

## Original Article

# Threats to honeybees and beekeeping practices in Mangu Local Government Area, Plateau state, Nigeria

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### ABSTRACT

Honey beekeeping is primarily for the production of honey, a product that has found high importance in nutrition and health. Beyond this importance and production of other tangible goods, bees are one of the most essential components of the ecosystem considering their immense contribution to plant pollination and a consequent contribution to high agricultural productivity. Threats to honeybees and beekeeping practices affect the population of bees, ease of keeping the bees, and profitability of honey production. In Mangu Local Government Area, 50 active beekeepers were purposively selected, to identify threats to honeybees and beekeeping practices using a semi-structured questionnaire. To ascertain the extent of perception of the threats, a 5-point Likert scale was used. Threats from anthropogenic activities were highest in the study area with mean scores ranging from 3.72 to 3.46. Biological threats from ants (3.72), honey badger termites (3.56), birds (3.52), beetles (3.48), and lizards (3.46) as well as threats from management and government policies – poor extension services (3.72), lack of business support services (3.72), absence of policies on beekeeping (3.56), inadequate beekeeping skills (3.56), crude beekeeping materials (3.52), poor storage facilities (3.48), and use of chemicals (3.46) – were high in the study area. Environmental/climatic conditions were not considered as major threats to beekeeping practice in the study area. Despite all the threats facing the beekeeping subsector, there are still enormous opportunities and potentials to boost the production and quality of honey production in the district.

**Keywords:** Anthropogenic activities, biological threats, deforestation, extension services, pollination

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## INTRODUCTION

Interactions between man and the environment has altered natural ecosystems resulting in the loss of biodiversity. Bees and other pollinators are “keystone species” in many habitats because of the role, they play in both food security and biodiversity.<sup>[1]</sup> Pollination is essential in plant reproduction and a decline in the population of bees and other pollinators causes a loss in crop productivity, threats to the health of the human population, and reduction in contributions to ecosystem services. At a time, where food insecurity is a major challenge in most parts of the world, there is a need to increase crop production output and one way to ensure yield is maintained at a high is to ensure adequate pollination in forests, farms, and fields.

Insect pollinated plants account for 35% of global food production<sup>[2]</sup> and managed honeybees are the most important

commercial pollinators of these crops. Due to this link between honeybees and sustainable agriculture and global food security, the decline of managed honeybees and the loss of wild pollinators are of increasing concern. In spite of the growing interest and demand for honeybee byproducts, a decreasing tendency for the past some 30 years on hive population in some countries has been reported.<sup>[3]</sup> This represents an ecological challenge which also affects negatively the economies of beekeepers and their contributions to national gross domestic products.

Threats to bees and other pollinators continue to emerge and have continues to contribute to a reduction of pollinators’ population. Several factors threaten bee health in a complex set of interactions. These factors include pesticides, pathogens, poor nutrition, parasites, and climatic conditions. Threats to honeybees and beekeeping practices may differ from one part of the world to another. It is important to identify peculiar

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threats in different localities so that possible solutions to the challenges can be identified. This research is, therefore, focused on identification of the various threat associated with honeybees and beekeeping practices which is Mangu Local Government Area of Plateau state. This is expected to stimulate solutions to the challenges and cause positive change in beekeeping as an industry.

## METHODOLOGY

### Study Area

Mangu Local Government Area lies between latitudes 8°55'28" and 9°45'05" North of the Equator and Longitude 9°0'29" and 9°17'38" East of the Greenwich Meridian. It shares boundaries with Bauchi state in the Northeast. It comprises 11 districts and has a total land area of about 3619 km<sup>2</sup> (Ministry of Land and Survey, Jos, 2011). Mangu Local Government Area has a total human population of 294,931, with about 145,763 male and 149,168 female as at the National Census, 2006.<sup>[4]</sup> Agriculture is the main stay of the economy of Mangu people with over 75% of the whole population directly engaged in the practice.

### Sample Size and Sampling Techniques

Depending on the nature of beekeepers composition and distribution in the district, purposive sampling was used. A total of 50 beekeepers were included in the study. The population encompassed beekeepers found in Mangu district regardless of their size and capacity. Even the least producer with respected to production capacity was included to ensure a more reliable and relevant procedure.

Copies of semi-structured questionnaire were used along with direct observation and key informant interview to elicit information from farmers.

### Data Analysis

Data were analyzed using percentages and presented in tables and charts. A 5-point Likert scale was used to analyze responses obtained. The mean score of respondents below 2.60 (1.0–2.60) was considered as low threat, the score variable of the respondents within the range of (2.61–3.40) was considered as moderate threat, and mean score of respondent above 3.40 (3.40–5.0) was considered as high threat in this study.

## RESULTS AND DISCUSSION

All the 50 respondents that participated in this study agreed that they experienced threats in beekeeping practices [Table 1]. These threats are diverse and include pests/predators, adverse environmental conditions, anthropogenic activities, management, and government policies.

### Biological Threats to Honeybees and Beekeeping Practices

It was observed that pest is a major threat to honeybees and beekeeping practices. The findings thus reveal that the pests that bring about the highest threat to honeybees and beekeeping practices are ants with a mean 3.72, other pests according to their order of mean include honey badger 3.56, birds 3.52, small hive beetles 3.48, and wax moth 1.08 [Table 2]. Others include beetle, spiders, wasps, praying mantis, and monkeys with a mean of 1, respectively.

These findings, therefore, reveal that bee pests and predators are major constraints affecting honey sub-sector<sup>[5]</sup> and that ant, honey badger (*Mellivora capensis*), bee-eater birds, small hive beetle (*Aethina tumida*), and lizard where the most serious pest problem in beekeeping sector.<sup>[6,7]</sup>

### Environmental Factors as Threat to Honeybees and Beekeeping Practices

Uncertainty about environmental factors was identified as a major hindrance to beekeeping activities. Environmental threats to honeybees and beekeeping practices include rainfall (2.96), shortage of bee forage (2.96), wind (2.94), excessive sunshine (2.92), and drought (2.86) [Table 3].

**Table 1: Respondent view on experiencing threats in beekeeping practices**

Experiencing threats	Frequency	Percentage
Yes	50	100
No	0	0

Source: Field Survey, 2018

**Table 2: Biological threats to honeybees and beekeeping practices on a 5-point Likert scale**

Factors	Variables					Total	Mean
	5	4	3	2	1		
Ants	0	45	0	1	4	186	3.72
Wax month	0	0	0	4	46	54	1.08
Beelike	0	0	0	0	50	50	1
Bettles	15	20	0	4	11	174	3.48
Spiders	0	0	0	0	50	50	1
Wasps	0	0	0	0	50	50	1
Praying mantis	0	0	0	0	50	50	1
Lizards	14	19	3	4	10	17.3	3.46
Birds	12	23	1	3	10	176	3.52
Hamagot/helmet mat	0	0	0	0	50	50	1
Monkeys	0	0	0	0	50	50	1
Snake	0	0	0	0	50	50	1
Honey badger termite	14	23	0	3	10	178	3.56

Key 5: Strongly agreed, 4: Agree, 3: Undecided, 2: Decided, 1: Strongly decided.

Source: Field Survey, 2018

Although, the result shows that respondents could not ascertain whether, environmental threats to honeybees and beekeeping practices are high or low, several authors have reported otherwise stating generally that environmental factors are major threats to honey production. It has been recognized that global climate change is very detrimental for bee population and biodiversity<sup>[8]</sup> and because climatic factors (rainfall, sunshine, wind, drought, etc.) are not independent,<sup>[9]</sup> their interaction with each other thus has major impact on bee population. It has also been recognized that habitat/forage loss (degradation, destruction, and fragmentation) is a major causal factor in the decline of bee population and diversity.<sup>[10,11]</sup>

**Anthropogenic Activities as Threat to Honeybees and Beekeeping Practices**

The result on anthropogenic activities as threat to honeybees and beekeeping practices reveals that the main anthropogenic activities that constitute threat to honeybees and beekeeping practices are herdsmen (3.72) and thieves (3.72) followed by deforestation/vegetation clearing (3.56) and fire/bush burning (3.56) [Table 4].

Threats from herdsmen and thieves are insecurity issues and could affect the distribution of hives but deforestation and vegetation clearing results in reduction of available forage and loss of nesting sites for the bees<sup>[11]</sup> and thus reduce the level of honey production. The results show that anthropogenic threat to honeybees and beekeeping practices is high and this is as a

result of anthropogenic effects, such as urbanization and their impacts on landscape, and resulting in pollination shortages and bee extinctions.<sup>[12]</sup>

**Management Concepts and Government Policies as Threats to Honeybee and Beekeeping Practices**

Poor extension services (3.72), lack of business support (3.72), lack of policies in apiculture, lack of training/skills of beekeeper (3.56), inadequate beekeeping materials/equipment (3.52), storage facility/post-harvesting (3.48), chemical application (3.46), and high cost of beehives production (3.06) possess high threats to the honeybees as well as beekeeping practices in the study area [Table 5]. Other factors that are threats according to their mean include swarming (2.06), absconding (1.08), and marketing with mean of 1.06.

The result reveals that management and government policies are major threats to honeybees and beekeeping and that the major constraints of beekeeping are lack of beekeeping knowledge, shortage of trained manpower, shortage of beekeeping equipment, pest and predators, as well as inadequate research and extension services to support apiculture development program.<sup>[13]</sup> Most local beekeepers lack basic tools such as veil, hand gloves smokers, and others basic tools required for the practice.<sup>[14]</sup>

Absence of policy in apiculture and poor extension services possesses high threats to honeybee and beekeeping practices in the study area [Table 5]. As it currently stands, the life

**Table 3: Environmental factors as threat to honeybees and beekeeping practices on a 5-point Likert scale**

Factors	Variables					Total	Mean
	5	4	3	2	1		
Drought	0	0	45	3	2	143	2.86
Rainfall	0	0	49	0	1	14.8	2.96
Sunshine	0	0	47	2	1	14.6	2.92
Wind	0	0	48	1	1	147	2.94
Bee forage	0	0	49	0	1	148	2.96

Key 5: Strongly agreed, 4: Agree, 3: Undecided, 2: Decided, 1: Strongly decided. Source: Field Survey, 2018

**Table 4: Anthropogenic activities as threat to honeybees and beekeeping practices on a 5-point Likert scale**

Factors	Variables					Total	Mean
	5	4	3	2	1		
Herdsmen	0	45	0	1	4	186	3.72
Fire/bush burning	14	19	3	4	10	173	3.46
Deforestation	14	23	0	3	10	178	3.56
Vegetation clearing	14	23	0	3	10	178	3.56
Thieves	0	45	0	1	4	186	3.76

Key 5: Strongly agreed, 4: Agree, 3: Undecided, 2: Decided, 1: Strongly decided. Source: Field Survey, 2018

**Table 5: Management concepts as threat to honeybee and beekeeping practices on a 5-point Likert scale**

Factors	Variables					Total	Mean
	5	4	3	2	1		
Absence of policies in apiculture	14	23	0	3	10	178	3.56
Poor extension service	0	45	0	1	4	186	3.72
Lack of training/skill of beekeeper	14	23	0	3	10	178	3.56
High cost of beehives	2	0	47	1	0	153	3.06
Lack of business support service	0	45	0	1	4	186	3.72
Marketing	0	0	1	1	48	53	1.06
Beekeeping materials/equipment	13	23	1	3	10	176	3.52
Chemical application	14	19	3	4	10	173	3.46
Absconding	0	0	1	2	47	54	1.08
Swarming	0	0	4	45	0	103	2.06
Storage facility/post-harvest handling	15	20	0	4	11	174	3.48

Keys 5: Strongly agreed, 4: Agree, 3: Undecided, 2: Decided, 1: Strongly decided. Source: Field Survey, 2018

stock sector has probably suffered more than crops sectors from inappropriate government policies<sup>[15]</sup> and the apiculture subsector is not an exception. Hence, to improve and sustain apiculture sector, government should give special attention to it.

## CONCLUSION

Most of the beekeepers follow traditional colony management, harvesting processing methods to produce honey. Despite all the threats challenge currently facing the beekeeping subsector, there are still enormous opportunities and potentials to boost the production and quality of honey production in the district. There is, therefore, the need to develop innovative methods of inputs and supply systems, strengthen extension activities in the area, and identify most effective method of pest and predator control.

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