

Prevalence and Demographic Distribution of Subcutaneous Mycoses among Rice Farmers in Ayamelum LGA, Nigeria

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ABSTRACT

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Subcutaneous mycoses are chronic fungal infections acquired through traumatic implantation of environmental fungi into the skin and subcutaneous tissues. They predominantly affect rural agricultural populations in tropical regions, where occupational exposure and limited access to healthcare contribute to delayed diagnosis and prolonged morbidity. This study determined the prevalence and demographic distribution of subcutaneous mycoses among rice farmers in Ayamelum Local Government Area (LGA.), Anambra State, Nigeria. A community-based cross-sectional study was conducted among 407 rice farmers selected from six towns within the LGA. Participants were clinically screened for subcutaneous lesions, and laboratory analyses were performed to confirm fungal infections and identify isolates. Demographic and occupational data were collected using structured questionnaires. Data were analyzed using descriptive statistics and chi-square tests to determine associations, with significance set at $p < 0.05$. Of the 407 farmers screened, 75 (18.4%) presented with suspected lesions, and 39 (9.6%) were laboratory-confirmed cases. The highest prevalence based on confirmed cases was observed in Omor (100% of suspected cases) and Umumbo (93.8%). Males showed a slightly higher infection rate (53.7%) than females (50%), with *Trichosporon asahii* significantly more prevalent among males ($p < 0.05$). Farmers aged ≥ 60 years constituted the highest proportion of affected individuals (26.7%). Lesions were most commonly located at the ankle (37.3%) and limbs (32.0%), and 60% had persisted for more than 12 months. Significant geographic variation ($p < 0.05$) was observed in the distribution of fungal isolates, including *Meyerozyma carpophila*, *Trichosporon asahii*, *Mucor indicus*, and *Penicillium brasilianum*. The study demonstrates a notable burden of subcutaneous mycoses among rice farmers in Ayamelum L.G.A., with clear occupational and demographic patterns. These findings underscore the need for targeted health education, early diagnostic services, and preventive strategies to reduce disease burden among high-risk agricultural workers in southeastern Nigeria.

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INTRODUCTION

Fungal infections constitute a substantial yet under-recognized component of the global burden of infectious diseases. It is estimated that more than one billion people are affected by fungal diseases annually, with significant morbidity and mortality in both immunocompromised and immunocompetent populations *Journal of Fungi* (Bongomin *et al.*, 2017; Anagor *et al.*, 2023). Despite their impact, fungal infections remain neglected in many low- and middle-income countries, particularly in sub-Saharan Africa, where diagnostic capacity and surveillance systems are limited (Rodrigues & Nosanchuk, 2020). Among these infections, subcutaneous mycoses represent a distinct group of chronic, progressively destructive fungal diseases acquired through traumatic implantation of environmental fungi into the skin and subcutaneous tissues.

Subcutaneous mycoses include clinical entities such as chromoblastomycosis, eumycetoma, sporotrichosis, phaeohyphomycosis, and entomophthoromycosis (Bonifaz *et al.*, 2010; Welsh & Arenas, 2012). These infections are predominantly associated with rural, agrarian communities in

tropical and subtropical regions, where frequent exposure to soil, decaying vegetation, and minor skin trauma facilitates inoculation (Torres-Guerrero *et al.*, 2012; Shaikh *et al.*, 2016). The chronicity of these conditions often results in deformity, disability, social stigma, and reduced productivity, thereby reinforcing cycles of poverty (Molyneux, 2013; Enbiale *et al.*, 2023). In recognition of their public health relevance, some forms such as mycetoma have been classified among neglected tropical diseases.

Globally, epidemiological data on subcutaneous mycoses remain fragmented and geographically skewed. Studies from Asia and Latin America have reported variable prevalence patterns influenced by climatic conditions, occupational exposure, and socioeconomic status (Nucci *et al.*, 2010; Verma *et al.*, 2018). Agricultural workers, particularly farmers, represent a high-risk group due to repeated skin trauma from tools, plant thorns, and contaminated soil (Ezekwueche *et al.*, 2019; Silva *et al.*, 2019; Nguyen *et al.*, 2020). In India, for example, fungal infections among agricultural workers have been associated with prolonged field exposure and inadequate protective clothing (Ghosh *et al.*,

2018). Similar occupational patterns have been documented in other tropical settings.

In Africa, the epidemiology of subcutaneous mycoses is insufficiently characterized despite environmental conditions that favor fungal proliferation (Gryzenhout *et al.*, 2012). Available estimates suggest a substantial but underreported burden of serious fungal infections across the continent (Faini *et al.*, 2015; Guto *et al.*, 2016). In Ethiopia, subcutaneous mycoses have recently been described as endemic yet neglected, underscoring the need for localized epidemiological data (Enbiale *et al.*, 2023). Nigeria, with its extensive agricultural workforce and humid tropical climate, provides ecological conditions conducive to fungal persistence. Previous reports from southeastern Nigeria have documented cutaneous mycoses among rice farmers, highlighting occupational vulnerability (Ekwealor & Oyeka, 2013). However, comprehensive prevalence studies focusing specifically on subcutaneous forms in defined rural communities remain limited.

Ayamelum Local Government Area in Anambra State is a predominantly agrarian region known for intensive rice cultivation. Rice farming involves prolonged exposure to wet soils, organic debris, and repetitive minor trauma to the lower extremities—recognized risk factors for implantation mycoses. Yet, there is a paucity of structured epidemiological investigations quantifying the burden and demographic distribution of subcutaneous mycoses in this population. Understanding prevalence patterns across age groups, gender, and geographic subunits is critical for targeted public health interventions, early detection strategies, and occupational health education.

Accurate epidemiological characterization also supports improved clinical recognition and resource allocation. Delayed diagnosis remains common in subcutaneous mycoses due to their indolent progression and resemblance to other dermatologic conditions (Carrasco-Zuber *et al.*, 2016; Fang *et al.*, 2023). In rural settings, limited laboratory capacity further complicates early identification (Kozel & Wickes, 2014). Consequently,

many patients present with advanced disease requiring prolonged antifungal therapy or surgical intervention (Mahajan, 2014).

Given the occupational nature of rice farming and the environmental suitability for fungal pathogens in southeastern Nigeria, there is a compelling need to quantify the magnitude of subcutaneous mycoses in Ayamelum LGA and to delineate their demographic distribution. Such data will contribute to the growing body of African epidemiological evidence, inform preventive strategies among high-risk agricultural workers, and support advocacy for recognition of these infections within neglected tropical disease frameworks.

Therefore, this study aimed to determine the prevalence and demographic distribution of subcutaneous mycoses among rice farmers in Ayamelum LGA, Anambra State, Nigeria. Specifically, it sought to (i) estimate overall prevalence among screened rice farmers, (ii) analyze distribution across age and gender categories, and (iii) assess geographic variation within the study area. By providing community-based epidemiological data, this work contributes to closing an important knowledge gap in the public health understanding of implantation mycoses in rural Nigeria.

2. METHODOLOGY

2.1 Study Area

Ayamelum is a Local Government Area of Anambra State, South East Nigeria with headquarters at Anaku (Fig. 1). It comprises eight towns namely; Omor, Umueje, Omasi, Igbakwu, Umumbo, Anaku, Umuerum and IfiteOgwari. It has the population of 225,400 with the approximate land mass of 537.7Km² area. It is bounded in the South by Anambra East and Awka North Local Government Areas, in the West by Anambra West Local Government Area. The two main seasons prevail in this area- dry season (November to March) and wet season (April to October) with a short break between late July and early August. Majority of the people in the study area are farmers who cultivate large quantities of rice for sale.

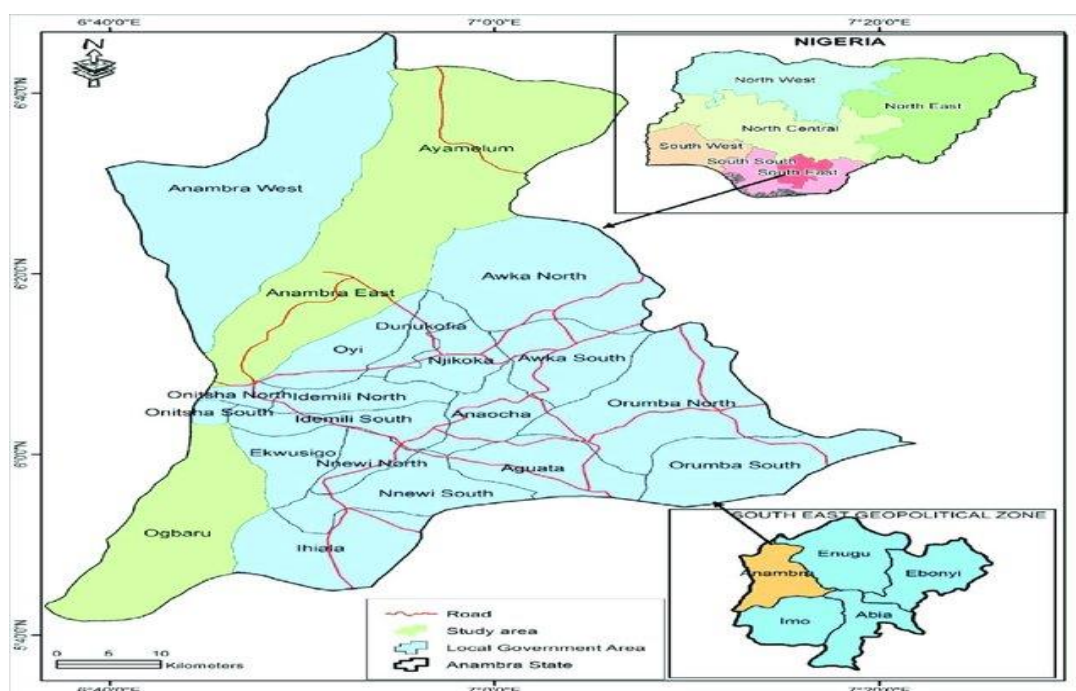


Figure 1: Map of Anambra State Showing Ayamelum Local Government Area (www.divagis.org)

2.2 Inclusion Criteria

The patients that were included were patients of any age and both sexes, who present with subcutaneous mycoses were asked to consent to participate in the study.

2.3 Exclusion Criteria

Patients who were not willing to consent and have no subcutaneous mycoses were excluded. The pregnant women were excluded.

2.4 Sample Size Determination

The minimum sample size was determined according to (Daniel, 1999). The formula is

$$n = \frac{Z^2 P (1-P)}{d^2}$$

Where; n = minimum sample size

Z= confidence interval of 95% equivalent to confidence coefficient of 1.96

P= approximated prevalence (Umeanaeto *et al.*, 2016)

d= The desired level of significance (0.05)

2.5 Ethical considerations

Approval was sought from Chukwuemeka Odumegwu Ojukwu Teaching Hospital (COOUTH) Awka with ethical ref number; COOUTH/HREC/ETH.C/VOL.I/FN:04/331 dated 16/05/2024 before the commencement of the study. Consents were sought from those who were willing to participate. The study participants were asked to sign informed consent forms, and they were duly assured of the confidentiality of the information provided.

2.6 Patient Recruitment

Patients presenting with symptoms of subcutaneous mycoses like skin implants were recruited. Consent of the patients were sought for those who were willing to participate. Questionnaires were used to obtain information on gender, age, sex, location of lesion, educational level, size of the family, duration of lesion, presence of pets or domestic animal in the house, and whether the farmer uses manure, fertilizer, herbicides or pesticides.

2.7 Collection of Clinical Specimen

Four hundred and seven (407) rice farmers including adults and children were screened for implant suggestive of subcutaneous mycoses. For obtaining the samples aseptically, the infected areas or lesions were cleaned with cotton wool soaked in 70% ethanol before collecting samples from the affected areas using sterile swab stick. The swab sticks containing the samples were put into drug dispensary polythene bags and transported to Microbiology Laboratory of Chukwuemeka Odumegwu Ojukwu University Teaching Hospital Awka for examination. The examination was carried out within 1 to 2 days. Questionnaires were used to obtain information on gender, age, sex, location of lesion, educational level, size of the family, duration of lesion, presence of pets or domestic animal in the house, and whether the farmer uses manure, fertilizer, herbicides or pesticides.

2.8 Processing of Specimen

Direct microscopy slides were prepared by mounting each specimen on a slide in a drop of 20% potassium hydroxide solution and observed under X40 microscope. Specimens showing hyphae or yeasts were considered positive (Karamanet *et al.*, 2017).

2.9 Culturing

The Sabouraud Dextrose Agar (SDA) supplemented with 0.05mg/ml of chloramphenicol and 0.5mg/ml cycloheximide was used for culturing. The media were prepared aseptically according to the manufacturer's instruction and dispensed in 25 ml amounts into 100 mm x 20 mm dimension of sterile Petri plates. This was done in a clean bench laminar cabinet which was disinfected by applying 70% alcohol. Each Petri plate was labeled with identification number given to corresponding samples after solidification. Cultured on duplicate Sabouraud dextrose agar (SDA) supplemented with 0.05 mg/ml chloramphenicol and 0.5 mg/ml cycloheximide and another duplicate SDA containing 0.05 mg/ml chloramphenicol incubated at 27° C for 2-4 weeks. Streak plate method was used for the culturing. Positive plates with fungal growth were purified by subculturing different colonies into fresh SDA slant without antibiotics (Ekwealor and Oyeka, 2013).

2.9.1 Identification of Isolates

The fungal isolates were identified based on detailed conventional methods: colony morphology, pigmentation on reverse side of colony, growth rate and slide culture. The morphologies were compared with the standard description given by Ellis *et al.* (2007).

2.9.1.1 Lactophenol cotton blue (LCB) mount microscopy

Two drops of LCB were placed on a clean slide and using an inoculating needle, a small piece of the fungal mycelium free of the medium was removed. The mycelium was then transferred to the LCB, spread out and the slide was covered with a cover slip. The slide was then observed under low (x10) as well as high power (x40) of light microscope (Ellis *et al.*, 2007). The identification was based on the nature of hyphae, fruiting bodies, phialides and conidia (Ellis *et al.*, 2007).

2.9.1.1 Slide culture technique

The modified slide culture technique as described by Wijedasa and Liyanapathirana (2012) was used to observe the fungal isolate in its natural conditions. Petri dishes each containing a slide, cover slip and a filter paper were sterilized. Sabouraud dextrose agar was prepared, aliquoted into small containers and sterilized. An aliquote of the media was pipetted aseptically onto the centre of the slide with a sterile Pasture pipette and allowed to set for 5 minutes. Each fungal isolate to be identified was inoculated onto the medium using a sterile straight wire and a sterile cover slip was placed on top of it. The filter paper was moistened with sterile distilled water to humidify the culture environment and the Petri dishes were incubated at room temperature. Fungal growth was observed using x10 and x40 light microscope on a daily basis. When sufficient growth had occurred, the cover slip was slightly raised and a drop of LCB was applied using a Pasture pipette. The slide was examined under x10 and x40 light microscope.

2.9.3.3 Statistical Analysis

The results and data that were obtained from the questionnaires distributed to the affected rice farmers in Ayamelum Local Government Area Anambra State were statistically analyzed using chi-square and ANOVA tests. The results were tested for significant level of 0.05.

3. RESULTS

3.1 Distribution of Rice Farmers Screened for Subcutaneous Mycoses in Ayamelum L.G.A., Anambra State

Among the 407 rice farmers screened for subcutaneous mycoses in Ayamelum L.G.A of Anambra State, 75 (18.40 %) presented with lesion suggestive of the infection; and 39 (52.00 %) out of the 75 were actually infected (Table 1). Umumbo town had the

highest percentage number of those screened (22.10 %, 90), Igbakwu, the highest percentage number with suspected lesion (22.60 %, 14), while all the participants with suspected lesion in Omor were also infected with subcutaneous mycoses (100.00 %, 7).

Table 1: Distribution of rice farmers screened for subcutaneous mycoses in Ayamelum L.G.A., Anambra State

Community	Number screened (%) ^a	Number with suspected lesion (%) ^b	Number infected (%) ^c
Ifite – Ogwari	53 (13.00)	11 (20.80)	4 (36.40)
Igbakwu	62 (15.20)	14 (22.60)	4 (28.60)
Umueje	51 (12.50)	10 (19.60)	7 (70.00)
Anaku	79 (19.40)	17 (21.50)	2 (11.80)
Omor	72 (17.70)	7 (9.70)	7 (100.00)
Umumbo	90 (22.10)	16 (17.80)	15 (93.80)
Total	407 (100.00)	75 (18.40)	39 (52.00)

^aPercentage values were calculated relative to the total sampling. ^bPercentage values were calculated relative to the number screened per community..

^cPercentage values were calculated relative to the number with suspected lesion per community.

3.2 Demographic Characteristics of Rice Farmers with Subcutaneous Lesions in Ayamelum L.G.A., Anambra State

The males (54.70 %) were more than females (45.30 %), participants within the age group 61 years and above had the highest frequency (20, 26.70 %). Majority of the participants attended only primary education (66.70 %). Those from family size ≥ 6 were more (69.30 %). While majority did not have any domestic pet (40.00 %), those

who had only fowl were high (32.00 %) compared to other pets. More of the participants used fertilizer (36.00 %) and both herbicide and pesticide (78.70 %) for farming. Subcutaneous lesions located at the ankle region were the highest (37.30 %), while those of the back were the least (4.00 %); and most of the lesions had lasted for more than 12 months (60.00 %).

Table 2: Demographic characteristics of rice farmers with subcutaneous lesions in Ayamelum L.G.A., Anambra State.

Variable	Category	Frequency	Percentage (%)
Age Group (Years)	≤ 10	4	5.30
	11 – 20	7	9.30
	21 – 30	4	5.30
	31 – 40	8	10.70
	41 – 50	18	24.00
	51 – 60	14	18.70
	≥ 60	20	26.70
Gender	Male	41	54.70
	Female	34	45.30
Educational Level	Primary	50	66.70
	Secondary	19	25.30
	Tertiary	6	8.00
Family Size	≤ 3	9	12.00
	4 – 5	14	18.70
	≥ 6	52	69.30
Domestic Animals/Pets Owned	Dog Only	3	4.00
	Cat Only	4	5.30
	Goat Only	10	13.30
	Fowl Only	24	32.00
	More than one pet	4	5.30
	None	30	40.00
Type of Manure Used	Compost Manure	10	13.30
	Fertilizer	27	36.00
	Both Compost & Fertilizer	19	25.30
	None	19	25.30
Other Chemicals Used	Herbicide	4	5.30
	Pesticide	4	5.30
	Both Herbicide & Pesticide	59	78.70
Location of Lesion	None	8	10.70
	Limb	24	32.00
	Ankle	28	37.30
	Eye	5	6.70
	Chest	5	6.70
	Head	4	5.30
	Back	3	4.00
	Underfoot	6	8.00
	Duration of Lesion	<6 Months	17
	6 – 12 Months	13	17.30
	>12 Months	45	60.00

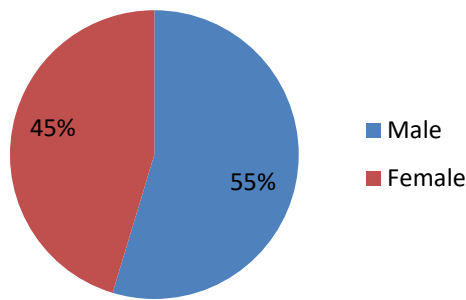


Figure 1: Percentage distribution of subcutaneous mycoses based on the gender of rice farmers in Ayamelum L.G.A Anambra State.

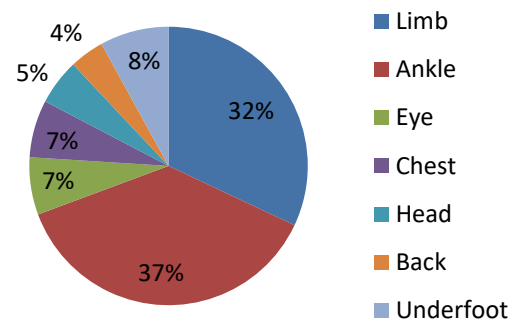


Figure 2: Distribution of infection sites among rice farmers in Ayamelum L.G.A Anambra State (%).

3.3 Prevalence of Subcutaneous Mycoses based on Town of Rice Farmers in Ayamelum L.G.A., Anambra State

The prevalence of subcutaneous mycoses among rice farmers in Ayamelum L.G.A., Anambra state, according to towns are shown in Table 3. Whereas the highest total prevalence of 100.00 % was obtained in Omor, there were significant

differences ($p < 0.05$) among towns in the prevalence of infections caused by *Meyerozymacarpophila*, *Trichosporonasahii*, *Mucor indicus* and *Penicillium brasilianum*, with Umumbo (37.50 %), Umueje (60.00 %) and Omor (28.60 %, 42.90 %) giving the highest prevalence respectively.

Table 3: Prevalence of subcutaneous mycoses based on town of rice farmers in Ayamelum L.G.A., Anambra State

Fungal Isolates	Ifite– Ogwarin=11	Igbakwun=14	Umuejen=10	Anakun=17	Omorn=7	Umumbon=16	p- value
<i>Meyerozyma carpophila</i>	3 (27.30)	0 (0.00)	1 (10.00)	0 (0.00)	0 (0.00)	6 (37.50)	0.007*
<i>Trichosporon asahii</i>	0 (0.00)	3 (21.40)	6 (60.00)	1 (5.90)	0 (0.00)	3 (18.80)	0.003*
<i>Limtongozyma siamensis</i>	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (14.30)	1 (6.30)	0.320
<i>Mucor indicus</i>	0 (0.00)	0 (0.00)	0 (0.00)	1 (5.90)	2 (28.60)	0 (0.00)	0.021*
<i>Penicillium brasilianum</i>	1 (9.10)	0 (0.00)	0 (0.00)	0 (0.00)	3 (42.90)	0 (0.00)	0.001*
<i>Pseudopestalotiopsis theae</i>	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (14.30)	2 (12.50)	0.213
<i>Penicillium citrinum</i>	0 (0.00)	1 (7.10)	0 (0.00)	0 (0.00)	0 (0.00)	3 (18.80)	0.139
Total	4 (36.40)	4 (28.60)	7 (70.00)	2 (11.80)	7(100.00)	15 (93.80)	

*Significant p-value (calculated $p < 0.05$). Percentage values are in parentheses.

3.4 Gender-Based Prevalence of Fungal Isolates among Rice Farmers with Subcutaneous Mycoses in Ayamelum L.G.A., Anambra State

The gender distribution of fungal isolates among rice farmers with confirmed subcutaneous mycoses is presented in Table 4. Of the 75 farmers with subcutaneous lesions examined, 41 (54.7%) were males while 34 (45.3%) were females. Overall, the total prevalence of confirmed fungal isolates was slightly higher among males (22/41; 53.7%) compared to females (17/34; 50.0%).

Among the identified fungal species, *Trichosporon asahii* was the most predominant isolate in males, occurring in 11 (26.8%) male farmers compared to 2 (5.9%) females. This difference was statistically significant ($p = 0.017$), indicating a meaningful association between male gender and infection with *Trichosporon asahii*.

In contrast, *Meyerozyma carpophila* was more frequently isolated from females (6; 17.6%) than males (4; 9.8%),

although the difference was not statistically significant ($p = 0.317$). Similarly, *Limtongozyma siamensis* was isolated only among females (2; 5.9%) and not detected in males, but this difference did not reach statistical significance ($p = 0.115$).

Other fungal isolates, including *Mucor indicus*, *Penicillium brasilianum*, *Pseudopestalotiopsis theae*, and *Penicillium citrinum*, were distributed across both genders with no statistically significant differences ($p > 0.05$). The frequencies of these isolates were relatively low in both males and females, each accounting for less than 6% within gender groups.

Overall, although the total infection rate was marginally higher among males, only *Trichosporon asahii* demonstrated a statistically significant gender association. The remaining fungal isolates showed comparable distribution between male and female rice farmers in the study area.

Table 4: Gender-Based Prevalence of Fungal Isolates among Rice Farmers with Subcutaneous Mycoses in Ayamelum L.G.A., Anambra State

S/N	Fungal isolate	Male n=41	Female n=34	p-value
1	<i>Meyerozyma carpophila</i>	4 (9.80)	6 (17.60)	0.317
2	<i>Trichosporon asahii</i>	11 (26.80)	2 (5.90)	0.017*
3	<i>Limtongozyma siamensis</i>	0 (0.00)	2 (5.90)	0.115
4	<i>Mucor indicus</i>	1 (2.40)	2 (5.90)	0.449
5	<i>Penicillium brasilianum</i>	2 (4.90)	2 (5.90)	0.847
6	<i>Pseudopestalotiopsis theae</i>	2 (4.90)	1 (2.90)	0.670
7	<i>Penicillium citrinum</i>	2 (4.90)	2 (5.90)	0.847
	Total	22 (53.70)	17 (50)	

*Significant p-value (calculated $p < 0.05$). Percentage values are in parentheses

4. DISCUSSION

This study provides important community-based evidence on the burden and demographic distribution of subcutaneous mycoses among rice farmers in Ayamelum L.G.A., Anambra State. The overall confirmed infection rate of 39 out of 407 screened farmers (9.6%) indicates a substantial burden within this occupational group. Additionally, 18.4% of participants presented with lesions clinically suggestive of subcutaneous mycoses, highlighting a considerable level of chronic dermatologic morbidity in the study population.

The observed prevalence aligns with existing evidence that subcutaneous mycoses disproportionately affect rural agricultural workers in tropical regions. The implantation of fungal pathogens through minor trauma during farming activities has been well documented in previous studies (Bonifaz *et al.*, 2010; Torres-Guerrero *et al.*, 2012). Rice farming, in particular, involves prolonged exposure to wet soil, decaying vegetation, and repetitive microtrauma to the lower extremities, creating ideal conditions for fungal inoculation. The high infection rates recorded in communities such as Omor (100% of suspected cases confirmed) and Umumbo (93.8%) suggest possible environmental or occupational differences, including soil composition, waterlogging patterns, farming intensity, or protective practices.

Significant geographic variation was observed among the towns, with statistically significant differences in the distribution of specific fungal isolates ($p < 0.05$). *Meyerozyma carpophila* was most prevalent in Umumbo, *Trichosporon asahii* in Umueje, *Mucor indicus* and *Penicillium brasilianum* in Omor. These findings suggest ecological heterogeneity within the LGA, potentially influenced by microclimatic conditions, agronomic practices, and environmental reservoirs of fungi. Similar geographic clustering has been reported in other tropical settings, where environmental and occupational variables shape fungal epidemiology.

The demographic distribution revealed a higher frequency of infection among males (54.7%) compared to females (45.3%), with an overall higher total prevalence among males. Notably, *Trichosporon asahii* infection was significantly more common in males (26.8%) than females (5.9%) ($p < 0.05$). This gender disparity may reflect greater occupational exposure among male farmers, who may engage more frequently in physically intensive field activities involving direct soil contact. However, the relatively high proportion of affected females underscores that both genders are at considerable risk in rice farming communities.

Age distribution showed that individuals aged 60 years and above constituted the highest proportion of cases (26.7%), followed by those aged 41–50 years (24.0%). This trend may be attributable to cumulative exposure over years of farming and

age-related immune modulation. Chronic environmental exposure increases the likelihood of repeated minor trauma and subsequent fungal implantation. Furthermore, older individuals may delay seeking medical attention, allowing lesions to progress.

Educational level and socioeconomic indicators also appear relevant. The majority of affected farmers had only primary education (66.7%) and large family sizes (≥ 6 members, 69.3%). Lower educational attainment may influence health-seeking behavior, awareness of protective measures, and timely recognition of early lesions. These socioeconomic factors are consistent with the established association between subcutaneous mycoses and poverty, limited healthcare access, and occupational vulnerability in rural settings.

Lesion distribution patterns further support the occupational etiology of infection. The ankle region (37.3%) and limbs (32.0%) were the most commonly affected sites. These anatomical locations are highly exposed during rice cultivation, especially where protective footwear is inadequate or absent. Similar predilection for lower extremities has been documented in studies of implantation mycoses globally. The chronic nature of the infections is evident from the finding that 60% of lesions had persisted for more than 12 months. This prolonged duration reflects the indolent progression of subcutaneous mycoses and the likelihood of delayed diagnosis and limited access to specialized care.

The high use of agrochemicals (78.7% using both herbicides and pesticides) and fertilizers (36%) may indirectly influence infection risk. Although not directly causative, frequent chemical exposure may compromise skin integrity or cause minor irritations, facilitating fungal entry. Additionally, environmental alterations due to fertilizer and pesticide use could affect fungal ecology in rice fields.

The diversity of fungal isolates identified in this study—including *Meyerozyma carpophila*, *Trichosporon asahii*, *Mucor indicus*, *Penicillium brasilianum*, and others—demonstrates that subcutaneous mycoses in this region are not caused by a single predominant pathogen. The statistically significant differences in isolate distribution among towns emphasize the importance of localized surveillance and tailored public health interventions. Overall, the findings reinforce the characterization of subcutaneous mycoses as occupational diseases of rural agricultural workers in tropical environments. The documented prevalence in Ayamelum L.G.A. contributes valuable epidemiological data from southeastern Nigeria, where structured community-level studies remain limited. Early detection programs, health education on protective clothing and footwear, improved laboratory diagnostic capacity, and integration of fungal disease awareness into primary healthcare services are recommended to reduce morbidity.

Further longitudinal and environmental studies are warranted to clarify risk factors, seasonal patterns, and environmental reservoirs of pathogenic fungi in the region. Strengthening surveillance systems and incorporating subcutaneous mycoses into neglected tropical disease frameworks may also improve recognition, reporting, and resource allocation.

4.1 Limitations of the Study

1. Rice farmers in Omasi and Umuerum did not consent for the research study. They had this superstitious belief that the infection was caused by the gods of the land.
2. Some subcutaneous mycoses never grew in the primary media due to prior exposure to antifungal drugs.

5. CONCLUSION

This study demonstrates that subcutaneous mycoses constitute a significant occupational health problem among rice farmers in Ayamelum Local Government Area of Anambra State, Nigeria. The confirmed prevalence of infection among screened farmers highlights the substantial burden of these chronic implantation mycoses within rural agricultural communities. The presence of a high proportion of long-standing lesions further underscores delayed diagnosis and limited access to appropriate medical care. The distribution of infection across towns revealed notable geographic variation, with some communities recording particularly high confirmation rates among suspected cases. The diversity of fungal isolates identified indicates that multiple environmental pathogens contribute to disease occurrence in the area. Demographically, older farmers and males were more frequently affected, although both genders remain at considerable risk due to shared occupational exposure. The predominance of lesions on the ankle and lower limbs reinforces the role of repeated minor trauma and inadequate protective footwear in disease transmission.

Overall, the findings emphasize the need for strengthened public health interventions, including occupational health education, promotion of protective clothing and footwear, early case detection, and improved laboratory diagnostic capacity in rural healthcare facilities. Incorporating fungal infections such as subcutaneous mycoses into local disease surveillance and neglected tropical disease frameworks may enhance recognition and resource allocation. Further research exploring environmental risk factors and preventive strategies is recommended to reduce the burden of these chronic and disabling infections among agricultural workers in southeastern Nigeria.

DECLARATION

Authors declare no conflict of interest.

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