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Analysis of information needs of beekeepers in Oyo State, Nigeria

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Abstract

Despite the significant and constant demand for bee products, especially honey, in Nigeria, the production rate is still very low, and there is inadequate information on improved management practices amongst beekeepers. This study presents the assessment of the information needs of beekeepers in Oyo state, Nigeria. Two-stage sampling technique was used to select 235 respondents. Data were obtained with a well-structured questionnaire, and analyzed using frequency counts, and the Kendall coefficient of concordance (Kendall's W). Results show that respondents' previous access to information concentrated on basic management practices. Respondents lacked information on colony division and improved management practices despite having sufficient experience and awareness of the importance of beeswax. Theft and vandalism, reliance only on other beekeepers as sources of information, and unsuitable or impractical information were the major bottlenecks in information accessibility and utilization amongst the farmers. Kendall's W indicates that the respondents differed on the areas of beekeeping information needs, and that there was a positive moderate relationship between the information received by the respondents and their management practices. Organized trainings and information dissemination on practical skills on bee colony division, improved colony management practices, apiary pen construction, queen rearing, apitherapy, and swarm catching, in consideration the beekeepers' local and economic contexts, are recommended.

Keywords - beekeeping, colony, economy, improved management practices, information needs

Introduction

Despite numerous initiatives of Nigerian Governments on agriculture and Nigeria's fertile land and other natural resources, agricultural production is still not up to the mark due to an inefficient inputs system and farming model (Mgbenka et al., 2015). Beekeeping, like other aspects of agriculture, has been adjudged to be capable of reviving the Nigerian economy (Ajao & Oladimeji, 2013; Ayansola, 2012). In Nigeria, many urban and rural dwellers practice beekeeping owing to its profitability and viability which in turn generate income and enhance sustainable livelihood. It is being practiced alongside other farming activities or taken as part-time vocation.

There are many benefits of beekeeping ranging from environmental, medical and social benefits. Honey production is the main purpose of beekeeping in Nigeria which is assumed economically driven. Honey has a prompt market as it is valuable and can be easily measured and priced. Hence, beekeeping in Nigeria and other developing countries can be utilized to boost the foreign exchange earnings of the country through exportation of bee products. Moreso, the sector potential for sustainable economic development of households and poverty eradication can be explored to generate employment for the large percentage of Nigeria youths who are currently unemployed.

Unfortunately, most Nigerian farmers still rely on traditional methods and techniques of farming including beekeeping (apiculture). Beekeeping as a commercial venture is still largely unexplored in Nigeria, and the country meets domestic demand for honey mostly by importation from other producing countries (Ayansola, 2012; Ja'afar-Furo, 2007). Abbas (2018) stated that Nigeria has the potential to produce twenty million liters annually but produces only an estimated two million liters per annum. Also, Siyanbola (2018) asserted that consumption rate of honey in Nigeria is 380,000 tons but the country

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produces only 200,000 tons. The sub-optimal production rate has been attributed to lack of timely and credible information on improved management practices amongst practitioners as well as lack of commitment and policy from government. Dukku (2001) asserted that apiculture in tropical countries is faced with numerous challenges taking in its ambit—lack of information on suitable markets, inappropriate processing technologies, lack of technical knowledge, and lack of capital and financial resources.

Information is one of the resources fundamental to decision making and developmental activities (Kamba, 2009). Information interacts with and determines other factors of production. Effectiveness of extension and advisory activities and the subsequent adoption of technology depend on the relevance of the information being disseminated to the farmers. According to Diekmann et al. (2009), the information being disseminated to the farmers must be relevant and meaningful to them; that is, it must be based on their needs. There is higher impact adoption of technologies or information that are context-specific and possibly leading to an increase in farm productivity for smallholder farmers (Samaddar, 2006). Thus, agricultural information needs analysis gives extension agents or program inventors the ability to design intervention that focus on the specific needs of farmers (Babu et al., 2012).

Information-seeking behavior concerns how farmers seek needed information from various available sources that propel utilization of the information through articulation, selection, and evaluation. Ekoja (2002) reported that information-seeking behavior, whether conspicuous or not, is the trait an individual shows when seeking for the perceived needed information which determines the eventual utilization of the information. Individual characteristics such as experience, location, gender, age, culture, exposure, education, cosmopoliteness and beliefs can influence his/her behavior towards information seeking and utilization (Afolabi, 2003; Utor, 2003). Also noted are the sources of the information, content, medium and language of presentation, time and nature of the information amongst others.

Information needs vary from one person to another. Nwagwu (2010), and Meitei and Devi (2009) stated that information needs of an individual is subject to many factors viz. geographical location, information-seeking behavior, level of education, age, sex, profession or area of specialization and career stage amongst others. The information needs determine the services to be provided and channels to be accessed. Harande (2009) categorized the rural dweller information needs into health, agriculture, housing, employment, transportation, religion, welfare, family and legal information components.

The present research investigates the information needs of beekeepers with the following specific objectives: to ascertain the socio-economic characteristics of the beekeepers in the study area, examine the current beekeeping management practices, determine the information sources utilized by the respondents through Total Information Score (TIS) technique, assess the types of information received by the respondents, identify areas of information needs of the respondents, and investigate the challenges facing information accessibility and utilization among the beekeepers. This study also aimed to determine whether there is agreement on the information needs amongst the respondents, and whether there is a relationship between respondents' received information and their management practices.

Literature Review

Development of any area of agriculture depends on meeting the diverse information needs of the farmers which are mostly provided by agricultural extension services. Thus, to ensure adequate provision of demand-driven extension services, several studies have been conducted on farmers' information needs which vary from farmer to farmer. Farmers' information needs assessment (FINA) is anchored mostly on farming activities on specific crops (rice, cassava, cotton, fish, poultry etc.), holders' category (that is, small-holders), farmers' location or geographical base (urban or rural areas), gender (male or female), and community or regional and geographical area information needs approaches, among others. Some researchers (Adeogun et al., 2019) combined information needs with training needs while others (Lwoga et al., 2010) merged it with search behavior. The goals of these studies were to identify areas where farmers need information on, to guide extension activities, and to design and plan strategies for adoption.

Agricultural Infromation Neesds (AIN)

There are varying definitions of agricultural information. Samuel (2001) defined agricultural

information as data for decision-making and a resource that must be acquired and used in order to make an informed decision. Aina et al. (1995) defined agricultural information as all published and unpublished knowledge of agriculture which can be broadly categorized into four classes: technical/ scientific information, commercial information, social and cultural information, and legal information. Umali (1994) classified agricultural information into two broad groups—pure agricultural information and agricultural information inherently tied to new physical inventions. The former refers to information on production techniques, marketing and processing while the latter concerns information on marketing and processing equipment, and new inputs technology among others.

Some studies had been carried out to determine farmers' information needs. Adeogun et al. (2019) analyzed information and training needs of cotton farmers in Zambia where profit calculation, agricultural inputs sourcing and costs were identified as areas where information is needed. Also, Salau et al. (2013) determined agricultural information needs of smallholder farmers in the central agricultural zone of Nasarawa state in Nigeria where it was revealed that pest and disease control, improved seeds/seedings, sources of farm credit and marketing information were highly rated by the farmers. Likewise, sources of agricultural information were captured by some researchers. Mittal and Mehar (2013) asserted that farmers source information from other farmers while Lwoga et al. (2010) emphasized that farmers rely more on word of mouth or interpersonal and face-face communication compared to explicit information sources such as mobile phones, television, or radios.

Constraints to Utilization of Agriculutral Information (CUAI)

Although there are many technical and non-technical agricultural information readily available, accessibility and utilization are limited among farmers in Nigeria. Information access and utilization constraints were reported in various studies. Ellen (2003) mentioned some factors hindering agricultural information accessibility, including social, institutional, psychological and intellectual factors. The International Food Policy Research Institute (IFPRI, 2011) identified age, educational level, farming experience, business characteristics, farm size, farm enterprise type, debt rate, farm ownership, cost of information, lack of equipment, literacy level, inadequate finance, broadcasting times, extension-to-farmer ratio and geographical characteristics as part of the constraints to information utilization.

Internal and external barriers were identified by Lwoga et al. (2010). Inadequate extension facilities and other credible sources of information as well as non-availability of inputs were reported by Mittal and Mehar (2013) as the constraints to the utilization of agricultural information received. Other constraints identified were the fact that those innovations and/ or improved crop varieties were beyond the small-holder farmers' economic capability.

One benefit of the farmers' information needs assessment (FINA) is to determine the pressing challenges and prospects that farmers experience, and the kind of information required, to aid extension services delivery. Other benefits are to ensure adequate participation of farmers in extension programs and planning, improve cost-effectiveness and serve as baseline information (Department of Agricultural Extension [DAE], n.d.). Other salient issues addressed in the FINA studies were the factors influencing information needs of farmers. According to Chen and Lu (2020), individual factors, social factors and natural factors were the factors that influenced access and utilization of the information by the farmers. They further stated that some scholars classified these factors into two which are subjective factors and objective factors. Subjective factors are individuals' characteristics such as educational level and marital status while objective factors include income level, infrastructure conditions, and regional economic development, among others.

Thus, several studies (such as Lwoga et al. (2010)) have recommended researching information needs on a regular basis. Kalusopa (2005) argued that regular studies are necessary for updating farmers' information needs. Also, Kaniki (2001) stated that the level of need may differ over time based on many factors and considering the fact that there is a knowledge gap in rural areas of many developing countries (Elly & Silayo, 2013).

Conceptual Framework

The conceptual framework (Figure 1) depicts the relationships between the independent and dependent variables as used in this work. Beekeepers' personal characteristics like age,

gender, marital status, and educational level affect their information needs. Also, information needs are affected by the family factors (household size, income level, etc.) and occupational characteristics (cosmopoliteness, apiary size, etc.). Challenges to access and utilization will also impact their information need directly or indirectly. For example, cost of information and distance to information sources will have strong effect on the information needs of the beekeepers. The information needs have a direct impact on beekeeping management practices which will reflect in the knowledge and production level.

Theoretical Framework

The theoretical framework used for this work is Uses and Gratification Theory (Katz et al., 1974). The theory attempts to explain why and how individuals use media and other sources to satisfy their needs. Up to recent times, this theory is utilized to investigate various media platforms such as the Internet and social media (Dhir et al., 2015; Zhang et al., 2016). While classic theories of mass media focus on the impact of media on the audiences (media effect), Uses and Gratification theory focuses on the audiences' active role in selecting and using media for their personal needs and development (satisfaction). It is believed that people refer to media for their interpersonal discussions in the form of references, enhancing their specific or general knowledge (Perse, 2014). More knowledge is acquired using media, thereby promoting knowledge of certain practices and activities.

The theory can be used to categorize the needs which media can be used for. These include cognitive needs, affective needs, personal integrative needs, social integrative needs, and tension free needs (Katz et al., 1973). Based on these categories, beekeepers use media to increase knowledge acquisition (cognitive) on beekeeping activities and use updated beekeeping equipment, to feel pleasure (affective), to reassert their status and credibility or ensure their status amongst their peers (personal integrative), to interact with their family members or other people in the community (social integrative), to relax from tension and stress (tension free) among others. Using media will help in meeting their individual needs and make them more satisfied.

Methodology

Study Area

The study was carried out in Oyo state, Nigeria (Figure 2). The state is geographically located between 6.5° and 9°N and between 3° and 5°E. The state has a population of 7,840,864 and is known for its equatorial climate with dry and wet seasons and relatively high humidity which favors agricultural activities. The dry season lasts from November to March while the wet season starts from April and ends in October. Average daily temperature ranges

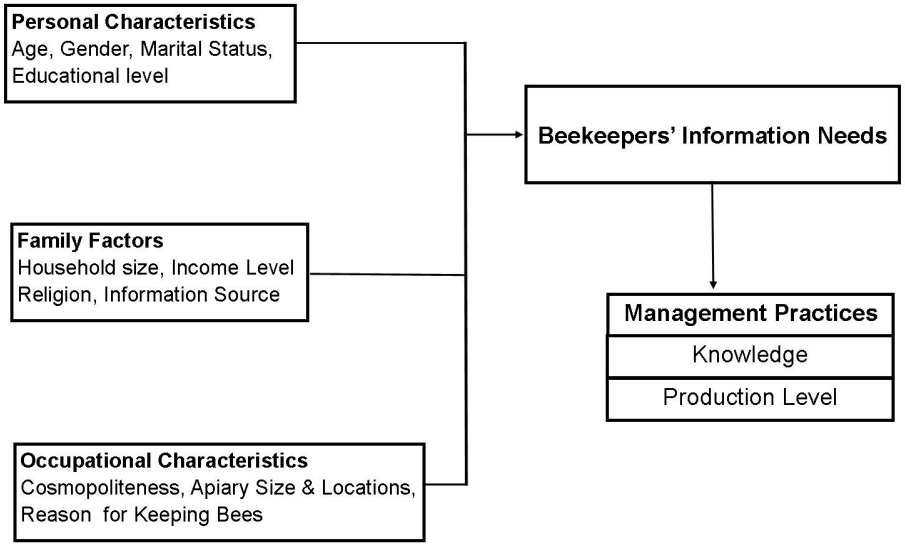

Figure 1. Conceptual framework on information needs.

between 25 and 35 °C almost throughout the year. The vegetation pattern of Oyo state is that of rainforest in the south and Guinea savannah in the north. The state covers 28,454 square kilometres (Oyo State Government, 2017). It is known for its agricultural activities and beekeeping practices. The state vegetation favors the rearing of bees and is one of the few states that produce honey in large quantities. *Apis mellifera* (honey bearing bee) is the only bee species being kept in the state and in Nigeria at large.

Sampling Technique and Sample Size

The targeted population for the study were the beekeepers who were members of Federation of Beekeepers Association of Nigeria (FEBKAN) in Oyo state. The respondents were selected through a two-stage sampling technique. The first stage involved purposive selection of seven zones of Federation of Beekeepers Association of Nigeria (FEBKAN) in the state, while the second stage involved selection of respondents from each zone using convenience sampling technique. Out of the 449 beekeepers in the seven zones, a total of 235 actively practicing beekeepers were chosen for the study after list validation based on their participation in association meetings and having hives installed in contemporary season. Zonewise representation of beekeepers is given in Table 1.

Data Collection and Measurement of Variables

Structural interview technique was used to elicit information from the respondents with the aid of a well-structured questionnaire designed in view of objectives of the study. Follow-up questions were provided as needed to understand the factors that affect information accessibility and utilization. Beekeepers' management practices were determined with the use of frequency counts and percentages. Information sources were determined using the Total Information Score (TIS) approach based on work of Demiryürek (2010). First, frequency of contact with different sources were assigned the following weights: 0.75 - very often, 0.5 - often, 0.25 - sometimes, 0 - not at all. Second, degree of usefulness was determined through the following weights: 0.5 - very useful, 0.25 - useful, 0 - not useful. Third, perceived effectiveness of the information received was assigned the following weights: 0.5 - very effective, 0.25 - effective, 0 - not effective. From these scores, the Total Information Score (TIS) was

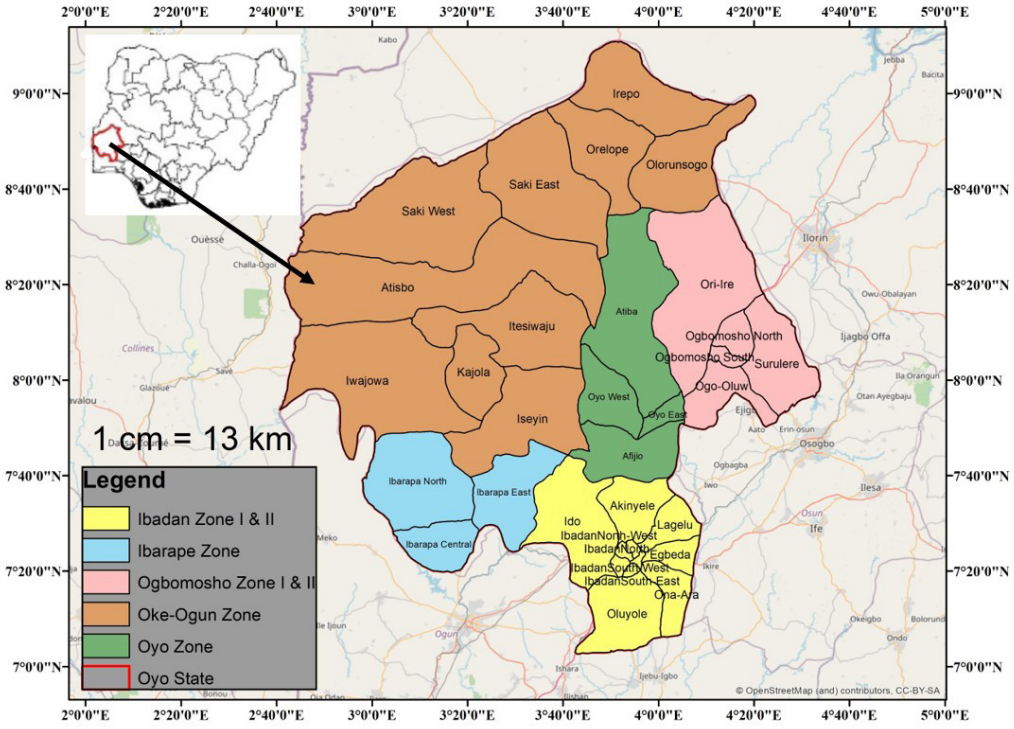

Figure 2. Map of Oyo State, showing the study area.

Table 1. Sampling frame for sample size in each zone.

	Stage I	Stage II
S/No.	Zone	Number of Practicing Beekeepers
1	Oke – Ogun Zone I	48
2	Oke – Ogun Zone II	42
3	Ibarapa Zone	25
4	Oyo Zone	47
5	Ibadan Zone I	23
6	Ibadan Zone II	25
7	Ogbomoso Zone	25
	Population	**235**

generated as the product of: frequency of contact, degree of usefulness and perceived effectiveness of the media sources.

Other data gathered included the type of information received, areas of information needed, and challenges in information accessibility and utilization. The type of received information on improved management practices was determined with a three-point Likert's scale containing the following options: 2 - regularly, 1 - sometimes, 0 - never. Similarly, areas of information needed were captured with a three-point Likert's scale with the following options: 2 - most needed, 1 - needed, 0 - not needed. Lastly, the challenges being faced in information accessibility and utilization were determined with the use of frequency counts and percentage based on a list of pre-determined choices.

Method of Analysis

Data analysis was done with the use of descriptive and inferential statistics viz. frequency counts, mean, percentage and Kendall's coefficient of concordance.

Results and Discussion

Socio-economic Characteristics of the Respondents

Table 2 shows that the mean age of the respondents was 49.8. This is in line with the findings of Kareem (2016), and Usman et al. (2016) about the ages of beekeepers in the study conducted in Osun and Katsina states, Nigeria, respectively. The findings also corroborate the view of Kamau et al. (2018). In these studies, majority of the respondents were middle-aged people, which can be attributed to the fact that many young people avoid agricultural activities. Table 2 further shows that majority (61.7%) of the respondents were Muslims while 38.3% of them were Christians, reflective of the fact that Oyo state is a historically Muslim town (Nolte, 2016). Similar findings were reported by Kebede (2011) and Famuyide et al. (2014). In both religions, beekeeping is present in their holy scriptures. In Islam, beekeeping (honey production) was emphasized in a whole surah (Chapter) of the Glorious Qur'an (Nahl) and Hadith of Noble Prophet Muhammad (Peace be upon him). Likewise, the Bible mentioned the importance of honey production in Mathew 3:4.

Table 2 reveals that most (76.6%) of beekeepers in the study area were males, and majority (88.9%) were married. There are more males than females who participate in beekeeping activities possibly due to tediousness of the activities of beekeeping. Further, majority of the beekeepers were married possibly because majority of the respondents in this study were between 41 and 50 years old, and that married people had more responsibilities and needed more economic sources to strengthen their earnings. These results agree with the findings of Babatunde et al. (2007), Adeniyi (2013), Famuyide et al. (2014), Usman et al. (2016) and Kareem (2016).

Majority (58.7%) of the beekeepers had tertiary

Table 2. Socio-economic characteristics of the respondents (n = 235).

Variables	Classification	Means	Frequency	Percentage
Age (Years)	31–40		46	19.6
	41–50		81	34.5
	51–60	49.8	69	29.4
	61–70		35	14.9
	≥ 71		4	1.7
Religion	Islam	-	145	61.7
	Christianity		90	38.3
Gender	Male	-	180	76.6
	Female		55	23.4
Marital status	Married	-	209	88.9
	Unmarried	-	26	11.1
Educationa level	No formal		4	1.7
	Primary		41	17.4
	Secondary		52	22.1
	Tertiary		138	58.7
Household size	1–5	5	151	64.3
	6–10		71	30.2
	≥ 11		13	5.5
Apiary locations	1–3	4	200	85.1
	4–6		31	13.2
	≥ 7		4	1.7
Hives ownership (Apiary size)	1–20	30	113	48.1
	21–40		80	34.0
	41–60		29	12.3
	61–80		10	4.3
	81– ≥100		13	1.3
Beekeeping experience	1–5	12	37	15.7
	6–10		72	30.6
	11–15		36	15.3
	16–20		86	36.6
	≥ 21		4	1.7
Main occupation	Beekeeping	-	12	5.1
	Farming		137	58.3
	Business/Trading		24	10.2
	Civil Service		32	13.6
	Retiree		7	3.0
	Others		23	9.7
Reason for keeping bees	Income	-	98	41.7
	Health/Social		110	46.8
	Hobby		27	11.5

Table 2. Continued...

Variables	Classification	Means	Frequency	Percentage
Average annual income (₦) from beekeeping only	≤50,000	125,000	115	49.0
	50,001–100,000	0	13	37.9
	100,001–150,000		89	5.6
	150,001–200,000		7	3.1
	≥200,001		11	4.7
Apitherapy practices	Yes	-	29	12.3
	No		206	87.7

₦ - Nigerian naira (US $ = 445.15 ₦)

education; about 22.1% had secondary education while only 1.7 % had no formal education. The household size of majority (64.3%) of the respondents ranged from 1 to 5 members while 5.5% had large household size of 11 or more members. The mean household size was estimated to be 5 members. This indicates that in the study area, beekeeping activities were practiced by educated people with small household size.

The educational level of an individual may influence the sources of information vis-à-vis their utilization, and may determine the extension teaching method and communication techniques to be used (Boz & Ozcatalbas, 2010; Okwu & Daudu, 2011). Further, household size could influence how individuals strive for better income sources and determines the information channel access by individuals. The educational level and household size of the sample in this study are similar to the findings of Farinde et al. (2005), Usman et al. (2016), Kebede (2011) and Kareem (2016) in respective studies of beekeepers.

Majority (85.1%) of the respondents had their hives placed in one to three places, while 1.7% had their hives installed in seven or more places. The reason for constructing hives in different locations may be to prevent attack (vandalism/theft). It was furthermore revealed that 48.1% of the respondents had 1 - 20 hives while only 1.3% had between 81-100 hives and/or more. The mean apiary size was found to be 30. This suggests that beekeeping in the study area was still at a developing stage, agreeing with the findings of Babatunde et.al (2007) and Nwaobiala and Obinna (2015). The result also confirmed subsistence practices (small holding) which is one of the characteristics of Nigeria agriculture.

The mean length of experience of beekeeping was 12 years, with 36.6% of the respondents having 16-20 years of beekeeping experience, while only 15.7% had 1-5 years of experience. It could be established that a large proportion of the respondents were experienced beekeepers. This is in contrary to the findings of Babatunde et al. (2007), Adeniyi et al. (2013) and Usman et al. (2016).

Majority (58.3%) of the respondents considered farming as their main occupation, and only about 5.1% of them had beekeeping as primary occupation. The reason for practicing beekeeping differed amongst the respondents. About 46.8% of them practiced beekeeping because of health and social benefits; 41.7% and 11.5% practiced because of income and as a hobby, respectively. These are in consonance with the findings of King et al. (2010), where 39% of respondents practiced beekeeping as a hobby. Most of the respondents (86.9%) derived an annual income of ₦100,000 or less (approximately USD 240 or less). In general, the beekeepers in this study did not rely on beekeeping as their primary source of income. Instead, beekeeping was practiced as a subsidiary occupation in the study area, similar to the sample in Adeniyi et al. (2013) and Famuyide et al. (2014) studies.

Around 87.7% of the respondents were not practicing apitherapy, while only 12.3% of the respondents were involved in it. This indicates that apitherapy is yet to be adopted by most of the beekeepers in the study area. The reasons for this differ amongst the beekeepers; the major one being the people's perception that apitherapy is linked to traditional medicine which deterred some Christians from practicing it.

Beekeeping Management Practices

Table 3 indicates that majority (83.8%) of the respondents got their hives from artisans, and only

Table 3. Beekeeping management practices of the respondents (n = 235).

Variables	Frequency	Percentage
Awareness of Improved Management Practices	235	100
Sources of Bee Hives		
Self-constructed	38	16.2
Constructed by artisans	197	83.8
Materials for hives construction		
Wood/plank	215	91.5
Metals	15	6.4
Bricks	5	2.1
Hive location		
Inside compound and on fields	218	92.7
In fields alone	17	7.2
Hive placement		
Placed on stand	139	59.1
Hung on a tree	52	22.1
Both	44	18.7
Hive products		
Honey	235	100
Bees wax	235	100
Propolis	-	-
Source of beeswax		
Left over after extraction of honey	235	100
Reason for wax collection		
Income Generation	10	4.3
Industrial use	28	11.9
Baiting/Foundation sheet	197	83.8
Materials for baiting		
Beeswax	211	89.9
Honey	24	10.2
Reason for not processing/marketing beeswax		
Unavailability of processing materials	103	43.8
Poor market linkage	52	22.1
Inadequate knowledge	28	11.9
Inadequate processing skills	18	7.7
Insufficient awareness about importance	15	6.4
Others	19	8.1

Table 3. Continued...

Variables	Frequency	Percentage
Bee hunting		
Yes	5	2.1
No	230	97.9
Method of extraction		
Manual (By hand)	30	12.8
Centrifugal Extractor (Honey Presser)	205	87.2
Evacuation of bee after harvesting		
Yes	-	-
No	235	100
Hive inspection for signs of maturity		
By external inspection of the hive	115	49.0
By observing the honey bee sign	61	26.0
By the end of flowering period	30	12.8
By cluster of honey bees around entrance of the hives	16	6.8
By smelling of the honey	10	4.3
Internal inspection of hives	3	1.1

16.2% of the respondents constructed their hives by themselves. Mostly, the hives were constructed on the instruction of other beekeepers who supervised the construction. This indicates that carpenters and other artisans in the study area were quite knowledgeable in hive construction.

Most of the hives (91.5%) were constructed from wood/plank, some (6.4%) from metal and a few (2.1%) from bricks. Respondents who used metal hives indicated that this was mainly to prevent theft in some areas, especially in Ibadan zones. Those who used brick hives were mostly those who practiced backyard beekeeping. Further, most hives (93%) were placed on the beekeepers' fields while only a few (7%) placed them in both the beekeepers' compound and fields. This suggests that residential apartment beekeeping is not really common amongst the farmers.

Majority of the hives (59.1%) were placed on metal stands in farms, but some (22.1%) were hung on trees, and some (18.7%) on both. Hive placement determines rate of colonization of the hives and prevention of ants/rodents from entering the hives before or after colonization. Placement of hives on trees indicates that beekeepers in the area did not pay adequate attention to ant invasion which can affect the rate of bee colonization or lead to absconding of the bees. Another possibility is that ant invasion was not being considered as a major threat to beekeeping practices in the study area.

Attempts were made to ascertain the management practices observed by the respondents before installation of hives to ensure timely colonization and survival of the bee colonies after colonization. It was revealed that most of the respondents practiced site clearing, placed hives near fruiting plants or cultivated crops, ensured water availability, practiced baiting of hives and planned hives' orientation to face east.

Table 3 shows that all respondents harvested both honey and beeswax, but not propolis. Beeswax was gathered mainly from the left-over from honey extraction. It was also revealed that majority (83.8%) of the beekeepers collected beeswax for baiting activities, and only 4.3% of the respondents sold their beeswax for income. Respondents also explained that they bait their hives with beeswax (89.8%) or honey (10.2%) after installation to attract bees to the hives. The study further indicated that many respondents lacked processing materials (43.8%) or market linkages (22.1%), even though only a few of them lacked awareness about the importance of

beeswax (6.4%).

Table 3 further shows that bee hunting seems to be an obsolete practice, with only 2.1% of the respondents (mostly in Saki town of Oyo state) stating that they practiced bee hunting, while 97.9% of the beekeepers responding otherwise. This is in line with findings of Sekumade et al. (2004) who stated that urbanization and improved management practices have reduced the practice of bee hunting. Moreso, logging activities or deforestation have also contributed to reduction in wild-bee hunting.

Table 3 further indicates that majority (87.2%) of the respondents extracted their honey from the comb with the use of locally fabricated extractor. All the respondents affirmed that bees did not evacuate after harvesting, implying that the respondents had good knowledge of beekeeping practices by not harvesting all the honey in the hives and the brood.

Table 3 also shows that 49.0% of the respondents determined honey maturity through external inspection of the hives (i.e., weighing the hives with hand, checking the entrance of the hives, aggressiveness of the bees, etc). Only 1.1% carried out internal inspection to determine when the honey matures and ripens.

Frequency of Beehive Inspection

Table 4 reveals the frequency of inspection of hives by the respondents which further shows the management practices prevailing in the study area.

Internal inspection. Majority (80.0%) of the respondents conducted internal inspection of the beehives sometimes. Internal inspection is conducted to check various conditions, including the performance of the bees, the orientation of comb construction, the wellbeing of the Queen, possible invasion by insects and pests, the presence of waste substances. Respondents did not pay desired attention to the colonies and bee biology.

External inspection. Majority (48.5%) of the respondents conducted external inspection weekly; 28.9% of the respondents do it on monthly basis, and 22.6% of the respondents visited their apiary sometimes. Frequent visits to the apiary sites indicate that the beekeepers in this study performed fair management practices.

Beekeeping Equipment

Table 5 shows that most of the respondents were yet to fully adopt modern beekeeping equipment and they are still in possession of crude equipment. None of the respondents owned a beeswax extractor and manual or electric processing machines. Only a few respondents (1.3%) owned an apiary pen. Only 14.0% possessed queen excluder, and only 14.5% had a swarm catcher.

Distribution of Respondents on Information Sources, Uses and Perceived Effectiveness

Table 6 indicates the respondents' Total Information Score (TIS), which was calculated based on the frequency of contact of respondents with information source, degree of usefulness and perceived effectiveness. The TIS in Table 6 shows that the main source of useful and effective information of the beekeepers was their association (878,651.63), followed by friends, neighbors and colleagues (712,389.06); the Internet (46,241.25); and co-members of the organization (8,707.50). The TIS likewise shows that the respondents were least likely to consider ministry of agricultural and extension agents (132.3) as well as local government and research institutes/higher education centers (1.3) as useful and effective sources of information. Specifically, the beekeepers' association and peers

Table 4. Inspection of bee hives by the respondents (n = 235).

Period	Internal		External	
	Frequency	Percentage	Frequency	Percentage
Weekly	10	4.3	114	48.5
Monthly	20	8.4	68	28.9
Sometimes	188	80.0	53	22.6
Rarely	17	7.3	0	0
Total	235	100	235	100

Table 5. Beekeeping equipment in possession by the respondents (n = 235)

Equipment	Frequency	Percentage
Hives	235	100
Knife/cutlass	217	92.3
Smoker	210	89.4
Bee suit	210	89.4
Rainboot	206	87.7
Brush	198	84.3
Bucket	198	84.3
Hand-glove	198	84.3
Honey extractor	160	68.1
Drinker	158	66.4
Swarm catcher	34	14.5
Queen excluder	33	14.0
Apiary pen	3	1.3
Bee house	0	0
Bee wax extractor	0	0
Manual processing machine	0	0
Electric processing machine	0	0

were the main sources of beekeeping information (frequency of contact = 135.25 and 107.5, respectively) in the study area and the information obtained from the sources was very useful (degree of usefulness = 106.5 and 115.25, respectively). The third most significant source (the Internet) was neither as frequently used (frequency of contact = 55.0) nor found to be useful (degree of usefulness = 29.5) despite the high literacy level observed among the respondents. Television and radio were ranked sixth which gives indication that the mass media were not adequately reporting agricultural or beekeeping information in the study area. These findings are in line with findings of Adereti et al. (2006) and Kareem (2016) who reported that a high number of cocoa farmers and beekeepers chose fellow farmers/beekeepers (friends and colleagues) as the main source of their technical information respectively. Also, this is similar to the findings of Tatlonghari et al. (2012) in Indonesia and Lao PDR. However, this is in contrary to the findings of Rehman et al. (2013) where print media were observed to be the primary source of information of farmers in Pakistan. This variation may be because newspaper industry reports agricultural issues in Pakistan but media houses in Nigeria do not adequately capture developmental news (Oladipo et al. 2015).

Distribution of Respondents on Type of Received Information

Table 7 indicates that most of the statements had a weighted mean score of above 1 in all the beekeeping management practices which include site selection, baiting, hive construction, inspection, etc. except on colony division/multiplication. This shows that the frequency of the received information was sufficient. The only information not frequently received was on colony division and multiplication. It means beekeepers receive various types of information to enhance their beekeeping activities.

Distribution of Respondents on Information Needs

Table 8 shows that most of the respondents needed information on colony division (the least received information in Table 7) followed by improved colony management practices and apiary pen construction.

The study also revealed that information on

Table 6. Total Information Score (TIS) of the respondents (n = 235).

Media source	∑ Frequency of Contact	∑ Degree of Usefulness	∑ Effectiveness of media scource	TIS
Beekeepers association	135.25	106.5	61	878,651.63
Friends, neighbors and colleagues	107.5	115.25	57.5	712,389.06
Internet	55.0	29.5	28.5	46,241.25
Co-member of organization	32.25	18.0	15.0	8,707.50
NGOs	14.5	11.5	8.75	1,459.1
Television and radio	13.5	8	6.0	648
Ministry of agricultural, extension agent, local government	10.8	3.5	3.5	132.3
Research institutes, higher education centre	2.25	0.75	0.75	1.3

TIS = ∑ (frequency of contact × degree of usefulness × effectiveness of the media sources)

hive inspection, marketing, honey extraction and separation techniques, and harvesting techniques were not as needed. The respondents have already received much of these information as indicated in Table 7. Further, in Nigeria, there is a ready-made market for honey (Essen, 2022) which reveals that information on marketing may not be the priority of beekeepers.

Challenges being faced in Information Accessibility and Utilization

Table 9 shows the challenges on information accessibility and utilization faced by the respondents. The availability of information (10.6%) or the language used (6.4%) were generally found to be acceptable. Major challenges were apprehensions about theft and vandalism (100%), that information on beekeeping can only be obtained from beekeepers (94.0%), and that information received is not suitable to beekeepers' economic conditions (65.9%) or local conditions (40.4%).

Rate of Agreement in Beekeepers' Information Needs

Table 10 shows that the respondents in this sample had diverse beekeeping information needs (W = 0.036). This implies that respondents differed on the areas of beekeeping information needs. The last column in Table 8 presents the Mean Rank of the individual's information needed areas. The lowest and highest mean ranks (representing the highest and lowest information needs, respectively) were colony division (6.70) and information on hives inspection (8.22). These ranks are relatively close together, indicating that certain information needs generated both high and low ranks from the respondents.

Relationship Between Respondents' Received Information and their Management Practices

Table 11 shows that there was a positive moderate relationship (Kendall's W = 0.421) between the information received by the respondents (Table 7) and their management practices (Table 3). It means areas where respondents had previously received information impacted their beekeeping management practices as reflected in the respondents' site selection, harvesting, apiary visitation, hives construction amongst others.

Discussion

Uses and Gratification Theory explains how media was being used by the beekeepers to derive development and satisfaction in their occupation. The beekeepers in this study received the needed information from their preferred sources of information which tend to increase their productivities. The main source of the information was beekeepers' association (friends and peers) which was chosen by 94.0% of the beekeepers. Other sources commonly used were - internet, television, radio, and research centers. Based

Table 7. Frequency of received information on beekeeping activities (n = 235).

	Regularly	Sometimes	Never	Score	WMS
Site selection	173 (73.6)	56 (23.8)	6 (2.6)	402	1.7
Baiting	173 (73.6)	56 (23.9)	6 (2.6)	402	1.7
Hives construction	173 (73.6)	56 (23.8)	6 (2.6)	402	1.7
Hive inspection	168 (71.5)	61 (26.0)	6 (2.6)	397	1.7
Selling/Marketing	165 (70.2)	60 (25.5)	10 (4.3)	390	1.7
Hive products	160 (68.1)	69 (29.3)	6 (2.6)	389	1.7
Swarm catching	97 (41.3)	56 (23.8)	82 (34.9)	250	1.1
Packaging/storage	93 (39.6)	64 (27.2)	78 (33.2)	250	1.1
Pests and diseases control	93 (39.6)	60 (25.6)	82 (34.9)	246	1.04
Harvesting	92 (39.1)	65 (27.6)	78 (33.2)	249	1.0
Colony division/Multiplication	80 (34.0)	60 (25.5)	95 (40.4)	220	0.9

Note: Numbers in parentheses are percentages; WMS = Weighted means score; Cut-off mark = 1

Table 8. Frequency of information needs by the respondents (n = 235).

Information Needs	Most Needed	Needed	Not Needed	Score	WMS	Mean Rank
Colony division	77(32.8)	134 (57.0)	24 (10.2)	288	1.23	6.70
Improved colony management practices	51(21.7)	181 (77.0)	3 (1.3)	283	1.20	6.85
Apiary pen construction	49(20.9)	182 (77.4)	4 (1.7)	280	1.19	7.03
Queen rearing	61(26.0)	150 (63.8)	24 (10.2)	272	1.16	7.18
Apitherapy	51(21.7)	169 (71.9)	15 (6.4)	271	1.15	7.54
Swarm catching	61 (26.0)	146 (62.1)	28 (11.9)	268	1.14	7.22
Pest and disease control	48(20.4)	171 (72.8)	16 (6.8)	267	1.14	7.37
Packaging and labelling	35 (14.9)	193 (82.1)	7 (3.0)	263	1.12	7.68
Wax extraction and processing	43 (18.3)	173 (73.6)	19 (8.1)	259	1.10	7.58
Hives construction and installation	39 (16.6)	176 (74.9)	20 (8.5)	254	1.08	7.58
Harvesting techniques	34 (14.5)	183 (77.9)	18 (7.7)	251	1.07	7.88
Honey extraction and separation techniques	34 (14.5)	182 (77.4)	19 (8.1)	250	1.06	8.03
Marketing techniques	21 (8.9)	200 (85.1)	14 (6.0)	242	1.03	8.18
Inspection of hive (internal and external)	36 (15.3)	161 (68.5)	38 (16.2)	233	0.99	8.22

Note: Numbers in parentheses are percentages; WMS = Weighted means score

Table 9. Challenges encountered by the respondents (n = 235) on information accessibility and utilization.

Challenges	Responses	%
Theft and vandalism problems	235	100
Information on beekeeping can only be sourced from beekeepers	221	94.0
Information received is not suitable to my economic condition	155	65.9
Information received on beekeeping is not practicable	117	49.8
Information received is not suitable to local conditions	95	40.4
Information received is not timely	85	36.2
Sources of information available are not credible and trustworthy	29	12.3
Sources of information are not readily available	25	10.6
The language using in disseminating beekeeping information is not understood by many people	15	6.4
Poor information sharing culture among the beekeepers	5	2.0

Table 10. Analysis of respondents' rate of agreement in beekeeping information needs.

Test Statistics	
N	235
Kendall's W[a]	0.036
Chi-Square	108.570
Df	13
Asymp. Sig.	0.000

[a]Kendall's Coefficient of Concordance

Table 11. Analysis of the relationship between received information and management practices.

Test Statistics	
N	235
Kendall's W[a]	.421
Chi-Square	1667.853
Df	18
Asymp. Sig.	.001

[a]Kendall's Coefficient of Concordance

on Uses and Gratification Theory, the choice of information sources was based on the beekeepers' needs (Katz et al., 1974). Some of the factors that necessitate turning to peers for information needs may be because the beekeepers in this study found most of the information from external sources not suitable to their local or economic conditions. The local and economic context of the beekeepers in this study indicate that they had small-scale beekeeping farms. Most of the respondents in the study area did not consider beekeeping as their main source of income and they did not possess modernized equipment for large scale production. They had only a few hives which they constructed mostly out of wood, metal or bricks. Metal and bricks hives were constructed to primarily prevent theft or vandalism. The constructions were mostly made by artisans in their communities with instruction and guidance of

the beekeepers.

Conclusion and Recommendation

The beekeepers under study were experienced and had previously accessed information on beekeeping. They were aware of management practices but lacked information on improved colony management practices. The current management practices they adopted can be described as basic beekeeping technique. Some of the areas where beekeepers need to be strengthened with information inputs include colony division, improved colony management practices, queen rearing, swarm catching, pest and disease control, among others. Theft and vandalism, impractical information, and finances were the major bottlenecks in information accessibility and utilization amongst the farmers. Kendall's co-efficient of concordance brought forward that there were differences in the beekeepers' information needs. There was also a moderate positive relationship observed between the information received by farmers and their management practices. This implies that the information inputs are likely to influence the actions of information users, and make an impact on their commercial activities (media gratification). Thus, the beekeepers' knowledge domains need to be strengthened by organizing trainings and disseminating information and practical skills on bee colonies division, improved colony management practices, apiary pen construction, queen rearing, apitherapy, and swarm catching, while also considering the beekeepers' local and economic contexts. The improved knowledge of farmers will bring ascendancy in production and eventual increase in income and sustainability, and prosperity of beekeepers' livelihood.

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No potential conflict of interest was declared by the author.

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