Study on Some Wild Medicinal Mushrooms Collections in Agaei Emirate Niger State, Nigeria

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***Abstract*—A study was conducted on some wild medicinal mushrooms collections in Agaei Emirate Niger State, Nigeria. Sampling was performed in the morning hours (between 7:00 a.m. and 11:00 a.m.) when fruiting bodies were fresh and fully expanded. A purposive sampling approach was adopted. The research team walked through all representative habitats (covering an estimated 60–80% of the accessible village area) and collected every visible macrofungus fruiting body, regardless of its perceived edibility or medicinal value. Individuals with knowledge of mushrooms were interviewed to obtain local names and uses of the macro fungi, then recorded accordingly along with other relevant data. A total of 119 mushroom specimens were collected from five villages in Agaie Emirate. Highest collection was 25.2% each for Agaie yown and Ekosa. Medicinal mushrooms collected were from ten different species made of *Lentinula edodes, Ganoderma sessile, Pleurotu sspp Trametes versicolor, Ganoderma applanatum, Podaxis pistillaris, G. tsugaie, Lycoperdon pyriforme G. lucidum* and *Daldinia concentrica.* Highest abundant was *G. lucidum* and *Podaxis pistillaris* with 11.76%.. theleast number of species collection was recorded in Solawu with 11 members of the macro fungi. The study confirms availability and diversity of mushrooms in the Emirate and efforts must be made to prevent them from going into extinction in the area.**

***Index Terms*—Mushrooms, Abundance, Diversity, Medicinal use, Agaie Emirate**

I. INTRODUCTION

Mushrooms or Macro fungi, are members to the Mycota kingdom and comprise a diverse group of organisms that have long captured human interest due to their medical, gastronomic, and ecological significance. These macrofungi that produce mushrooms have different fruiting bodies and can grow above or below ground, while visible to the naked eyes. The fruiting bodies of macrofungi can be picked up by hand. They are fleshy, spore-bearing fruiting bodies of a fungus, and are also known as toadstools (Begum, 2022). Mushrooms exist as a group of organisms with immense ecological and potential pharmacological significance (Wijesekara and Xu, 2023).

Nutritional attributes of the edible mushrooms and their healthy food benefiting effects result from bioactive compounds they contain (Singh *et al.,* 2025). Bioactive compounds in them serve as defense mechanisms against pathogens, oxidative stress, and environmental pressures, and have been shown to possess significant biomedical importance (Singh *et al*., 2025; Kaushik, 2025).Toxicity of these organisms stems from an array of complex chemical compounds, some of which may be highly potent and difficult to detect only visually (Yan, *et al* 2023). Traditional knowledge in use of these fungi exists among local communities; however, the information is rarely recorded or scientifically validated. In addition, there is insufficient data on the phytochemical constituents of medicinal mushrooms in the area, which restricts their potential application in pharmaceutical and nutraceutical development.

Challenges such as lack of awareness about mushroom cultivation techniques, limited infrastructure for storage and transportation, and competition from imported mushrooms pose obstacles to market growth. Environmental factors including sensitivity of fungal strains to pH and temperature variations, competition with indigenous microbiota, and the need for optimised delivery systems (Jayakodi, 2026; Khan *et al.,* 2025), agricultural expansion, bush burning, deforestation, and climate change further threaten mushroom diversity in Niger South. Restricted substrate supplies, increased damage from pests and

pathogens, and higher energy expenditures for climate controlled cultivation facilities drastically affects their existence (Wan *et al.,* 2025).

The market potential for mushrooms in Nigeria is substantial which produces approximately 300 tonnes of mushrooms annually against a demand for 1,200 tonnes, leaving a deficit of 900 tonnes (AllAfrica, 2025; Daily Trust, 2025). Mushrooms represent a promising source of alternative and complementary therapeutic compounds that are generally seen as safer and environmentally friendlier than synthetic drugs.

A major contribution of this study lies in its detailed analysis of the phytochemical composition of selected medicinal mushrooms. Understanding the nature and distribution of bioactive compounds in these species offers scientific justification for their traditional medicinal use and provides a foundation for future pharmacological investigations.

II. MATERIALS AND METHODS

The study was conducted in Ahaie Emirate of Niger State, which lies in the North central Geopolitical Zone of Nigeria. It is on Latitude 80º to 11º:30'North and Longitude 30º 30' to 74^0'East. The State is bordered to the North by Zamfara and Kebbi States, South by Kogi State, South West by Kwara State, North East by Kaduna State and South East by Federal Capital Territory (F C T Abuja). The state also has an international boundary with the Republic of Benin.

III. SAMPLE COLLECTION

This was performed in the morning hours (between 7:00 a.m. and 11:00 a.m.) when fruiting bodies were fresh and fully expanded. The research team walked through all representative habitats (covering an estimated 60–80% of the accessible village area) and collected every visible macrofungus fruiting body, regardless of its perceived edibility or medicinal value. A purposive sampling approach was adopted (Prayudi et al., 2019; Andjiereyir, 2024).

A clear photograph of the fruiting body in its natural habitat taken. The specimen was carefully dug out, including the base of the stipe and any attached substrate, to preserve morphological characters. Each specimen was wrapped individually in aluminum foil to prevent moisture loss and physical damage, then placed in a well ventilated basket. Field notes were recorded for each collection: habitat type, substrate (e.g., dead wood, soil, termite mound, dung). The specimens were later transported to the Botany Laboratory. then sorted, labeled with unique collection codes and processed for preservation and identification using macroscopic and microscopic techniques then compared with the standard mycological and mushroom atlases.

The environment of collection as well as the substrate types was noted. The indigenes were verbally interviewed as to the local names and potential medicinal uses of the collected mushrooms, all other data were carefully noted and recorded for further analysis/ Statistical analysis of data obtained from the sample collected was performed using the Statistical Package for the Social Sciences (SPSS version 20). Data was subjected to one-way analysis of variance (ANOVA); the main treatment means calculated from the triplicate sample analyses (n 3) was compared using Duncan multiple range test ($P \leq 0.05$).

IV. RESULTS AND DISCUSSION

Distribution of mushroom collections in villages across Agaie emirate

Agaie town and Ekosa had highest collection with (25.2% each), together accounting for 50.4% of all specimens. Jippo yielded 28 specimens (23.5%), bringing the three most productive villages to 88 specimens (74.0% of the total). Ewugi produced 20 specimens (16.8%), which were 10 specimens lower than Jippo and 10 specimens higher than Solawu. Solawu recorded the lowest collection with 11 specimens (9.2%). This value was less than half of Jippo's collection and less than one-third of those from Agaie town or Ekosa. Solawu's percentage contribution was substantially below the mean of 20% per village if equally distributed. Mushrooms work in collaboration with specific bacteria, they actively participate in the decomposition of deceased and aging elements within the natural environment, (Pusa; 2023).

Table 1. Distribution of mushroom collections in villages across Agaie emirate

Villages	Frequency (n)	Percentage (%)
Agaie town	30	25.2
Ewugi	20	16.s8
Jippo	28	23.5

Ekosa	30	25.2
Solawu	11	9.2
Total	119	100

Diversity and documentation of mushroom species in agaie emirate

The diversity and distributing of mushrooms are presented in Table 2 with 10 mushroom species documented across the five villages of Agaie Emirate. *Ganoderma sessile* was the most abundant species, with 17 specimens, representing 14.29% of the total collection from the emirate. *Ganoderma lucidum* and *Podaxis pistillaris* each contributed 14 specimens (11.76% each). *Ganoderma tsugaie*, *Daldinia concentrica*, and *Lentinula edodes* each yielded 12 specimens (10.08% each). *Ganoderma applanatum* and *Lycoperdon pyriforme* each produced 11 specimens (9.24% each). *Pleurotus* spp accounted for 9 specimens (7.56%), while *Trametes versicolor* was the least abundant, with only 7 specimens (5.88%).

The *Ganoderma* genus collectively dominated the collections. *G. sessile*, *G. lucidum*, *G. tsugaie*, and *G. applanatum* together contributed 54 specimens, which constituted 45.38% of all mushrooms collected in Agaie Emirate. The remaining six species (*Podaxis pistillaris*, *Lycoperdon pyriforme*, *Lentinula edodes*, *Daldinia concentrica*, *Pleurotus* spp, and *Trametes versicolor*) accounted for the other 65 specimens (54.62%). All ten species were found in Agaie town, Ekosa, and Solawu, while Ewugi lacked *Pleurotus* spp and *Trametes versicolor*, and Jippo lacked *Ganoderma applanatum* and *Trametes versicolor*. The relative abundance ranged from 5.88% to 14.29%, indicating a moderately even distribution across species. The availability in all villages is due to adaptability to different substrate, related to the findings of Okoko, Ben and Osu (2025) that conducted a study on the cultivation of *Pleurotus ostreatus* from fruit bunches of oil palm with varying proportions of substrates in Uyo, , Nigeria.

Table 2: Diversity and documentation of mushroom species in Agaie emirate

S/N	Scientific Name	Family	Frequency (n)	Relative Abundance (%)	Villages Present
1.	*Ganoderma applanatum*	Ganodermataceae	11	9.24	Agaie, Ewugi, Ekosa, Solawu
2.	*G. tsugaie*	Ganodermataceae	12	10.08	Agaie, Ewugi, Jippo, Ekosa, Solawu
3.	*G. lucidum*	Ganodermataceae	14	11.76	Agaie,Ewugi, Jippo, Ekosa, Solawu
4.	*Pleurotu s*spp	Pleurotaceae	9	7.56	Agaie, Jippo, Ekosa, Solaw
5	*Trametes versicolor*	Polyporaceae	7	5.88	Agaie, Ewugi, Jippo, Solawu
6.	*Daldinia concentrica*	Hypoxylaceae	12	10.08	Agaie, Ewugi, Jippo, Ekosa
7.	*Podaxis pistillaris*	Agaricaceae	14	11.76	Agaie, Ewugi, Jippo, Ekosa, Solawu
8.	*Lycoperdon pyriforme*	Agaricaceae	11	9.24	Agaie, Ewugi, Jippo, Ekosa, Solawu
9.	*Ganoderma sessile*	Ganodermataceae	17	14.29	Agaie, Ewugi, Jippo, Ekosa, Solawu
10	*Lentinula edodes*	Marasmiaceae	12	10.08	Agaie, Ewugi, Jippo, Ekosa, Solawu
Total			119	100	

Morphological and medicinal features of the ten mushroom species in Agaie Emirate

Table 3 documented morphological and medicinal features of the ten medicinal mushroom species. *Ganoderma applanatum* (Artist's conk) had a large, woody bracket with brown upper surface and spores at 40×; used as antitumor and anti-inflammatory. *Ganoderma tsugaie* (Hemlock varnish shelf) showed a reddish-brown varnished cap with white margin and pores; served immunomodulatory and hepatoprotective functions. *Ganoderma lucidum* (Reishi) displayed a reddish-varnished, kidney-shaped cap; used as immunostimulant, anticancer, and antiviral. *Pleurotus* spp (Oyster mushroom) had a white to cream funnel-shaped cap with decurrent gills; applied for cholesterol lowering and antioxidant effects. *Trametes versicolor* (Turkey tail) showed thin, multicolored concentric zones with velvety cap; known for anticancer and immune-boosting properties. *Daldinia concentrica* (King Alfred's cake) had spherical black fruiting bodies with concentric rings; used for antimicrobial activity. *Podaxis pistillaris* (Desert shaggy mane) exhibited a cylindrical to club-shaped fruiting body with powdery spores; employed for wound treatment. *Lycoperdon pyriforme* (Pear-shaped puffball) showed a small pear-shaped body with brown powdery spores; used as antimicrobial. *Ganoderma sessile* had a woody bracket with varnished surface; served immunostimulant roles. *Lentinula edodes* (Shiitake) displayed a brown scaly convex cap with white gills; known for anticancer (lentinan) and immune modulation.

Species distribution density in Agaie Emirate

Table 4 shows the species density and distribution pattern across villages in Agaie Emirate. All five villages exhibited species richness of 10 species. Agaie recorded 10 species with 30 specimens, with *Podaxis pistillaris* and *Lycoperdon pyriforme* (4 each) as the most abundant. Ekosa recorded 9 species with 30 specimens, with Daldinia concentrica, Podaxis pistillaris (4 each), and *Ganoderma sessile* (5) as most abundant. Jippo recorded 9 species with 28 specimens, with *Ganoderma applanatum* (3) as most abundant. Ewugi recorded 9 species with 20 specimens, with *G. applanatum* (4) and G. sessile (3) as most abundant. Solawu recorded 9 species with 11 specimens, with *G. sessile* and *P. pistillaris* (2 each) as most abundant. The high distribution is important as a potential of indigenous mushroom species, which have been used traditionally but remain largely untapped in modern agricultural systems is very high (Mafe *et al*., 2025).

Table 3. Morphological features and traditional uses of mushroom species

S/N	Scientific name	Common name	Morphological evidence (from plates)	Medicinal uses
1	*Ganoderma applanatum*	Artist’s conk	Large, woody bracket: brown upper surface; spores observed at 40x	Antitumor, anti-inflammatory antioxidant
2	*Ganoderma tsugaie*	Hemlock vanish shelf	Reddish-brown vanished cap, white margin, pores on under side	Immunomodulatory, hepatoprotective
3	*Ganoderma lucidum*	Reishi/Lingzhi	Reddish vanished surface, kidney-shaped cap, white to brown pore layer	Immunostimulant, anticancer, antiviral
4	*Plaurotus spp. (oyster mushroom)*	Oyster mushroom	White to cream funnel-shaped cap, decurrent gills, short latteral stipe	Cholesterol-lowering, antioxidant, anti inflammatory
5	*Trimates versicolar*	Turkey tail	Thin, multicolored concentric zones, velvety cap, pores on underside	Anticancer (polysaccharopeptudes immune booster)
6	*Daldinia concentric*	King Alfred’s cake	Spherical black fruiting bodies with concentric rings inside	Antimicrobial, antioxidant

7	*Podaxis pistillaris*	Desert shaggy mane	Cylindrical to club shaped fruit body, powdery spore mass	Antimicrobial, traditional wound treatment
8	*Lycoperdon pyriforme*	Pear-shaped puffball	Small pear-shaped body, white when young, brown powdery spores	Antimicrobial, antioxidant
9	*Ganoderma sessile*	–	Woody bracket with varnished upper surface, white pore surface	Immunostimulant, hepatoprotective
10	*Lentinula edodes*	Shiitake	Brown scaly convex cap, white gills central stipe	Anticancer (lentinan), immune modulation

Table 4. The species distribution and density in Agaie emirate

Village	Species Richness	Total Specimens	Most Abundant Species	Least Abundant Species
Agaie	10	30	*Podaxis pistillaris* (4), *Lycoperdon pyriforme* (4)	Pleurotusspp (2), Trametes versicolor (2)
Ekosa	9	30	*Daldinia concentrica* (4), *Podaxis pistillaris* (4), *Ganoderma sessile* (5)	Ganoderma applanatum (3)
Jippo	9	28	*Ganoderma applanatum* (3)	Trametes versicolor (2), Lycoperdon pyriforme (2)
Ewugi	9	20	*Ganoderma applanatum* (4), *Ganoderma sessile* (3)	Lycoperdon pyriforme (1)
Solawu	9	11	*Ganoderma sessile* (2), *Podaxis pistillaris* (2)	All species well represented
Total	46	119		

V. CONCLUSION

There are wild and medicinal macrofungi available in relative abundance within Agaei Emirate. *Ganoderma* species happen to be most common even though all species were available in all the villages sampled. Their medicinal values are high and varied according to the different languages spoken in the Emirate. The cultivation of mushrooms should be encouraged to preserve the species and to capture more unknown species and prevent them from becoming extinct.

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