

*This work was carried out in collaboration between both authors. Both authors equally contributed. Both authors read and approved the final manuscript.*

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## **ABSTRACT**

Retention of rural youth in agriculture in rural areas has become an inevitable phenomenon in our country. The rural youth population of India is slowly deserting their origin and swarming toward the urban areas. This has several implications for the future of Indian agriculture and India's food security. Experts felt that there is a need to retain rural youths in agriculture because they can play a significant role in ensuring food security if they are encouraged to involve in agriculture farming. Having an insight into the rationale behind the retention of rural youth in agriculture is hence crucial. Bearing in mind this point of view, a study was conducted among 300 rural youths with an agricultural background. The retention of rural youth has been studied by developing a suitable measurement methodology that quantifies their retention in agriculture. The Retention Index was developed and the composite Retention Index worked out was 73.00. On the basis of the results of retention index these indicators are very important in the development of projects or programmes

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by policymakers, development agencies and extension functionaries should consider these indicators while preparing and planning programs or projects for the development of rural youth.

*Keywords: Index; policy; retention; rural youth; Maharashtra.*

## 1. INTRODUCTION

The global population is predicted to be around 8.6 billion by 2030 and 9.8 billion by 2050 [1]. Youth would represent around 21 per cent global population According to the International Bank for Reconstruction and Development report, the working-age population will outnumber the dependent population for a minimum of over 20 years (until 2040) in India [2]. India presently has the leading population of youth (356 million between 10-24 years age group) in the globe [3]. At present 50.00 per cent of India's population is below the age of 25 years and over 65.00 per cent below the age of 35 years. The majority of them live in rural areas. The population in the age group of 15-34 years increased from 353 million in 2001 to 430 million in 2011. Current predictions suggest a steady increase in the youth population to 464 million by 2021 and finally to decline to 458 million by 2026 [4]. Making India the world's youthful country with 64 per cent of its youth population within the working cohort [5]. Today's youth are tomorrow's hope. Rural youth are playing quite a significant role in almost every country in the world as they possess zeal and energy. However, India is losing more than 2,000 farmers every single day and that since 1991 the overall number of farmers has dropped by 15 million till 2013 [6].

The strain on the agricultural youth is solely because they are cognizant of their strength and dynamism. Rural youth are recognized as effective "change agents" and a precious human resource in every country. This noticeably seems to reflect a bright future since around half of this population (nearly 200 million) lives in rural areas, which may well be motivated and attracted professionally to agriculture and allied fields. Contrary to the present situation only around five per cent of the agricultural youth is currently getting engaged in agriculture [7].

It was concluded that "ARYA" project shows a positive impact on attracting and motivating unemployed rural youths in agriculture [8]. Rural youth retention in agriculture is a multi-dimensional concept that cannot be measured by a single metric alone. It can be better understood

by an aggregate of several indicators that capture many dimensions. The Retention Index also facilitates the comparison of rural youth progress across geographic regions over a period of time. It enables all the stakeholders to understand the big picture, measure progress, assess the needs of various social segments, identify the priority areas for development interventions and make policy advocacy. It empowers the policymakers towards policy dialogue and promotes accountability of the state agencies towards programmatic efforts.

## 2. RESEARCH METHODOLOGY

The present study was conducted during the year 2020-21 in two revenue districts from the Vidarbha region of Maharashtra state viz., Yavatmal (from Amravati revenue region) and Nagpur (from Nagpur revenue region). An exploratory research design was used for the investigation. Three talukas from each district and five villages from each taluka were selected with the highest youth population with an age group of 15 to 30 years [9]. A total of 300 respondents' rural youth were selected by random sampling method by using number table. The field-level data were collected from rural youth respondents by using a pretested interview schedule and collected data was tabulated and analyzed by relevancy weightage, percentage, mean, ranking techniques, coefficient of correlation ( $r$ ) and composite statistical methods for a conclusion.

### 2.1 Development of Retention Index

In this study, retention of rural youth in agriculture has been operationalised as empowering and keeping rural youth in rural areas to take up agriculture as a profession for sustainable livelihood in society. The existence of selected indicators are important to the retention of rural youth in agriculture. Keeping the objectives in view, an attempt has been made to measure the retention of rural youth in agriculture by taking into consideration all the indicators. The indicators were identified by reviewing the literature and as quoted by different authors. The procedure is adopted by [10] and [11] with

necessary modifications that have been used for the development of the retention index.

## 2.2 Operationalisation of Index

An index may be defined as a method of totaling or reducing a single composite series number on a number of distinct, but related variables expressed in dissimilar units of measurement

## 2.3 Identification and Relevancy Rating Scrutiny Indicators

The finishing inventory of indicators was subjected to expert opinions. The experts or judges were from the cadres of Assistant Professor and above in teaching, research and extension faculty of social science group of Dr. PDKV, Akola and other agriculture universities throughout India and scientists working in ICAR Institutions. Total 117 experts of 25 institutes in the field of social science. The experts were requested to specify whether each of the identified indicators was relevant and appropriate for inclusion in the Retention Index. Their responses were obtained on a three-point continuum viz., Most Relevant, Relevant and Not Relevant and scored as 2, 1 and 0 respectively. The responses received from the expert judges were analysed and the Relevancy Weightage (RW) of  $i^{\text{th}}$  indicator (RW<sub>i</sub>) was worked out by using the following formula.

$$\text{Relevancy weightage for each indicator (RW)} = \frac{(M \times R \times 2) + (R \times 1) + (N \times R \times 0)}{\text{Maximum Possible Score}}$$

Taking into consideration relevancy weightage, the indicators were screened for their relevancy. Accordingly, indicators having a relevancy weightage of more than 0.76 were considered for inclusion in the retention index. Using this procedure, twenty-one indicators were selected under the Retention Index the mean score presented in Table 1.

## 2.4 Quantification of Indicators

To develop a composite retention Index and to obtain meaningful conclusions, a separate index was developed for every indicator. The procedure has been followed as developed by [10] with essential modifications appropriate for the study. The details of the quantification of each indicator are furnished in Table 2.

## 2.5 Development and Standardization of Rural Youth Retention Index

### 2.5.1 Reliability of the Index

The reliability of the index indicates that it is stable and if measures the variable consistently from one time to another. For assessing the reliability index was administered to the 30 respondents in a non-sample area (10% of the total sample size). The index was applied to them two times at an interval of a fortnight. A product-moment correlation coefficient (r) was computed between two sets of scores was observed to be (0.92). It indicates quite high reliability and stability of the index. For testing the stability of the index, it was applied to 30 randomly selected beneficiaries by the two independent persons. The rank-order correlation coefficient (r) between the scores obtained by two independent judges was very high (0.90).

### 2.5.2 Validity of the index

The validity is the property of the index that ensures that the obtained Retention Index score correctly measures the variable they are supposed to measure. In the present case, the validity of the scale was established. A random sample of 15 rural youth with relatively high status and 15 rural youth with relatively low status were judged. The rank-order correlation between the scores of the two categories was quite high (0.86) and significant at a one percent level of probability. It strongly indicates the validity of the index.

## 3. RESULTS AND DISCUSSION

### 3.1 Retention Index of Rural Youth in Agriculture

Each key indicator was identified with sub-indicators. Both key and sub-indicators have been identified to work out the Retention Index (RI). The responses of the rural youth suitable for fabricating the Retention Index were carefully collected and presented in Table 3. Finally, the composite retention index worked out was (73.00).

**Skills development:** The average mean index score for skill development of rural youth (76.00) was a more positive opinion regarding the development of skills and expertise in farm management is essential for individual progress

and development. They were also aware of the various diversified opportunities like such as the operation of farm machineries, processing of food products, use of ICT technology, improved technical and other agro-based skills among rural youths related to rural enterprises are of key importance for enhancing the productivity and marketability of their farm products in the competitive market environment. Their optimistic state of mind towards skill development as an important pillar for growth is often ignored and put in the backburner and consistently ignored due to the high capital requirement.

**Access to market:** The rural youth possessed a high mean index score (75.00). The rationale behind it could be at present rural youth has a more favourable opinion towards shifting traditional farming to higher-value agricultural products having more market demand bears important opportunities for value addition and job creation. Agribusiness centers with storage and processing facilities are expected in rural areas at present in order to link farmers and traders, sensitization and capacity-building programmes on market operators, financing opportunities and new agricultural technologies facilitate the development of infrastructure, especially roads linking from rural areas to markets. Favourable marketing policies are needed to develop and encourage rural youth in their agriculture activities.

**Quality education:** The mean index score (74.40) is high. The rationale behind it the earlier institutional arrangements for formal education in agriculture like district agricultural schools, gramsevak's training units and farmer's training centers have now vanished. In the meantime, even as more rural youth are becoming literate, the formal education system is seen to have shed all aspects of agricultural education.

**Exposure to agribusiness management:** The mean index score (72.60). The reason behind it would be that the rural youth who are currently involved in agriculture, it is energetic to expand their talents in several aspects of management of agriculture, horticulture, livestock production, marketing, finance and employment skills in a rural area they said agriculture is huge potential in creating employment only need carry out a farming better way. The rural youth considered farming to be the most profitable venture in a rural area but felt the need for proper training regarding business management theories and practical skills.

**Access to finance services:** The mean index score for access to financial services is (70.40). Responses obtained from rural youth, it clear that finance, banking, crop insurance and credit facilities were the primary preferred crucial requirement of rural youth in starting profitable and sustainable agriculture. Also, rural youth feel that in rural areas agriculture is most profitable venture than other enterprises/ occupations.

**Access to technology:** The rural youth possessed a higher index score towards access to technology (74.40). The rationale behind that strong communication networks is present at the doorstep in rural areas, risk mitigation technologies which can help to add economic value to the productivity and profitability in agriculture.

**Family income:** The rural youth possessed a high mean index score for family income (75.80). They had a strong relationship between family income and rural youth retention in agriculture.

**Access to agricultural input:** The rural youth (73.40) were found to obtain a high score in this domain and conveyed their opinion that conventional, high-input farming may generate high yields for the short term. They feel they are required to purchase expensive inputs for better management in farming. Continuously increased input prices, as well as non-availability of input at a critical period of crops in a rural area, were also major obstacles in farming. Therefore, they suggested the agricultural credit be made available at a reduced rate of interest in time and needs to be sanctioned to purchase the inputs at the subsidized rates for them.

**Intrinsic motivation:** The rural youth possessed an index score (75.40). The rationale behind it would be their enthusiastic outlook towards agriculture as a profession because they feel self-satisfaction as they can provide food for people and other living beings. The rural youth expressed their readiness to permanently engage in agriculture provided there exists a scope/ prospectus for skill variability, task identity, task significance, substantial freedom to innovate and suitable recognition.

**Social support:** The index score (72.40). that the majority of the rural youth felt proud being young farmer and felt happy about their increase's social status in society if they are retaining in agriculture. They also expect appreciation from people who love and care.

Social relationships provide psychological and material support at various levels during agricultural activities. The social status includes a relationship with neighbours, trust in the relationships and participation in social and decision-making. Overall social support has a direct association with health and well-being. Rural youth with high levels of social support experience less stress when in stressful situations and are able to cope with stress more successfully.

**Access to farm mechanization:** Index score (72.40). During the ground visits, the researcher was able to observe the subdued opinion possessed by the rural youth towards farm mechanization in agriculture. Rural youth perceived 'lack of small farm machinery' as the major constraint in agriculture and the higher prices of farm machineries and non-availability of custom hiring centres at the village level or higher rental costs involved in hiring these machineries.

**Reward and recognition:** The index score (72.60). The rationale behind it would be the reward and recognition are the expectations of the rural youth in receiving appreciation and high opinion from family and social system while practicing modern agricultural technologies in his/her profession. They also conveyed their willingness to commit to agriculture provided their status being accepted as a business profession or farm entrepreneur rather than a farmer and farming as a respectable profession. On the other hand, rural youth were observed to have felt satisfied and proud about their positive contribution as a farmer in society.

**Government schemes:** A quick look through Table 3 shows that they obtained an index score of 70.20. Rural youth were found to be interested in contribution and involvement in the planning process of different schemes/projects/ policies /programs for self and rural development. Rural youth was not aware of different schemes/projects/policies/programs and made rural youth development they are not satisfied with the implantation of various Government schemes and programmes in operation under different Ministries of State and Central Governments.

**Agricultural policy:** They obtained a mean index score (69.00). From the field level survey, observed that the government is on track to achieving the target of doubling farmers' income by 2024 and recent farm reforms, including

setting up a Rs 1 lakh crore agri-infra fund, including three ordinances to provide barrier-free trading platforms to farmers, are aimed at addressing the post-production challenges and ensuring better returns to farmers. The above reforms have the potential to create large employment in rural areas. On the same side will also provide a unique opportunity for rural youth to start Agri-tech start-ups with a commercially viable solution. The objective is to support the technology base by funding/ providing incubation support to the best fundamental concepts while helping talented and creative innovations for promising avenues at the frontier of the technology. It will provide start-ups with access to priority infrastructure, and make agriculture an attractive sector for the country's best brains residents in a rural area.

**Aspiration:** The index score for aspirations is 73.40. Rural youth have the aspirations of attaining a stable economic, social status, material and property possession and aspired to renovate an old house or plan to build a new house are the key aspirations of rural youth which were seen on the higher end. Additionally, the researcher was able to observe an intricate relationship between the educational status and the aspirations of rural youth. It is relatively common that when the enhanced educational status of the rural youth increases, their aspirations would also increase. On contrary, it was interesting to note that the educational attainment of the rural youth did not discourage aspiring for a better economic and social status.

**Affiliation:** The average mean index score for the affiliation of the rural youth (75.60). Were found to have a more perceived attachment to agriculture. The majority of the rural youth feel proud being engaged in farming during the COVID-19 pandemic situation as during such tedious situation only agriculture business is an important activity for livelihood and employability in a rural area. Rural youth feel happy about their family occupation because of father/forefather's engagement in agriculture motivates rural youth to retain in agriculture occupation. The strong in-group team spirit of farm families of these rural youth would have prompted their affiliation towards agriculture. Some of the rural youth also had plans to reveal their indecisiveness about encouraging their forthcoming generations to engage in agriculture.

**Access to digital technology:** India will have a powerful digital infrastructure in years to come.

All private sector, public sector, educational institutions and government services will soon be able to provide only digital services. Like e-governance services, web-based farm advisory services, market information, resource library, digital payments, distance learning, access to agro-input, training and e-health services, etc. Due to the easy accessibility of digital technology in a rural area more employment prospects will open in the future, it helps to retain rural youth in a rural area. It could be determined from Table 3 that, the average mean index score for access to digital technology was 69.60. The justification behind it would be their enthusiastic outlook. The digital platforms should be provided to the rural youth engaged in agriculture and allied sectors not only to enhance productivity and efficiency. But also, for easy access to information, financial services and markets agriculture information digitally available in rural areas. Availability of the platform is required to advertise products for sale and share other valuable information through Smart phones. It attracts the attention and interest of the rural youth to these high-end tools and internet access facilities available in rural areas. These rural youths should be taught what great amount of information these devices can provide and are easily available on hold and how their correct utilization can make them their own boss. It is of prime importance to maintain proper connectivity of data speed in a rural area.

**Autonomy:** The findings from above Table 3 reveal that the average mean index score for autonomy is 75.20. The rural youth aspired to attain more independence in their profession. From the field level survey, the researcher could observe that rural youth exhibited hope to own boss if they involve actively in farming, he takes own decisions to decide and manage resources in near future on their own. Thus, their preference to get self-directed to solve their own problems might be the reason behind their intention to reach self-sufficiency through agriculture.

**Perception:** The mean index score for the perception is 74.20. The rural youth believed that agriculture is a primary occupation that would be the best profession for them because a career in agriculture is noble and blessed as they are working with the soil. The only positive sign revealed from the data was the fact that a high percentage of rural youth think agriculture is best for future development and a reliable source of livelihood. The rural youth wanted to engage in farming but in the mix with some other subsidiaries, occupation is a promising profession for their source of income if managed properly. Rural youth's perception regarding a farmer's life style is a very busy and hectic one and multitasking. A lot of tasks and work are must be completed every day to achieve their ultimate goal.

**Table 1. Selected retention indicators with their relevancy weightage**

Sl. No.	Indicators	Relative Weightage Score
1	Skills development	0.90
2	Access to market	0.89
3	Quality education	0.88
4	Exposure to agribusiness management	0.86
5	Access to finance services	0.85
6	Access to technology	0.85
7	Family income	0.84
8	Access to agricultural input	0.84
9	Intrinsic motivation	0.82
10	Social support	0.82
11	Access to farm mechanization	0.81
12	Reward and recognition	0.80
13	Government schemes	0.80
14	Agricultural policy	0.80
15	Aspiration	0.79
16	Affiliation	0.78
17	Access to digital technology	0.78
18	Autonomy (Self-sufficiency)	0.77
19	Perception	0.77
20	Health care services	0.76
21	Employment policy	0.76

**Table 2. Quantification of indicators**

SI.No	Qualitative Indicator	Operationalisation	Formula	Abbreviation
1	Skills development	The imparting skill-based training to rural youth on agri-based vocational areas in compliance with National Policy on Skill Development & Entrepreneurship in agriculture and allied areas to promote employment in rural areas	$SDI = \frac{SSSD\ x_i}{TSSD\ y_i}$	SDI = Skills Development Index SSSD $x_i$ = Score secured by an individual on skills development domain TSSD $y_i$ = Total possible score for an individual on skills development domain
2	Access to market	The market access for rural youth with the ability to acquire farm services and the capability to deliver agricultural produce to buyers	$AMI = \frac{SSAM\ x_i}{TSAM\ y_i}$	AMI = Access to Market Index SSAM $x_i$ = Score secured by an individual on access to market domain TSAM $y_i$ = Total possible score for an individual on access to market domain
3	Quality education	the foundation to improve people's lives and sustainable development to ensure the completion of primary and secondary education by all boys and girls, and guaranteeing equal opportunities for access to quality education in field of art, science, commerce, agriculture, technical and vocational, etc. The quality education acquired by rural youth in different areas and especially in the agricultural branch helps to retain them in agriculture	$QEI = \frac{SSQE\ x_i}{TSQE\ y_i}$	QEI = Quality Education Index SSQE $x_i$ = Score secured by an individual on quality education domain TSQE $y_i$ = Total possible score for an individual on quality education domain
4	Exposure to agribusiness management	The exposure of rural youth to application of business theories and practical skills in the area of agriculture, horticulture, livestock production, marketing, finance and management of lower production cost, boost net profits in agribusiness	$EAMI = \frac{SSEAM\ x_i}{TSEAM\ y_i}$	EAMI = Exposure to Agribusiness Management Index SSEAM $x_i$ = Score secured by an individual on exposure to agribusiness management domain TSEAM $y_i$ = Total possible score for an individual on exposure to agribusiness management domain
5	Access to finance services	The availability of financial/credit facilities to rural youth from financial service providers. Like banks, credit institutions, microfinance services, insurance companies, etc. In rural areas. Specially for agricultural loans, start-up loans for agribusiness, subsidies, insurance for online and offline payments/receipt's purpose.	$AFSI = \frac{SSAFS\ x_i}{TSAFS\ y_i}$	AFSI = Access to Finance Services Index SSAFS $x_i$ = Score secured by an individual on access to finance services domain TSAFS $y_i$ = Total possible score for an individual on access to finance services domain

Sl.No	Qualitative Indicator	Operationalisation	Formula	Abbreviation
6	Access to technology	The easy availability of low-cost, environmentally sustainable, high-yielding and more profit-oriented advance agricultural technologies at the rural level to rural youth helps retaining them in agriculture.	$ATI = \frac{SSAT_{xi}}{TSAT_{yi}}$	ATI = Access to Technology Index SSAT xi = Score secured by an individual on access to technology domain TSAT yi = Total possible score for an individual on access to technology domain
7	Family income	The rural youth their family member's gross income derived from agriculture as well as other sources. Retention of rural youth in agriculture activities depends upon the economic status of family. Sustainable income motivates the rural youth to retain in agriculture'	$FII = \frac{SSFI_{xi}}{TSFI_{yi}}$	FII = Family Income Index SSFI xi = Score secured by an individual on family income domain TSFI yi = Total possible score for an individual on family income domain
8	Access to agricultural input	The rural area should have easy access to agricultural inputs which are utilized in farm production such as seeds, fertilizers, chemicals, equipment, feed and energy to obtain desired output.	$AAll = \frac{SSAAI_{xi}}{TSAAI_{yi}}$	AAll = Access to Agricultural Input Index SSAAI xi = Score secured by an individual on access to agricultural input domain TSAAI yi = Total possible score for an individual on access to agricultural input domain
9	Intrinsic motivation	The rural youth's hope of practicing an intellectually stimulating agriculture'	$IMI = \frac{SSIM_{xi}}{TSIM_{yi}}$	IMI = Intrinsic Motivation Index SSIM xi = Score secured by an individual on intrinsic motivation domain TSIM yi = Total possible score for an individual on intrinsic motivation domain
10	Social support	Social support to rural youth by friends, family member, and rural people enhances and provide better support against adverse life events pertaining to rural youths	$SSI = \frac{SSSS_{xi}}{TSSS_{yi}}$	SSI = Social Support Index SSSS xi = Score secured by an individual on social support domain TSSS yi = Total possible score for an individual on social support domain
11	Access to farm mechanization	Farm mechanization is the application of engineering and technology in agricultural operations to do a job in a better way to improve productivity as well as employment for rural youth. This includes development, application and management of all mechanical aids for field production, water control, material handling, storing and processing	$AFMI = \frac{SSAFM_{xi}}{TSAFM_{yi}}$	AFMI = Access to farm mechanization Index SSAFM xi = Score secured by an individual on access to farm mechanization domain TSAFM yi = Total possible score for an individual on access to farm mechanization domain

Sl.No	Qualitative Indicator	Operationalisation	Formula	Abbreviation
12	Reward and recognition	Recognition is an important expectation of rural youth from family/social system and they want to listen that their work is followed, recognized and appreciated in agriculture as his/ her profession'	$RRI = \frac{SSRR_{xi}}{TSRR_{yi}}$	RRI = Reward and Recognition Index SSRR <sub>xi</sub> = Score secured by an individual on reward and recognition domain TSRR <sub>yi</sub> = Total possible score for an individual on reward and recognition domain
13	Government schemes	These schemes are started by government for agriculture and rural development to cater the social and economic welfare of rural youth and rural people of the country	$GSI = \frac{SSGS_{xi}}{TSGS_{yi}}$	GSI = Government Scheme Index SSGS <sub>xi</sub> = Score secured by an individual on government scheme domain TSGS <sub>yi</sub> = Total possible score for an individual on government scheme domain
14	Agricultural policy	Agricultural policy is generally designed by the government to raise agricultural production and productivity also to upgrade the level of income and standard of living of rural youth and people within a definite time frame	$API = \frac{SSAP_{xi}}{TSAP_{yi}}$	API = Agricultural Policy Index SSAP <sub>xi</sub> = Score secured by an individual on agricultural policy domain TSAP <sub>yi</sub> = Total possible score for an individual on agricultural policy domain
15	Aspiration	Aspiration refers to the rural youth's desires for future states of being, such as standard of living, social status, education and occupational attainments due to retaining in agriculture	$AI = \frac{SSA_{xi}}{TSA_{yi}}$	AI = Aspiration Index SSA <sub>xi</sub> = Score secured by an individual on aspiration domain TSA <sub>yi</sub> = Total possible score for an individual on aspiration domain
16	Affiliation	Affiliation here means 'the rural youth's perceived attachment towards his /her profession of agriculture	$AFI = \frac{SSA_{xi}}{TSA_{yi}}$	AFI = Affiliation Index SSAF <sub>xi</sub> = Score secured by an individual on affiliation domain TSAF <sub>yi</sub> = Total possible score for an individual on affiliation domain
17	Access to digital technology	India will have a powerful digital infrastructure in years to come. All private sector, public sector, educational institutions and government services will soon be able to provide only by digital services. Like e-governance services, web-based farm advisory services, market information, resource library, digital payments, distance learning, access to agro-input, training and e-health services, etc. Due to easy	$ADTI = \frac{SSADT_{xi}}{TSADT_{yi}}$	ADTI = Access to Digital Technology Index SSADT <sub>xi</sub> = Score secured by an individual on access to digital technology domain TSADT <sub>yi</sub> = Total possible score for an individual on access to digital technology domain

Sl.No	Qualitative Indicator	Operationalisation	Formula	Abbreviation
		accessibility of digital technology in rural area, more employment prospects will open in future, its helps retain rural youth in rural areas.		
18	Autonomy (Self-sufficiency)	Autonomy here referred as 'the rural youth's aspiration of attaining self-sufficiency rather than working under somebody / some organization	$AUI = \frac{SSAU_{xi}}{TSAU_{yi}}$	AUI = Autonomy Index SSAU xi = Score secured by an individual on autonomy domain TSAU yi = Total possible score for an individual on autonomy domain
19	Perception	Perception has been operationalised as 'the rural youth's perception towards agriculture that will match his/her interest and goals	$PRI = \frac{SSPR_{xi}}{TSPR_{yi}}$	PRI = Perception Index SSPR xi = Score secured by an individual on perception domain TSPR yi = Total possible score for an individual on perception domain
20	Health care services	Health care services ensure health and well-being for all at every stage of life which includes all major health priorities, including reproductive, maternal and child health and access to safe, effective, quality, affordable/reasonable medicines and vaccines in rural areas	$HCSI = \frac{SSHCS_{xi}}{TSHCS_{yi}}$	HCSI = Health Care Services Index SSCSI xi = Score secured by an individual on health care services domain TSHCS yi = Total possible score for an individual on health care services domain
21	Employment policy	Employment policy is a main strategy adopted and facilitates rural youth in the rural areas with employment, skill up-gradation, training, credit and other support services so that the rural youth can take up income-generating activities for supplementing their incomes	$EPI = \frac{SSEP_{xi}}{TSEP_{yi}}$	EPI = Employment Policy Index SSEP xi = Score secured by an individual on employment policy domain TSEP yi = Total possible score for an individual on employment policy domain

**Table 3. Indicator and sub-indicator-wise Retention Index Score**

<b>Sl. No.</b>	<b>Retention Indicators</b>	<b>Mean Index Score</b>
<b>1</b>	<b>Skill Development</b>	<b>76.00</b>
i	I feel scientific farming is always profitable	85.00
ii	I feel that timely expertise advice is desired for rural youth to start an enterprise	81.00
iii	I retain in agriculture, if I get training on entrepreneurial and farm management skill development	76.20
iv	I feel that technical skills are needed for productive employment	74.80
v	I feel lack of skilled youth is a major obstacle for farm enterprise	71.60
<b>2</b>	<b>Access to market</b>	<b>75.00</b>
i	I feel need to grow those crops which has more market demand	83.60
ii	I would be satisfied if warehouses facility can help to get a better price for produce	74.40
iii	I think that well-functioning and managed markets are important	73.20
iv	I would continue in agriculture if feasible marketing facilities are available	69.00
<b>3</b>	<b>Quality education</b>	<b>74.40</b>
i	I think agricultural courses are incorporated middle and high school education	83.60
ii	I feel education is lifelong learning and provides skill-development opportunities	75.80
iii	I feel a well-educated rural youth can do farming in a better way	71.20
iv	I feel quality education is a valuable asset to rural youth and children	67.20
<b>4</b>	<b>Exposure to agribusiness management</b>	<b>72.60</b>
i	I feel agriculture has a strong sector and potential in creating employment	81.20
ii	I feel agriculture is to be considered as a prime occupation in rural areas	71.20
iii	I retain in agriculture, if well exposed to soft skills and technical skills	65.80
<b>5</b>	<b>Access to finance services</b>	<b>70.40</b>
i	I would practice agriculture, if credit facilities are available	80.40
ii	I feel finance is crucial for starting and sustaining agriculture	72.60
iii	I feel, agriculture is a profitable venture than other enterprises at rural level	66.60
iv	I feel, crop insurance facility is essential within village	62.00
<b>6</b>	<b>Access to technology</b>	<b>74.40</b>
i	I feel advanced technologies encourage youth to boom in farming	82.00
ii	I retain in agriculture, if risk mitigation strategies support agriculture	76.40
iii	I retain in agriculture, if strategies are available to increase productivity and profitability	71.20
iv	I retain in agriculture, if the agricultural technology are timely and easily available at farmers doorsteps in different form	68.00

<b>Sl. No.</b>	<b>Retention Indicators</b>	<b>Mean Index Score</b>
<b>7</b>	<b>Family income</b>	<b>75.80</b>
i	I feel, if properly planned agriculture helps in improving the income of the family	83.20
ii	I retain in agriculture, if regular and reliable income coming from agriculture and allied occupation	74.40
iii	I can achieve a strong household economic stability if I engage in modern agriculture	70.00
<b>8</b>	<b>Access to agricultural input</b>	<b>73.40</b>
i	I would practice agriculture, if there is easy access to agriculture inputs in rural areas	80.60
ii	I would carry out agriculture, if the inputs are available at proper time	70.80
iii	I would carry out agriculture, if quality inputs are available at reasonable prices in rural areas	69.00
<b>9</b>	<b>Intrinsic motivation</b>	<b>75.40</b>
i	I practice agriculture, because of self-satisfaction that I provide food for people and other living beings	83.80
ii	I would do agriculture, if there is a prospect for recognition for my innovations	72.60
iii	I would do agriculture, if there is a prospect for skill development	70.00
<b>10</b>	<b>Social support</b>	<b>72.40</b>
i	I retain in agriculture, if my social status increases in society	80.20
ii	I retain in agriculture, if surrounded by people who love, care, appreciate and accept me	74.40
iii	I retain in agriculture, if I got the emotional help and support from my family, friends and public	63.00
<b>11</b>	<b>Access to farm mechanization</b>	<b>71.80</b>
i	I feel mechanization stimulates employment opportunities in a rural area	81.80
ii	I feel mechanization gives rise to positive perceptions of young people engagement in agriculture	74.40
iii	I would practice agriculture, if sufficient credit facility with subsidies available for farm mechanization	68.60
iv	I practice agriculture, if timely low-cost farm implements/machinery and custom hiring of different farm implements facility available in a rural area	63.00
<b>12</b>	<b>Reward and recognition.</b>	<b>72.60</b>
i	I would feel more professional if I get accessibility to modern agricultural technologies	82.20
ii	I practice agriculture, if agriculture is considered as business	70.60
iii	I would continue agriculture, if society recognizes and rewards me for my positive contribution as a farmer	65.00
<b>13</b>	<b>Government schemes</b>	<b>70.20</b>
i	I retain in agriculture, if government involve rural youth in the planning of different schemes/project/policy for rural development.	77.80
ii	I would practice agriculture, because of government provides a platform for universal access to banking services and insurance	69.80
iii	I would practice agriculture, because of government has implemented different farmers welfare	69.60

Sl. No.	Retention Indicators	Mean Index Score
	schemes	
iv	I would practice agriculture, because of government create scientific farm storage facility with linkage marketing facilities in rural areas	70.00
v	I retain in agriculture, because of now a day government schemes are electronically available in the rural areas on the fingertip	64.40
<b>14</b>	<b>Agricultural policy</b>	<b>69.00</b>
i	I retain in agriculture, because of government planned target of doubling farmers' income by 2024	74.80
ii	I retain in agriculture, it has potential to create large employment	72.40
iii	I retain in agriculture, because of agri-startups policy more focus in a rural area	68.40
iv	I retain in agriculture, as food processing policy raises farmers income	67.00
v	I retain in agriculture, as policy is addressing the felt needs of the youth	62.60
<b>15</b>	<b>Aspiration</b>	<b>73.40</b>
i	I aspire to earn more money if retain in agriculture	80.40
ii	I aspire to increase my material possession if retain in agriculture	75.80
iii	I aspire to renovate old/build a new house if retain in agriculture	64.20
<b>16</b>	<b>Affiliation</b>	<b>75.60</b>
i	I feel proud, as I engaged in farming during the COVID-19 pandemic situation only agriculture business is an important activity for livelihood and employability.	82.80
ii	I retain in agriculture, as my father/forefather's engagement in agriculture motivates me.	74.80
iii	I am proud of being a member of an agricultural family.	69.40
<b>17</b>	<b>Access to digital technology</b>	<b>69.60</b>
i	I retain in agriculture, because a digital platform is available to advertise products for sale and share other valuable information through Smartphone's	78.80
ii	I retain in agriculture, due to internet access easily available in a rural area	68.00
iii	I retain in agriculture, due to easy access to information, financial services, and markets, agricultural information digitally in a rural area.	62.00
<b>18</b>	<b>Autonomy (Self-sufficiency)</b>	<b>75.20</b>
i	I could be my own boss, if I carry out agriculture.	81.40
ii	I could take my own decisions, if I carry out agriculture.	75.00
iii	I could deal with my own problems that come up in agriculture.	69.40
<b>19</b>	<b>Perception</b>	<b>74.20</b>
i	I feel a career in agriculture is noble and blessed as they are working with the soil.	80.80
ii	I think agriculture best for future development	74.60

<b>Sl. No.</b>	<b>Retention Indicators</b>	<b>Mean Index Score</b>
iii	I feel agriculture is a promising career with benefits, if done properly	72.00
iv	I feel working as a farmer is a way of life that can be fully enjoyed	69.60
<b>20</b>	<b>Health care services</b>	<b>73.00</b>
i	I retain in agriculture, due to agriculture provides fresh air, water and nutritious farms produce	81.80
ii	I retain in agriculture, because of agriculture profession guarantees physical health and mental peace	75.20
iii	I retain in agriculture, due to low-cost medicinal plant base, health care medicines and vaccines are easily now also available in rural areas.	62.20
<b>21</b>	<b>Employment policy</b>	<b>74.40</b>
i	I retain in agriculture, as agriculture has vast scope to provide employment to others	81.20
ii	I retain in agriculture, due to agri-entrepreneurship is a good option in the present scenario of global challenges.	75.20
iii	I retain in agriculture, because it has wider/diversified opportunities are available	72.00
iv	I retain in agriculture, as I know farming is the only solution to limit the unemployment rate.	69.60

**Health care services:** The average mean index score for the health care services (73.00). The present studies explored access to health care for rural youth. Rural youth experience poorer access to health care services in rural areas as compared to urban areas. They agree to remain in agriculture because of the agriculture environment which provides fresh air, water and nutritious farm produce in rural areas if they engaged in agriculture. The positive views regarding the agriculture profession guarantee physical health and mental peace if the rural youth remain in agriculture.

**Employment policy:** The average index score for the employment policy is 70.20. The present studies discovered main occupation and subsidiary occupation to utilize the available resources and generate additional employment and income for family members and other people living in society throughout the year. The rural youth also agreed that the agro-entrepreneurship industries like food processing, medicinal plant products, etc. act as a good option for the generation of the highest employment opportunities and a constant producer of income as a good option in the present scenario of global challenges. These need to be promoted as top priority to improve the quality of life of the rural youth.

#### 4. CONCLUSION

This present study on the quantification of retention index of rural youth engaged in agriculture will support the planners, policymakers and development professionals have an insight into the justification behind the withdrawal of rural youth from the agriculture profession, the challenges they face and the unfulfilled desires of agrarian rural youth. It would also enlighten them to prepare special agricultural policies focusing on agrarian rural youth as well as build up strategies to empower them, aspire, attract them and retain them in the agriculture profession.

In this study, for measurement of retention of rural youth in agriculture retention index was developed and standardized, on the basis of the results of retention index these indicators are very important in the development of a project or programme. Therefore, it is implied that policymakers, development agencies and extension functionaries should consider these indicators while preparing and planning programs or projects for the development of rural youth.

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#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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