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ARAŞTIRMA MAKALESİ **RESEARCH ARTICLE**

Determinants of Rural Women Utilization of Indigenous Knowledge for Small Ruminant Production: Evidence from Southwestern Nigeria

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Abstract

In spite of rural women having considerable indigenous knowledge for use in livestock production in Southwestern Nigeria, its utilization for small ruminant production has not gained the desired prominence. This paradox raises profound questions for research in rural sociology and agricultural development. Therefore, this study ascertained the determinants of rural women utilization of indigenous knowledge for small ruminant production in Southwestern Nigeria. A multi-stage sampling procedure was used to select 220 respondents. Using interview schedule, data were obtained on respondents' demographic and small ruminant enterprise characteristics, sources of information on indigenous knowledge for small ruminant production, knowledge on indigenous practices for small ruminant production, constraints to utilization of indigenous knowledge in small ruminant production, and utilization of indigenous knowledge in small ruminant production. Data were analyzed with descriptive statistics, Chi-square, Pearson product moment correlation, and multiple regression at $\alpha_{0.05}$. The mean respondents' age and household size were 51.0±17.0 years and 5.0±2.0 persons, respectively. Most were married, formally educated, engaged in crop farming as primary occupation and using personal labour. The average small ruminant rearing experience, number stocked/reared and monthly income were 18.0±11.0 years, 9.0±7.0 and ₦14,074.0± 17,150.0, respectively, with majority using extensive management system (57.3%). The indigenous knowledge information for small ruminant production was accessed mostly through family ($\bar{x}$=1.38) and 56.8% had high knowledge on indigenous practices for small ruminant production. Slow effectiveness of indigenous practices ($\bar{x}$=1.18) was the major constraint to utilization of indigenous knowledge for small ruminant production. Utilization of general management (53.6%), nutrition (65.9%) and health (57.3%) indigenous knowledge in small ruminant production were low. A little above half (52.3%) had low overall utilization of indigenous knowledge. Crop farming as primary occupation (χ^2=30.7), rearing experience (r=0.34), numbers of small ruminant (r=0.19), extensive management system (χ^2=8.57), personal labour source (χ^2=7.03), income from small ruminant (r=0.14) and knowledge on indigenous practices (r=0.30) were significantly related to utilization of indigenous knowledge in small ruminant production. Determinants of utilization of indigenous knowledge in small ruminant production were age (β=0.04), household size (β=0.35), membership of small ruminant group (β=1.22), primary occupation (crop farming) (β = 1.40) and sources of information (β=0.67). Rural women in Southwestern Nigeria had low utilization of indigenous knowledge in small ruminant production, which was determined by age, household size, membership of small ruminant group, crop farming as primary occupation and sources of information. Therefore, extension agents should include indigenous knowledge practices education in information disseminated to rural women as well as encourage membership of small ruminant rearers group.

Keywords: Determinants, Indigenous knowledge, Livestock, Ruminants, Utilization, Women

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1. Introduction

Livestock is very essential to humans, as evident in its being dependent on in diverse ways by 7.7 billion people all over the world. It serves as source of meat and milk, raw materials for industries, games, soil fertility, drought power, for transport, and recreation (Addisu and Berihu, 2015). It, particular ruminant livestock (RL) and small ruminant (SR), serves as crucial source of revenue for government, contribute to food security, and provides employment which make it to stand as reservoir of wealth to sustain in period of climatic and economic shock (World Bank, 2017). In Nigeria, livestock plays an important socio-economic role as it contributed about 1.7% and 9.0% to the country's GDP and value addition in agriculture, respectively (FAO, 2019). In the country, RL contribute a significant quota of the total livestock production, hence, plays vital roles in rural households livelihood (Aruwayo et al., 2015). Small ruminants are widely distributed in rural areas of the country, as almost every household rear at least one. This is because they are critical in rural poverty alleviation (Nchor, 2011), as their ownership can create a pathway out of poverty for smallholder, especially women, livestock keepers (Kariuki et al., 2013).

Despite livestock production, especially SR, being a viable economic activity for food security, income generation and poverty reduction, its production is still being affected by many factors. The productivity of SR in most developing countries is often far below their potentials as a result of genetic and environmental constraints. The constraints, among others, include low production rates, and high cost of conventional feed as well as high susceptibility to parasite and disease infestations favoured by high humidity and temperature. Monau et al. (2020) stated that insufficient feed and water especially during dry seasons, parasite and disease infestations reduce the optimum productivity of SR. Although, using modern livestock farming methods can enhance productivity of SR, their use is however too expensive for most subsistence farmers to afford. For instance, though modern veterinary practices and drugs can be utilize to control most of the SR health challenges, thereby bringing about improve productivity and livelihood for farmers, most rural farmers (RF) due to high cost still cannot afford the services. Smallholder farmers (especially women) often find it too expensive to manage their animals using the modern and/or conventional methods. Apart from cost, other factors hinder using modern livestock farming methods. Failure of some conventional medications against certain ailments such as in the control of intestinal parasites as a result of development of drug resistance by the parasites (Ajala et al., 2016) has become a serious concern. Walking long distances with sick animals in search of veterinary services can predispose the animals to additional stress (Woldu, 2016). The foregoing have led to reduced confidence in the use of modern veterinary drugs and services in SR production (SRP) in rural areas. Hence, calls for indigenous practices (IP) which are often more accessible, affordable and effective.

According to Giday et al. (2003), livestock healthcare and drug development can be improved with the use of traditional knowledge of medicinal plants. Productivity of livestock and/or SR can be improved upon using traditional healing as economic solution (Adedeji et al., 2013). In developing countries, including Nigeria, traditional healing practices and use of medicinal plants have become available alternative to RL rearers to meet their livestock health care needs (Ojewole, 2004). This alternative approach to livestock and SR production involves the use of the people's indigenous knowledge (IK) that constitutes the core of community development processes including agriculture, animal husbandry and ethnic veterinary medicine (Abah et al., 2015). IK is the local knowledge gained out of experience and passed on from generation to generation (Wenisch and Asha, 2016). It, according to Njiraine et al. (2010), is unique to a given culture and based on the ideas, experiences, practices and information generated by a group of people and incorporated into their way of life. It is paramount to the survival and subsistence of rural communities (Haile et al., 2013). This is because it is often the only asset in the hands of smallholder farmers (Kereto et al., 2022), especially rural women (RW) who accounts for 60 to 80% of small holder farmers.

Utilization of IK (UIK) in SRP has the potential to increase production. Significant improvement in SRP, according to Abu (2021), can be achieved when IK is effectively utilized by RF. Apart from enhancing production, IK has other economic benefits. The importance of IK is not only seen in improving SRP but also serves in increasing income, thus, it has the potential of playing an important role in poverty reduction. Abu (2021) reported that use of IK in SRP has the potential to increase income of SR owners by reducing cost of production, thus, reducing poverty. Briggs (2013) stated that promoting IK at the local level can help to address rural poverty in developing countries. This, according to Ravikumar et al. (2016), is because IK and practices are cost effective,

readily available and accessible, and provide sustainable solution to rural community problems. However, despite these potentials of IK for SRP and poverty reduction, the use of IK in SRP has not gained the desired prominence among RW in Southwestern Nigeria.

Several works have been carried out on IK in Nigeria. For example, Adekunmi et al. (2020) assessed ethno-veterinary management practices among sheep and goat farmers in Southwest Nigeria. Omotara and Olutegbe (2015) examined the use of endogenous knowledge in treating pests and diseases of small ruminants in Obokun Local Government Area of Osun State. However, information on the level of RW use of IK in SRP is scarce. Also, there is dearth of information concerning the determinants of RW use of IK in SRP. It is against this backdrop that this study was carried out to investigate the determinants of UIK for SRP among RW. The general objective of the study was to assess the determinants of RW UIK for SRP in Southwestern Nigeria. The study's specific objectives were to: outline the demographic characteristics of RW producing SR, examine the SR enterprise features of RW, identify sources of information (SI) on IK practices for SRP, ascertain RW knowledge of indigenous practices (KIP) for SRP, identify constraints that limit RW UIK in SRP, and ascertain the level of UIK in SRP. Based on the main and specific objectives of the study, the following hypotheses stated in the null form were tested; hypothesis one (H_{01}): there is no significant relationship between RW selected demographic characteristics and their UIK in SRP, hypothesis two (H_{02}): there is no significant relationship between RW selected enterprise characteristics and their UIK in SRP, hypothesis three (H_{03}): there is no significant relationship between RW frequency of use of information sources (IS) and their UIK in SRP, hypothesis four (H_{04}): there is no significant relationship between RW KIP for SRP and their UIK in SRP, and hypothesis five (H_{05}): there is no significant contribution of selected independent variables to RW UIK in SRP.

2. Materials and Methods

The University of Ibadan's Department of Agricultural Extension and Rural Development's Ethical Committee gave its approval for this study's conduct, on the 20/03/2017 (Ethic committee approval number: AERD/03-2017/0003).

2.1. Study area

The study was carried out in southwestern Nigeria. Southwestern Nigeria comprises of six Nigerian states. These are Oyo, Ogun, Osun, Lagos, Ekiti and Ondo states (*Figure 1*). The area lie between longitude 2° 31′ and 6° 00′ East, and Latitude 6° 21′ and 8° 37′ North of the of the Greenwich Meridian and equator, respectively with an overall landmass of approximately 77, 818 Km^2.

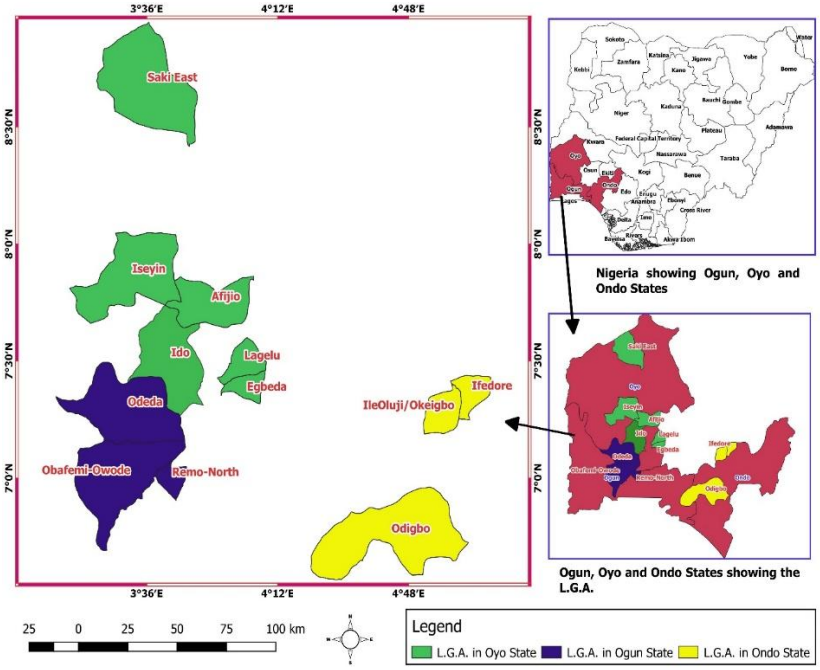

Figure 1: Map showing the study area

2.2. Population and sampling procedure

The study population comprised of all RW rearing SR in the study area. A multi-stage (five-stage) sampling procedure was used to select respondents. First stage involved random selection of 50% states of the southwestern Nigeria to give three states out of the six states. These were Oyo, Ogun and Ondo states. In the second stage, 20% of rural Local Government Areas (LGAs) in the selected states were randomly selected to give 6, 3 and 3 LGAs from Oyo, Ogun and Ondo states, respectively. Third stage involved random selection of 20% of the wards in the selected LGAs, resulting in 25 wards (*Table 1*). These were 13, 6 and 6 wards from Oyo, Ogun and Ondo states, respectively. Fourth stage involved compiling a list of women SR rearers in the selected wards using snowball technique. This produced 1000, 614 and 594 women SR rearers from the 13, 6 and 6 wards in Oyo, Ogun and Ondo states, respectively, to give a total of 2208 women SR rearers. In the fifth stage, from the list of women SR rearers in the selected wards, 10% of the women SR rearers were randomly selected from each of the selected wards for analysis, using proportionate sampling technique. The total number of women SR rearers randomly selected was two hundred and twenty (220). Thus, the sample size for the study was 220 respondents. This comprised 100, 61 and 59 women SR rearers from Oyo, Ogun and Ondo states, respectively.

Table 1. Summary of the sampling procedure and sample size

Number of states in Southwestern Nigeria	Random selection 50% states in Southwestern Nigeria	LGAs in selected states	Rural LGAs in selected states	Random selection of 20% of rural LGAs	Wards in selected rural LGAs	Random selection of 20% wards per rural LGA	No of women compiled in selected wards (snowball)	10% of selected rural women small ruminant rearers in the selected wards
Oyo	Oyo	33	30	(6)				
Ogun				Ido	10	2	144	14
Osun				Egdeda	11	2	157	16
Lagos				Afijio	10	2	167	17
Ekiti				Lagelu	14	3	240	24
Ondo				Saki-east	11	2	148	15
				Iseyi	11	2	144	14
	Ogun	20	15	(3)				
				Obafemi-	12	2	184	
				Owode	10	2	213	18
				Remo	10	2	217	21
				North				22
				Odeda				
	Ondo	18	15	(3)				
				Ifedore	10	2	183	18
				Ile-Oluji	10	2	253	25
				Odigbo	11	2	160	16
Total		71	60	12	130	25	2210	220

Source: Field Survey, March to August 2019

2.3. Instrument for data collection

Data gathering took place between March and August 2019. The semi-structured interview schedule was used to obtained quantitative data from the respondents. The data collected covered information on respondents' demographic and SR enterprise characteristics, information sources (IS) on IK for SRP, KIP for SRP, constraints to UIK for SRP, and UIK in SRP.

2.4. Measurement of variables

Sources of information on IK for SRP was measured at interval level. Eight SI on IK for SRP (which include family, neighbours, and other farmers) were presented to respondents. The respondents were asked to indicate the frequency with which they received IK for SRP from the various IS. This was measured on a three-point rating scale of 0 for never, 1 for occasionally, and 2 for always. The weighted mean scores of each IS were calculated and used to rank the IS on IK from most to least frequently used.

Respondents' KIP for SRP was measured at interval level. The KIP for SRP by respondents was measured using thirteen multiple choice questions on indigenous practices-IP used in SRP. Correct options and/or answers

were scored one (1) while all incorrect answers/options scored zero (0). Each respondent scores on KIP for SRP were summed together to obtain an index of KIP for SRP. The minimum and maximum scores were obtained. Mean knowledge score was obtained and used to group the respondents into: high knowledge, scores between mean and maximum, and low knowledge, scores between minimum and just below the mean.

Constraints that limit respondents' UIK in SRP was measured at interval level. Respondents were presented a list of 14 possible constraints to UIK in SRP, which include the slow effectiveness of IK, and lack of empirical testing. Response was rated on a three-point rating scale of "severe constraint (2)", "mild constraint (1)", and "not a constraint (0)". The mean score of each constraints item was calculated and used to rank in order of severity the constraints to UIK in SRP.

The UIK in SRP was measured at interval level by asking the respondents to indicate the extent to which IK practices were utilized for SRP. Respondents were provided with a list of 20 IP for SRP, which include separating sick animals from healthy ones, and neutralizing poisonous substances consumed with dissolved charcoal or palm oil. Respondents were provided with response options of to a large extent (used all the time), to a moderate extent (used when convenient), and not at all (never used) with scores of 2, 1 and 0 given, accordingly. Each respondent scores were summed together to obtain an index of IK utilization. The highest score and lowest score were obtained from the IK utilization index. Mean score was obtained from the IK utilization index and used to group the respondents into: those with high UIK, scores between mean and highest, and low UIK, scores between lowest and below the mean. Furthermore, the mean score of each item ratings on UIK practices in SRP was calculated and/or computed and used to rank the IK practices from the most utilized to the least utilized for SRP.

2.5. Method of data analysis

Data were analyzed using descriptive statistics such as frequency counts, percentages, and mean as well as inferential statistics like Chi-square, Pearson product moment correlation-PPMC and multiple linear regression. Chi-square and PPMC were used to test hypotheses one and two. Hypotheses three and four were tested with the use of PPMC. Hypotheses five was tested using multiple regression.

The significant determinants of UIK in SRP were ascertained using multiple regression and the model is expressed as follow (equation 1):

$$Y = a + b_1X_1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots + b_n X_n + e \quad \text{(Eq. 1).}$$

Where: Y = Scores for UIK for SRP (dependent variable), a = constant term, b_1, b_2…b_n = regression coefficient, X_1, X_2……X_n = regression parameters, and e = error.

The following regression parameters were included in the model: X_1 = Age of respondents, X_2 = respondents' marital status (Married=1, Otherwise=0), X_3 = Respondents' educational attainment (Formal education=1, Otherwise=0), X_4 = Household size (Actual number of persons in the respondents household), X_5 = Membership of SR rearers group (Member=1, Otherwise=0), X_6 = Primary occupation of respondents (Crop farming=1, Otherwise=0), X_7 = Income from SR, X_8 = IS on IK for SRP, X_9 = KIP, X_{10} = Constraints

3. Results and Discussion

3.1. Demographic characteristics of respondents

Table 2 shows that the respondents' average age was 51±17 years. This suggests that most respondents were predominantly mature aged and in their productive ages, thus, still have physical strength to comfortably engage in the rearing of SR. The result is in consonance with that of Abdullah et al. (2015) and Koc and Uzmay (2022) who reported that the average age of SR and livestock farmers were 50 years and 45 years, respectively. The result is also consistent with Oyibo and Odebode (2024a) who found that most female farmers were in their active ages with a mean age of 42 years. The respondents age distribution is likely to affect UIK in SRP, as mature and relatively older aged farmers are more likely to be fatalistic, experienced, exposed, and conscious of adopting modern and/or conventional medication, hence, higher likelihood to take advantage of opportunities to utilize IK, practices and/or methods, and thus likely to lead to high UIK for SRP. Earlier study by Abegunrin (2021) found that age influence use of ethno-veterinary medicine. He also reported that older or ageing ruminant livestock farmers were more utilizers of ethno-veterinary medicine, compared to younger and/or middle age farmers.

Majority (79.1%) of the respondents were married. This suggests that most of the respondents had family obligations. The implication is that RW producing SR had social and economic family responsibilities/obligations that needed commitment financially. The result corroborates Faruque et al. (2016) who reported that most goat owners in Bangladesh were housewives. The result is also in line with Mukaila et al. (2022) who found that most women farmers were married. The respondents' marital status distribution is likely to affect UIK, as married women are more likely to be highly conscious of their family obligations, hence, higher likelihood to be more conscious of high cost of livestock management using the modern and/or conventional methods, thereby positively influencing their UIK in SRP, hence may have high UIK in SRP. The study conducted by Omotara and Olutegbe (2015) found that marriage affect and increases the usage of endogenous knowledge.

Table 2. Demographic characteristics of respondents

Characteristics	Category	F	%	Mean± SD
Age (years)	21-35	46	20.9	
	36-50	84	38.3	
	51-65	52	23.6	50.9 ± 16.8
	Above 65	38	17.2	
Marital status	Married	174	79.1	
	Single	6	2.7	
	Divorced	1	0.5	
	Widowed	39	17.7	
Size of household (persons)	1-3	58	26.4	5.1 ± 2.2
	4-6	101	45.9	
	7-9	53	24.1	
	More than 10	8	3.6	
Educational attainment	None	79	35.9	
	Islamic	8	3.6	
	Primary	75	34.1	
	Secondary	49	22.3	
	Tertiary	9	4.1	
Membership of SR owners' group	NO	112	50.9	
	Ordinary member (Non-leaders)	90	40.9	
	Leaders	18	8.2	
Primary occupation	Crop farming	88	40.0	
	SR rearing	32	14.5	
	Agricultural produce processing	10	4.5	
	Trading	78	35.5	
	Artisan	12	5.5	
Secondary occupation	SR rearing	128	58.2	
	Crop farming	12	5.4	
	Agricultural produce processing	16	7.3	
	Trading	47	21.4	
	Artisan	15	6.8	
	Traditional mid-wife	2	0.9	

Note: F = Frequency, % = Percentage, SD = Standard deviation

Table 2 shows that the mean size of household was 5 ± 2 persons. The average family size is okay when compared to what is obtainable among other rural farming households in regions and/or areas within Nigeria. Oyibo and Odebode (2024b) found the average family size of 9 persons per family in rural areas of Nigeria's Niger-Delta area/region. The result implies that respondents had moderate family size in the study area. The result agrees with Beyene et al. (2018) who reported an average family size of 5 persons for SR farmers in southern Ethiopia. The household size has implication for meeting family obligations and consequently for the RW UIK for SRP. Moderate household size could afford the women ruminant rearers less family obligations in terms of social and economic family responsibilities, hence, a higher likelihood of being less conscious of high cost of livestock management using the modern and/or conventional methods thereby decreases their UIK in SRP. This may lead to low utilization status of IK. Over half (60.5%) of the respondents had formal education, with 26.4% having more than primary education. The results indicates relatively high level of literacy which could be used to source for information on modern and/or conventional methods to improve their production of SR. Earlier study by Abdullahi et al. (2015) also found that over half of SR farmers had basic education. The educational attainment distribution of respondents is likely to influence UIK in SRP. Respondents with high level of literacy and/or formal education are likely to have lower UIK, as high educational status will likely enhance the utilization of modern and/or conventional methods of SRP, hence respondents may have low level of UIK in SRP. Oyibo (2020) opined that education not only enhance extension guide, bulletins and technical paper understanding and internalizing,

but also enhance the utilization of extension services disseminated ideas and innovation. Education brings about change in RF knowledge, skills and attitude (Odebode et al., 2021).

The result in *Table 2* shows that a little above average (50.9%) of the respondents were non-members of the SR owners' group. It further shows only 8.2% of respondents were leaders in SR associations/groups. The results indicate relatively marginal low level of membership in SR associations. In addition, the result implies that in relationship to SR associations RW belonged, only few of them who belonged to SR associations held an unpaid position of responsibility. The implication is that respondents may not highly have access to firsthand information and may not highly share knowledge concerning issues of IP used in SRP. This result disagrees with Mueller et al. (2017) who found that majority (90.28%) of SR rearers do not belonged to SR groups. The relatively marginal low membership status in SR associations may hinder UIK, as poor participation in groups/associations prevent gaining of social capital from groups, and also limit effective interaction to share knowledge among farmers, which can enhance UIK in SRP.

As shown in *Table 2*, crop farming (40.0%), trading (35.5%) and SR rearing (14.5%) were the primary occupation commonly engaged by respondents. The results indicate that crop farming and trading were the predominant primary occupations engaged in by respondents. Furthermore, it could be deduced that rearing of SR was not the primary occupation of respondents. The implication is that crop and trading livelihood activities were the major primary income activities engaged in by RW rearing SR in the study area. Earlier study of Ugboma (2014) reported crop farming as a major occupation of RW. *Table 2* shows that, in the study area, SR rearing (58.2%) and trading (21.4%) were the secondary occupations commonly engaged by respondents. It could be deduced that SR rearing and trading were the predominant secondary occupations engaged in by respondents. The implication is that SRP and trading occupation were the major secondary income activities engaged in by RW rearing SR in the study area. In addition, the implication is that SR rearing as secondary occupation, could be practiced alongside with crop farming as primary occupation. This could likely be because of the usefulness of crop farm byproducts and/or waste in feeding the SR. Furthermore, the implication of the foregoing result is that as an additional income generating activity, the keeping of SR can be a complimentary activity used to improve the livelihood of RW. This is in line with the submission of Abdulla (2015) that livestock production was an important income generating activity for most rural people.

3.2. Respondents enterprise features

Table 3 reveals that 68.6% of the respondents reared goats, and 30.5% reared both sheep and goats. It could be deduced that only goats farming was the predominant SR enterprise. It could also be inferred that both goats and sheep, and only goats rearing were the commonly SR enterprise among respondents. The implication is that respondents engaged more in rearing of only goats as well as both sheep and goats. The reason could be that whereas goat meat (chevon) features more regularly in dishes in most homes in the study area, and is also used for most ceremonies throughout the year, meat from sheep (mutton) is commonly eaten as a delicacy (sheep *suya*) or used for Muslim's festival of sacrifice (*Ileya* festival). The combination of two SR livestock rearing in a single farm might likely be a form of risk management, which might also help to expand the farm enterprise. The results is in line with Nyako et al. (2016) who found that RF commonly reared sheep, cattle and goats, however, predominant proportion reared goat due to cultural and/or religious purposes. Results show that the average number of SR reared was 9 ±7. It could be deduced that respondents do not rear large number and/or quantity of SR. This implies that most of the respondents had low or reduced stock of SR. The implication is that RW operated on a subsistence level in terms of SRP. The result is in line with Ezeanya-Esiobu (2017) who acknowledged that RW in agriculture mainly operate on a subsistence level, which accommodates the use of IK. The result is consistent with Gebremedhin et al. (2015) who found that the average flock size of SR owners in the highlands of Ethiopia was 8.

The mean years of rearing experience was 17.73±10.61 years (*Table 3*). It could be deduced that the respondents had high number of years of SR production experience, which could have broadened their experience and/or knowledge in their SR farming enterprise. Thus, respondents were highly experienced in rearing of SR. The result is in consonance with Garba et al. (2015) who found that the average SR rearing experience was approximately 20 years. The years of rearing experience is likely to influence UIK for SRP. Respondents with high numbers of years of rearing experience are likely to have high UIK, as they are more likely to be exposed to

and/or experienced in IP, which could lead to increase in KIP for SRP, hence may have high UIK for SRP. *Table 3* reveals that extensive (57.3%) and semi-intensive (34.5%) systems were the common practice of rearing SR. The result indicates that extensive system was the predominant system of rearing SR in the study area. This suggests that to feed SR in the study area, respondents greatly depend on available pasture within their environment. The implication is that traditional system was the most preferred system used to rear SR. The result agrees with Akewusola et al. (2017) who reported that SR found in rural areas of Southern Nigeria were reared using extensive and semi-intensive systems. The system of SR management/rearing is likely to affect UIK, as farmers practicing extensive system of rearing ruminant animals are more likely to have high UIK in SRP. This is because extensive management system is mostly traditional, which accommodates IK use in subsistence farming.

Table 3. Respondents' enterprise features

Characteristics	Category	F	%	Mean± SD
Types of SR reared	Goat	149	68.6	
	Sheep	2	0.9	
	Goat and sheep	69	30.5	
Number of SR	1-5	88	40.0	
	6-10	84	38.2	9 ± 7
	11-15	29	13.2	
	> 15	19	8.6	
Years of rearing experience	1-5	65	29.5	
	6-10	48	21.8	17.73±10.61
	11-15	44	20.0	
	16-20	22	10.1	
	> 20	41	18.6	
Types of management system	Extensive system	126	57.3	
	Intensive system	18	8.2	
	Semi-intensive system	76	34.5	
Sources of labour	Personal	146	66.4	
	Family	72	32.7	
	Hired	2	0.9	
Estimated monthly income from SR (₦)	Less than 5,000	64	29.2	
	5,000-10,000	48	21.8	
	10,001-15,000	83	37.7	14,074.2 ± 17,149.9
	15,001-20,000	8	3.6	
	> 20,000	17	7.7	

Note: F = Frequency, % = Percentage, SD = Standard deviation, **₦ = Naira**

Most (66.4%) of the respondents used personal labour for herding SR, while 32.7% used family labour (*Table 3*). This result suggests that personal and family labour were the predominant sources of labour for SRP. The implication is that labour supplied by the farmers and their family members was sufficient to manage and/or rear SR. This finding corroborates Monau et al. (2020) who reported that much of the labour used in goat management was provided by women and their family members. The sources of labour distribution of respondents is likely to affect UIK, as farmers utilizing personal labour are more likely to be using their high number of years of SRP experience, which influence exposure to and/or experience in IP and increase in KIP for SRP, hence may have high UIK for SRP. *Table 3* reveal that the mean income respondents earned per month from SRP was ₦14, 074.0 ± 17, 150.0. This amount is low when compared with what is obtainable among other farming households within Nigeria. Oyibo and Odebode (2023) found the mean monthly income from sweetpotato production of farm families in Nigeria's Niger-Delta area to be ₦219,796.00. The result implies that most of the respondents may not have considerably and appreciable capacity to supplement their families' income with respect to income earned from SR rearing activities as a secondary livelihood activity. The implication of the low income from SR is that small-scale rearing of SR as a primary livelihood activity is not a good source of income for the rural farm families. In addition, the implication of the low income from SR is that RW rearing SR may not be able to expand their SR enterprise due to limited income to purchase more animals as well as meet their other needs. The result corroborates Abdullahi et al. (2015) who reported an average monthly income of less than ₦5,000.00 for SR farmers. The low income realized from SRP may be due to the small or few number/quantity of SR reared as well as farmers often sell it under duress (when farmers are in dire need of money) instead of taking advantage of market demand when prices are highly competitive. According to Mueller et al. (2017), incomes realized rise with increasing herd size.

3.3. Sources of Information on IK for SRP

Table 4 shows the respondents use of IS on IK in SRP. The mean scores reveal that respondents accessed SRP IK information mostly through family ($\bar{x}$=1.38), neighbours ($\bar{x}$=1.29) and other farmers ($\bar{x}$=1.00). The result implies that the predominant IS on IK for SRP were family and neighbours. This result corroborates Owiny et al. (2014) who reported that IK was transmitted across generations from parents to children and from one neighbour to another through face-to-face interactions. Earlier study by Mansour (2022) also reported experienced farmers as well as neighbours and relatives as predominant sources accessed by farmers for agricultural information. The use of family and neighbours as IS on IK is probably attributed to the high value placed on these sources when it comes to sharing of information and they remain potent SI transfer in rural communities. These sources are also informal means of information dissemination characteristic of rural life. Furthermore, the high access through family could be due to strong family ties or relationship as well as the home being the first agent of socialization. Parents living in rural communities always try to pass relevant information to their children with the hope that such information, especially concerning their culture and tradition, would continue to be passed down across generation so that subsequent generations would continue to learn from the experiences of previous ones. The high access through neighbours could be due to strong interpersonal relationship. The findings are in consonance with Odebode et al. (2021) who found that neighbour, and family/friends were the most frequently used information sources by rural farmers. Neighbour as a predominant IS on IK for SRP is expected because of the neighbours belief that one of the characteristics of good neighbourliness is that of sharing relevant information whether such information were requested or not.

Table 4. Sources of information on IK for SRP

Sources of information	Always	Occasionally	Never	Mean	Rank
Family	117 (53.2)	71(32.3)	32 (14.5)	1.38	1
Neighbours	98 (44.5)	89 (40.5)	33 (15.0)	1.29	2
Other farmers	71 (32.3)	78 (35.5)	71 (32.3)	1.00	3
Radio	30 (13.6)	78 (35.5)	112(50.0)	0.62	4
Television	8 (3.6)	46 (20.9)	166 (75.5)	0.32	5
Teachers	7 (3.2)	35 (15.0)	178 (80.9)	0.22	6
Extension agents	11 (5.0)	20 (9.1)	189 (85.9)	0.19	7
NGOs	3 (1.4)	14 (6.4)	203 (92.3)	0.09	8

Note: Values in parentheses are percentage scores.

3.4. Knowledge of IP for SRP

The result of RW's KIP for SRP is shown in *Table 5*. With respect to general management practices, majority (91.8%) of the respondents knew that poisonous substances that are consumed by animals while grazing could be neutralized by giving the animals palm oil to drink. Palm oil is readily available in most homes and so respondents continue to pass down this knowledge from generation to generation. Similarly, majority (80.0%) of the respondents knew that separating sick animals from healthy ones prevents the spread of diseases in small ruminants. This knowledge probably resulted from personal experience as IK is known to be transferred through practical demonstration and also from observing significant other women successfully use the practices.

On nutrition practices, *Table 5* indicates that 68.6% of the respondents knew that SR could receive adequate nutrients when they are fed on variety of feeds like forage, dried cassava peels, tree legumes (such as *Leucina* and *Gliricidia*) and kitchen waste like soya bean chaff. This is probably due to the knowledge obtained from observing the parents and grandparents feed their animals with whatever was readily available and affordable. With respect to health practices, 41.4% of the rural women knew that bloat in small ruminants was a nutritional disorder (*Table 5*) and that it could be controlled by giving the animals palm oil to drink or by feeding the animals slightly wilted grass. This is an indication that RW were aware that the condition could become serious if enough attention was not paid to it and therefore have learnt of various methods of controlling it in order to save the lives of their animals.

Table 5. Knowledge of IP for SRP

Knowledge statements	Category	
	F	%
Knowledge on general management practices		
Separating sick animals from healthy ones prevents disease spread	176	80.0
Keeping different species of animals minimizes risks from total loss arising from disease attack	38	17.3
Not allowing animals to go grazing reduces parasite infestations	39	17.7
Allowing animals to graze only after the sun has risen reduces parasite infestations	36	16.4
Palm oil or dissolved charcoal given to animals to drink neutralizes poisonous substances consumed by animals	202	91.8
Knowledge on nutrition practices		
Small ruminants receive adequate nutrients when they are given variety of feeds such as pasture, dried cassava peels, forage legumes and common cereals like maize and sorghum	151	68.6
Knowledge on health practices		
Water with high salt concentration controls skin infection	5	2.3
Ground tobacco leaves/seeds or liquid from *siam weed* is used to treat wounds/lesions on skins of animals	11	5.1
Water from soaked un-ripe pawpaw fruits or boiled bark of *iroko tree* is used to control intestinal worms	21	9.5
Diarrhoea and dysentery in small ruminants can be controlled by giving the animals juice of 'efirin' plant/bitter leaf plant	14	6.4
Trypanosomiasis in small ruminants can be treated by blood letting	4	1.8
Bloat in small ruminants can be treated by giving the animals palm oil to drink/feeding the animals with slightly wilted grass	91	41.4
Retained placenta can be expelled with salt water	4	1.8

Note: F = Frequency, % = Percentage

3.5. Categorization of respondents according to their KIP for SRP

Table 6 reveals that respondents knowledge on indigenous health (90.0%) and general management (69.5%) practices of SRP were low, but high on indigenous nutrition practices (68.6%). On the overall, 56.8% of the respondents had high KIP for SRP. This implies that there was relatively adequate KIP for SRP in the study area and that respondents had better knowledge on indigenous nutrition practices than general management and health practices. However, respondents had better knowledge on indigenous general management practices compared to health practices.

The high KIP could have been due to the high frequency of use of IS on IP from family and neighbours by the respondents. Furthermore, the high KIP could have resulted from the advanced age of the respondents which might have afforded them access and/or appreciation of traditional knowledge since the elderly are believed to have more respect for the use of IK and practices. This result supports the report of FAO (2011) that RW have considerable IK about many aspects of animal husbandry.

Table 6. Categorization of respondents by level of KIP for SRP

Knowledge status	Categories of KIP for SRP							
	General management		Nutrition		Health		Overall/pooled	
	F	%	F	%	F	%	F	%
Low	153	69.5	69	31.4	198	90.0	95	43.2
High	67	30.5	151	68.6	22	10.0	125	56.8
Minimum	0.0		0.0		0.0		0.0	
Maximum	5.0		1.00		10.0		12.0	
Mean	2.23 ± 0.89		0.69 ±0.47		0.76 ±0.14		3.68±1.62	

Note: F = Frequency, % = Percentage. Source: Field Survey, 2017

The adequate knowledge of respondents on indigenous nutrition practices is suggestive that the women were knowledgeable on indigenous nutrition practices of SRP. The implication is that during the dry season when forage (grasses and legumes) is no longer adequate in terms of quality and quantity, RW can use their IK to provide readily available feeding stuffs like dried cassava peels, maize waste, cowpea waste, soya bean waste, crop residues, plantain and banana peels as well as household waste for their animals. The low knowledge on indigenous health and general management practices suggests that several respondents were not highly knowledgeable on indigenous health and general management practices as they were unfamiliar with a lot of indigenous health and general management practices for SRP. This result is at variance with Chah et al. (2009) who reported that RW had excellent knowledge of ethno veterinary practices and ethno botany. The low knowledge on indigenous health

practices could be because traditional medical practitioners are often found to be unnecessarily secretive. This is in consonance with Emeagwali and Dei (2014) who observed that many traditional medical practitioners are reluctant to reveal the active ingredients in their mixtures.

3.6. Constraints to use of IK in SRP

Results in *Table 7* indicate that slow effectiveness of IK ($\bar{x}$=1.18), lack of empirical testing of IK ($\bar{x}$=1.04), poor documentation of IK ($\bar{x}$=0.92), lack of standard in the use of IK ($\bar{x}$=0.92), belief that IK is inferior to Western type expertise ($\bar{x}$=0.92), and deliberate condemnation of IK by users of other knowledge practices ($\bar{x}$=0.87) ranked 1st, 2nd, 3rd, 3rd, 3rd, and 6th, respectively, amongst the constraints limiting the use of IK in SRP. This implies that the most serious constraints to the use of IK in SRP were the slow effectiveness, lack of empirical testing, poor documentation, lack of standard in it/the use, belief that it is inferior to Western type expertise, and deliberate condemnation by users of other knowledge practices.

Constraints to use of IK in SRP due to slow effectiveness of IK implies that the women would want to see quick solutions to their problems from the use of indigenous methods to warrant continuous use. Indigenous methods that seem to work very slowly even if they eventually achieve the set objectives may not encourage utilization. This view is in accord with that of Briggs (2005) who said that farmers were not using IK and practices because they believed it did not work. Lack of empirical testing of IK as constraints to use of IK in SRP could be because most traditional knowledge practitioners could not explain their practices using scientific methods (Mohamedbhai, 2013).

Table 7. Constraints to use of IK in SRP

Constraints	Severe constraint	Mild constraint	Not a constraint	Mean	Rank
Slow effectiveness of IK	88 (40.0)	84 (38.2)	48 (21.8)	1.18	1
Lack of empirical testing of IK	65 (29.5)	98 (44.5)	57 (25.9)	1.04	2
Poor documentation of IK	58 (26.4)	86 (39.1)	76 (34.5)	0.92	3
Lack of standard in the use of IK	69 (31.4)	65 (29.5)	86 (39.1)	0.92	3
Belief that IK is inferior to Western type expertise	54 (24.5)	94 (42.7)	72 (32.7)	0.92	3
Deliberate condemnation of IK by users of other knowledge practices	56 (25.5)	80 (36.4)	84 (38.2)	0.87	6
High acquisition of formal education by members of the community	53 (24.1)	75 (34.1)	92 (41.8)	0.83	7
Secrecy surrounding the use of IK	28 (12.7)	107 (48.6)	85 (38.6)	0.74	8
Difficulty in sourcing the different indigenous practices	35 (15.9)	89 (40.5)	96 (43.6)	0.72	9
Memory loss or death of traditional knowledge holders	34 (15.5)	83 (37.7)	103 (46.8)	0.69	10
Negative attitude of people towards IK	38 (17.3)	64 (29.1)	118 (53.6)	0.64	11
Distance to source(s) of IK	29 (13.2)	68 (30.9)	123 (55.9)	0.57	12
Spiritual component of IK	23 (10.5)	50 (22.7)	147 (66.8)	0.44	13
Limiting transfer of information to oral method	56 (25.5)	107 (48.6)	57 (25.9)	0.10	14

Note: Values in parentheses are percentage scores

The constraint of poor and/or inadequate documentation may prevent IK from being accurately transferred to the succeeding generation due to limitation of accurate recall from memory only. Ngcobo and Obono (2013) reported that because IK was not adequately documented and validated, it was not readily available outside a particular community, hence difficult to preserve and limiting its wide acceptance. The lack of standard in the use of IK observed as a constraint indicates the practice of traditional knowledge holders to individualize their practices instead of generalizing them. Emeagwali and Dei (2014) said that most IK practitioners tend to look at individual situations rather than from a broader perspective.

Belief that IK is inferior to Western type expertise as constraints to use of IK in SRP is in line with Risiro et al. (2013). They reported that the belief that IK was inferior to Western type expertise was a major constraint to use of IK practices. Belief that IK is inferior to Western type expertise as constraints to use of IK in SRP is expected because of IK has been deliberately made to appear inferior to Western knowledge. In an earlier study, Kaya and Seleti (2013) argued that IK was being made to look inferior to Western knowledge by portraying Western world view of knowing as the only way of knowing.

3.7. *Utilization of IK in SRP*

The dependent variable for this study is RW UIK in SRP. This section presents the UIK in SRP among RW in Southwestern Nigeria. The study measured general management, nutrition and health domains or dimensions of

IK utilization for SRP. Results were presented for utilization of general management IK for SRP, utilization of nutrition IK for SRP, utilization of health IK for SRP and overall utilization of IK for SRP.

3.7.1. Utilization of general management IK for SRP

The result in *Table 8* reveals that majority (64.5%) of the respondents agreed that they all the time separate sick animals from healthy ones to prevent spread of diseases. Separating of sick animals from healthy ones to prevent spread of diseases ranked second ($\bar{x}$=1.57) amonst all the UIK practices. Result for this variable indicates that RW producing SR were able to practice separation of sick animals from healthy ones to prevent spread of diseases. The reason may be that it is easy to use these knowledge and practices. Also, the practices cost very little and involves no extra labour. For example, separating sick animals from healthy ones to avoid spread of diseases is relatively easy as sick or unthrifty animals would not put up any form of resistance. In terms of providing some form of housing for animals, 44.5% of the RW agreed that they all the time provide some form of housing for animals and 27.7% when convenient provide some form of housing for animals. Providing some form of housing for animals ranked fifth on the list of IK practices utilization with a mean score of 1.17. The result implies a fairly provision of some form of housing for animals.

3.7.2. Utilization of nutrition IK for SRP

Result in *Table 8* shows that giving animals variety of feeds such as pasture, dried cassava peels, forage legumes and common cereals like maize and sorghum to meet their nutrient requirements ($\bar{x}$=1.65) ranked highest on the list of IK practices utilised, with the majority (76.4%) of the respondents agreeing that they all the time gave their animals variety of feeds to meet their nutrient requirements. This results suggest more of the respondents were able to meet their animal nutrient requirements due to feeding with pasture, dried cassava peels, forage legumes and common cereals like maize and sorghum. This is probably due to the fact that SR feed basically on forage crops which are readily available to the animals to graze or browse especially during wet seasons. When forages are not sufficient as a result of dry weather, respondents used their IK to source for other feeds for their animals such as dried cassava peels, maize chaff, crop residues, soya bean chaff, cowpea chaff and other household wastes.

3.7.3. Utilization of health IK for SRP

The results in *Table 8* reveal that 62.7% of the respondents agreed that they all the time neutralized poisonous substances consumed by animals with dissolved charcoal, crushed garlic or palm oil. Neutralizing poisonous substances consumed by animals by giving them dissolved charcoal, crushed garlic or palm oil to drink ($\bar{x}$=1.52) ranked third amongst all the IK practices utilization. Treating diarrhoea and dysentery in small ruminants with juice of *efirin* plant or juice of bitter leaf plant ranked fourth ($\bar{x}$=1.27) on the list, with fairly large porportion (62.7) of the respondents agreed to all the time treat diarrhoea and dysentery in their animals with *efirin* or bitter leaf. These findings show that most of the respondents utilized the IK practices of neutralizing poisonous substances consumed by animals with dissolved charcoal, crushed garlic and/or palm oil as well as treating diarrhoea and dysentery in small ruminants with juice of *efirin* plant or bitter leaf plant. Indigenously neutralizing poisonous substances consumed by animals requires the use of materials, palm oil and charcoal which are readily available in most homes and at no extra cost to the respondents, hence the high level of use. The indigenously treating diarrhoea and dysentery in SR with juice of *efirin* plant or bitter leaf plant is probably due to the fact that diarrhoea and dysentery are fairly easy to control in SR using aforementioned items.

Table 8. Utilization of IK in SRP by RW

IK practices in SRP	UAT	UWC	NU	Mean	Rank
Utilization of general management IK				**6.43**	
Separating sick animals from healthy ones to prevent spread of diseases	142 (64.5)	61 (27.7)	17 (7.7)	1.57	2
Keeping different species of animals to minimize risk from total loss from disease infestation	36 (16.4)	69 (31.4)	115 (52.3)	0.64	12
Managing animals through Partial restriction of their movement to reduce cost	36 (16.4)	81 (36.8)	103 (46.8)	0.70	9
Disallowing grazing by animals at early hours of the morning before the sun comes out to prevent parasite infestations	35 (15.9)	77 (35.0)	108 (49.1)	0.67	10
Tying plastic straps on bases of rams and male goats to control indiscriminate mating	48 (21.8)	49 (22.3)	123 (55.9)	0.66	11
Maintaining regular reproduction to increase profit	68 (30.9)	88 (40.0)	64 (29.1)	1.02	6
Providing some form of housing for animals	98 (44.5)	61 (27.7)	61 (27.7)	1.17	5
Utilization of nutrition IK				**2.20**	
Cutting forage to feed animals in their sheds for faster weight gains	35 (15.9)	51 (23.2)	134 (60.9)	0.55	13
Giving animals variety of feeds such as pasture, dried cassava peels, forage legumes and common cereals like maize and sorghum to meet their nutrient requirements	168 (76.4)	27 (12.3)	25 (11.4)	1.65	1
Utilization of health IK				**7.17**	
Separating and observing new animals brought into the flock for signs of diseases	50 (22.7)	110 (50.0)	60 (27.3)	0.95	8
Neutralizing poisonous substances consumed by animals by giving the animals dissolved charcoal, crushed garlic or palm oil to drink	138 (62.7)	58 (26.4)	24 (10.9)	1.52	3
Controlling skin infection by bathing animals in 'wells' with high salt concentration	21 (9.5)	48 (21.8)	151 (68.6)	0.41	15
Treating wounds/lesions on the skin with ground tobacco (*Nicotiana tabacum*) leaves or seeds, or liquid from *siam* weed leaves	27 (12.3)	54 (24.5)	139 (63.2)	0.50	14
Controlling intestinal worms by giving animals juice from soaked unripe paw- paw fruits (pawpaw latex) or boiled bark of *Iroko* tree to drink	19 (8.6)	44 (20.0)	157 (71.4)	0.37	18
Treating diarrhoea and dysentery in small ruminants with juice of *efirin* plant or juice of bitter leaf plant	102 (46.4)	75 (34.1)	43 (19.5)	1.27	4
Treating trypanosomiasis by blood letting	8 (3.6)	19 (8.6)	193 (87.7)	0.16	20
Treating foot rot by rubbing Shea butter or ground seeds of *'iroko'* tree on affected parts	15 (6.8)	20 (9.1)	185 (84.1)	0.23	19
Controlling *Peste des petits ruminants* (PPR) by raising the floors or using dried grass/wood shavings as beddings	26 (11.8)	31 (14.1)	163 (74.1)	0.38	16
Treating bloat in small ruminants by giving the animals palm oil to drink or feeding them with slightly wilted grass	77 (35.0)	66 (30.0)	77 (35.0)	1.00	7
Expelling retained placenta by giving animals salt water to drink	28 (12.7)	27 (12.3)	165 (75.0)	0.38	16

Note: UAT = Used all the time, UWC = Used when convenient, NU = Never used. Values in parentheses are percentage scores

3.8. Categorization of respondents based on UIK for SRP

A little over half (52.3%) of the respondents had low UIK in SRP (*Table 9*). Disaggregated results across the UIK for SRP reveals that UIK on general management (53.6%), nutrition (65.9%) and health (57.3%) were low among respondents. It could be deduced that there was relatively inadequate UIK for SRP in the study area. This implies that respondents were low utilizers of IK in SRP. The implication is that RW were relatively low in usage of IK for the production of SR in Southwestern Nigeria. The result is at variance with Omotara and Olutegbe (2015) who found high usage of endogenous method in treating pests and diseases of SR. Furthermore, it could be inferred that nutrition IK was the least utilized for SRP among RW, while IK on general management was the most utilized compared to IK on health.

The low utilization could be due to the relatively high literacy level of the respondents (*Table 2*) which might have enabled them to utilize other readily available and accessible knowledge types such as Western knowledge. This is in consonance with Ijeoma and Osondu (2015) assertion that increase in the educational level of farmers results in decreased usage of IK and practices. Furthermore, the inadequate utilization could be due to that IK were not fully shared by the RW. Earlier study by Woldu (2016) found that traditional practitioners were always very secretive about their knowledge and were not always willing to reveal what they knew to others. Additionally, the low level of UIK in SRP could be as a result of the perception of RW that IK practices do not work as effectively as western practices. According to Briggs (2005), farmers were not using IK and practices because they believed it did not work.

Table 9. Categorization of respondents based on UIK in SRP

Utilization status	Categories of IK utilization for SRP							
	General management		Nutrition		Health		Overall	
	F	%	F	%	F	%	F	%
Low	118	53.6	145	65.9	126	57.3	115	52.3
High	102	46.4	75	34.1	94	42.7	105	47.7
Minimum	1.00		0.00		0.00		4.00	
Maximum	13.00		4.00		18.00		32.00	
Mean	6.42 ± 2.60		2.20 ± 1.11		7.16 ± 1.15		15.77 ± 5.41	

Note: F = Frequency, % = Percentage. Source: Field Survey, 2017

3.9. Relationship between selected demographic characteristics of respondents' and their UIK for SRP

Chi-square and PPMC results in *Table 10* show that respondents' age (r=0.18), educational attainment (r=-0.16), household size (r=0.22), group membership (χ^2= 3.88) and (crop farming) primary occupation (χ^2 = 30.71) were significantly ($p< 0.05$) related to UIK in SRP. This implies that age, household size, group membership and primary occupation had a significant relationship with UIK in SRP.

The positive correlation between age of respondents and UIK in SRP implies that the older the respondents, the more IK they use in SRP. This suggests a corresponding increase in the UIK with age. This is similar to Ijeoma and Osondu (2015) who found that increase in age of farmers led to increased UIK. The reasons older farmers were more utilizers of IK in SRP could be because younger persons do not have as much IK as older ones. The foregoing, according to Owiny et al. (2014), was the cause of younger persons not utilizing as much IK as older persons. The negative correlation between educational attainment of respondents and UIK in SRP implies that the more educated the respondents, the less IK they use in SRP. This suggests that with increase in the educational attainment of the RW, there is decrease in UIK in SRP. This result agrees with Ijeoma and Osondu (2015) who found that increase in the educational level of farmers' results in a decrease in their use of IK and practices. The positive correlation between household size and UIK in SRP implies that the larger the household members or size, the more RW utilized IK in SRP. The result corroborates with Adekunmi et al (2020) who reported positive and significant correlation between household size and use of ethno-veterinary medicine practices among farmers rearing goat and sheep.

The positive relationship between group membership and UIK in SRP implies respondents who belong to SR rearers' group tend to utilize more IK in their rearing of SR. This suggests that respondents' membership of SR producers group influence their UIK in SRP. This could be as a result of group effect of interactions of people of similar interest which consequently leads to increase in the sharing of relevant knowledge and information thereby increases the use of the information. The relationship of primary occupation (crop farming) with UIK in SRP implies that crop farming primary occupation influence the RW UIK for SRP. This implies that UIK in SRP was a function of the respondents' engaging in crop farming as a primary occupation. Earlier study by Abdullahi et al. (2015) found that occupation was significantly related to indigenous management systems in SRP.

Table 10. Chi-square and PPMC analyses of selected demographic characteristics and UIK in SRP

Variables	Df	χ^2	r-value	P-value
Age of respondents	-	-	0.18*	0.01
Educational attainment	-	-	- 0.16*	0.02
Marital status	3	4.04	-	0.26
Household size	-	-	0.22*	0.00
SR rearers' group membership	2	3.88*	-	0.01
Primary occupation (crop farming)	4	30.71*	-	0.00

Note: Df = Degree of Freedom, χ^2 = Chi-square Coefficient, r-value = Correlation coefficient, * Significant at $p\leq 0.05$

3.10. Chi-square and correlation analyses between selected enterprise characteristics of respondents and their UIK for SRP

Results in *Table 11* shows that years of SR farming experience (r=0.34), number of SR (r=0.19), extensive system of management (χ^2=8.57), personal labour type (χ^2=7.03) and income from SR (r=0.14) were significantly ($p< 0.05$) associated with RW UIK in SRP. This implies that years of SR rearing experience, SR number, extensive system of management, personal labour type and income from SR had significant relationship with UIK in SRP.

The implication is that utilization of IK in SRP was a function of SR farming experience, quantity of SR owned, system of SR management and labour type for SRP.

The positive correlation between years of SR farming experience and UIK in SRP implies that respondents UIK in SRP increases as their years of SR farming experience increases. It is expected that with increased SR farming experience, there is likely to be higher UIK for SRP. Increased years of SR farming experience implies increase in SRP experience as well as knowledge on IP for SRP, which encourages the farmers to utilize IK in SRP. The finding is in agreement with Adekunmi et al (2020) who found significant and positive correlation between goat and sheep farmers farming experience and their use of ethno-veterinary medicine practices in Southwest Nigeria. Furthermore, the positive correlation between the number of SR and UIK in SRP implies that UIK for SRP increases as the number and/or quantity of SR increases. This suggests that with increase in SR, there is significant increase in UIK for SRP. The results correlates with Abegunrin (2021) who found a positive and significant contribution of number of cattle reared to ruminant livestock farmers' use of ethnoveterinary medicine in Nigeria.

The relationship between system of SR management (extensive system) and UIK in SRP implies that extensive system of SR management influence the RW UIK for SRP. The implication is that traditional system of SR management enhances UIK in SRP by RW. The result contradicts Abegunrin (2021) who observed no significant association between knowledge and use of ethnoveterinary medicine among ruminant livestock farmers in Nigeria. The relationship of personal labour type with UIK implies that personal labour type influence the UIK in SRP. Personal labour influenced UIK in SRP, because utilization of personal labour enables RW to quickly and timely utilize their knowledge on IP in SRP which could positively influence UIK for SRP.

The positive correlation between income from SR and UIK in SRP implies that the RW UIK in SRP increases as their income from SR increases. This suggests that an increase in income from SR would result in an increase in UIK for SRP. The implication is that UIK in SRP was a function of respondents' SR income status. Therefore, income is a great incentive for the use of IK in SRP due to possible reduction in the cost of production leading to increase in profit margin. This is in line with Abdullahi et al. (2015) who found that income was significantly related to indigenous management systems in SRP. Owiny et al. (2014) opined that UIK was a function of economics.

Table 11. Chi-square and PPMC analyses of selected enterprise characteristics of respondents' and UIK in SRP

Variables	Df	χ^2	r-value	p-value
Small ruminants rearing experience	-	-	0.34*	0.00
Number of SR owned/reared	-	-	0.19*	0.01
System of SR management (extensive system)	2	8.57*	-	0.01
Sources of SR farm labour (personal labour)	2	7.03*	-	0.03
Income from SR	-	-	0.14*	0.04

Note: Df = Degree of Freedom, χ^2 = Chi-square Coefficient, r-value = Correlation coefficient, * Significant at p≤ 0.05

3.11. Correlation analysis between sources of information and UIK in SRP

Table 12 shows that a significant correlation existed between SI on IK and UIK in SRP (r=0.23, p<0.05). It could be deduced that the information sources of IK determined RW UIK in SRP.

The significance of SI means that with increased IS on IK, UIK in SRP increases. This suggests that having access to SI on IK for SRP does affect RW level of UIK in SRP. The result is in line with Adekunmi et al. (2020) who found that SI had positive and significant correlation with the use of ethno-veterinary medicine practices among goat and sheep farmers. The IK IS determines the accuracy and/or reliability of the IK information for SRP.

Table 12. Correlation analysis between information sources and UIK for SRP

Variable	r-value	p-value
Information sources	0.23*	0.00

Note: r-value = Correlation coefficient, * Significant at p≤ 0.05

3.12. Correlation analysis between respondents' KIP for SRP and their UIK in SRP

The correlation analysis shown in *Table 13* indicates that knowledge on IP (r=0.30) for SRP was significantly related to UIK in SRP ($p<0.05$). This implies that knowledge on IP for SRP had significant relationship with UIK for SRP.

The positive correlation between knowledge on IP for SRP and UIK in SRP implies that the more knowledge on IP for SRP, the more the UIK in SRP. Hence, adequate knowledge on IP for SRP will likely enhance high UIK in SRP. This result disagrees with Abegunrin (2021) who reported a negative and significant association between knowledge and use of ethnoveterinary medicine among ruminant livestock farmers in Nigeria. The theory of knowledge utilization worked with this study as it postulated a direct positive relationship between knowledge acquired and knowledge utilized.

Table 13. PPMC analysis between KIP for SRP and UIK in SRP

Variable	r-value	p-value
Knowledge on indigenous practices for SRP	0.30*	0.00

Note: r-value = Correlation coefficient, * Significant at p≤ 0.05

3.13. Determinants of UIK in SRP

Table 14 reveals that the R^2 value was 0.58. This indicates that 58.0% of the UIK for SRP was explained by the selected independent variables. The Table also shows that age ($\beta = 0.04$, $p < 0.05$), household size ($\beta = 0.35$, $p < 0.05$), membership of SR owners group ($\beta = 1.22$, $p < 0.05$), primary occupation (crop farming) ($\beta = 1.40$, $p < 0.05$) and information sources ($\beta = 0.67$, $p < 0.05$) contributed significantly to UIK in SRP. This implies that age, household size, membership of SR group, crop farming as primary occupation and information sources were determinants of respondents UIK in SRP.

The significance of age implies that with increasing age (increase in age) of the RW, there is increase in their UIK for SRP. Older respondents are likely to possess higher experience, exposure, knowledge and insight in terms of IK and/or practices for rearing SR, which can enhance their UIK in SRP. The result contradicts Omotara and Olutegbe (2015) who found no significant correlation between age and use of endogenous knowledge in treating pest and diseases of SR. The significance of household size establish that household size influences respondents UIK for SRP and with large household, there is significant increase in UIK in SRP. This is suggestive that big family size will lead to high level of IK utilization for SRP. The result conforms to the study of Ijeoma and Osondu (2015) who found that larger households led to increase or high UIK and practices. The significance of primary occupation implies that it contributed significantly in enhancing UIK in SRP as involving in crop production appeared to have a positive effect on UIK for SRP. The significance of group membership indicates that with more or sufficient involvement in SR producers' association/group, there is significant increase in UIK in SRP. The significance of information sources means that with increased information sources, UIK for SRP increases.

Table 15. Regression analysis on contribution of selected independent variables to RW UIK in SRP

Variables	β- value	t- value	p- value
Age	0.04*	2.17	0.03
Marital status (Married)	-0.72	-0.89	0.38
Household size	0.35*	2.50	0.01
Educational attainment	0.43	0.67	0.51
Membership of SR rearers group	1.22*	2.17	0.03
Primary occupation (Crop farming)	1.40*	2.39	0.02
Income from SR	-4.76	-0.31	0.76
İnformation sources	0.67*	4.51	0.00
Knowledge of IP	-0.15	-0.79	0.43
Constraint	-0.09	-1.60	0.11
Summary			
F value	18.53*		
P-value	0.00		
R	0.76		
R^2	0.58		
Adjusted R^2	0.54		
Standard error of estimate	3.55		

Note: * Significant at p≤ 0.05

4. Conclusions

Rural women UIK in SRP was marginally low, although, some of them still highly UIK as a viable alternative to modern livestock farming methods. Age, household size, membership of SR owners group, primary occupation (crop farming) and information sources were major determinants of UIK in SRP. IK information for SRP was accessed mainly through family, neighbours and fellow farmers. High KIP for SRP was predominant. Personal labour and market were the main sources of labour and SR, respectively. Low income, relatively high level of literacy, extensive system of management, moderate household size and non-members of SR group were prevalent in the study area. Slow effectiveness of IK, lack of empirical testing of IK and poor documentation of IK were predominant constraints to UIK for SRP. Finally, demographic characteristics such as age, household size, group membership, crop farming as primary occupation, years of rearing experience, numbers of SR, extensive system of management, personal labour, income from SR, SI and KIP were features that positively influenced RW UIK for SRP in Southwestern Nigeria.

Stakeholders at all levels should be actively involved in formulation of promotional policies that will enhance the UIK for SRP. Extension personnel, in both public and private organization, should actively engage women farmers to complement their SR medication with cheap and effective IK practices for SRP.

Agricultural policies and programmes oriented towards improving UIK for SRP should be promoted to emphasize increased KIP for SRP and membership of SR groups. In addition, intervention should center and/or focus on increasing KIP for SRP as well as membership of SR rearers group.

Intervention programmes on use of IK for SRP should seek to deploy effective IS that will stimulate intensive UIK for SRP among RW. Messages on IK utilization for SRP can be broadcast through radios and televisions in the local language. Short messages can also be sent through mobile phones. This will help to address the problem of low utilization as a result of less appreciation and interest on the part of the RW. Rural women should also be encouraged to share knowledge with one another for higher UIK in SRP.

Ethical Statement

This study was prepared under the permission numbered AERD/03-2017/0003, dated 20/03/2017, from the Ethics Committee of University of Ibadan's Department of Agricultural Extension and Rural Development.

Conflicts of Interest

The article authors declare there is no conflict of interest between them as authors.

Authorship Contribution Statement

Concept: Abu, J. Z., Akinbile, L. A.; Design: Abu, J. Z., Oyibo, O., Akinbile, L. A.; Data Collection or Processing: Abu, J. Z.; Statistical Analyses: Abu, J. Z., Oyibo, O.; Literature Search: Abu, J. Z., Oyibo, O.; Writing, Review and Editing: Abu, J. Z., Oyibo, O., Akinbile, L. A.

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