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THE SOCIO-CULTURAL AND PRODUCTIVITY NEXUS IN YAM FARMING IN NIGERIA

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ABSTRACT

Socio-cultural structures of yam production are largely shaped by the tradition, religion, beliefs, taboos, myths, spirituality and social relationships. Obudu community was the focus to examine the implications of these structures on yam productivity and sustainability. Data was collected through 60 interviews, 2 public meetings, 3 focus group discussions, local informants, review of literature, including secondary and grey literature and keen observation. Our findings reveal a range of indices of respondents' perception as measures of productivity. The native and the 'aged' majority of the population were more conservative in their farming practice exhibiting deeper attachment to traditional practices and ecological wholesomeness with decreasing material productivity and performance in yield outputs, though not so significant. The socially mobile non-natives and the younger demographic groups were open to the modern farming approach targeting the quantity and tons of yam tubers and were not so keen on the overall health and integrity of the ecological system that makes sustainable production and human existence possible. The results emphasize the need to look beyond the improvement in material productivity as other non-material indices of productivity should be explored. More rigorous quantitative and long-term trend analysis should be conducted to assess the productivity performance trend associated with the natural ecological health and yam outputs for the study area.

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СОЦИАЛЬНО-КУЛЬТУРНЫЕ И ПРОИЗВОДСТВЕННЫЕ СВЯЗИ В ВЫРАЩИВАНИИ ЯМСА В НИГЕРИИ

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КЛЮЧЕВЫЕ СЛОВА:
рациональное и экологически устойчивое производство, социокультурный, производство ямса

АННОТАЦИЯ

Социокультурные факторы при производстве ямса в значительной степени формируются традицией, религией, убеждениями, запретами, мифами, духовностью и социальными отношениями внутри общества. Чтобы изучить влияние этих факторов на уровень урожайности ямса, а также на рациональное и экологически устойчивое производство ямса было выбрано сообщество Обуду. Данные были собраны в ходе 60 интервью, 2 общественных встреч, 3 обсуждений в фокус-группах, в рамках бесед с местными информаторами, обзора литературы, включая вторичную и малоизвестную литературу, а также за счет внимательного наблюдения. Наши результаты выявили ряд показателей восприятия респондентами показателей урожайности ямса. Большинство коренного и пожилого населения были более консервативными в своих методах ведения сельского хозяйства, проявляя глубокую привязанность к традиционным методам и экологической чистоте при возделывании корнеплода при снижении производительности и показателей урожайности, хотя и не столь значительных. Социально мобильные респонденты, не являющиеся аборигенами, и более молодые демографические группы проявляли открытость для современных сельскохозяйственных подходов, ориентированных на количество корнеплодов и общий вес клубней ямса, и не были так заинтересованы в сохранении общего благополучения и целостности экологической системы, которая делает возможным рациональное и экологически устойчивое производство в процессе человеческого существования. Результаты подчеркивают необходимость не ограничиваться лишь улучшением показателей материальной производительности, поскольку необходимо изучить и другие, нематериальные показатели производительности. Должен быть проведен более строгий количественный и долгосрочный анализ тенденций, чтобы оценить тенденцию производительности, связанную с естественным экологическим благополучием и урожайностью ямса на изучаемой территории.

ФИНАНСИРОВАНИЕ: Грант на проведение исследований на местности был предоставлен программой исследования ямса Национального научно-исследовательского института корнеплодов г. Умудике, штат Абиа, Нигерия.

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1. Introduction

The importance of food to human existence has been given higher pre-eminence under the sustainable development goals (SDGs). SDGs 1, 2 and 3 primarily touch on human well-being and health reflected in their emphasis on zero hunger (SDG 2), good health and well-being (SDG 3) and poverty alleviation (SDG 1). These goals are at the core of human search for food security through sufficient production and distribution, enhanced access and improvement in nutrition [1]. Attaining the SDG food security goals by 2030 has the potential of addressing other elements bordering on reduced inequality (SDG 10) and responsible consumption and production (SDG 12), among other targets in several other goals.

[1,2] noted that 239 million people in sub-Saharan Africa were still afflicted by hunger due to inadequate supply, soaring prices, and of course we would like to mention the challenge of poor institutional coordination. The recent projection from [3,4] shows that one in every four people in sub-Saharan Africa is undernourished. Compared to other regions of the world, sub-Saharan Africa is shown to be lagging behind in the battle to achieve food security for its population primarily due to a range of factors including low productivity challenge, rising unproductive population growth, climate and soil quality problem as well as slavery in African history and weak health care [5,6,7]. Other challenges include conflicts and wars, and poor optimization of the agricultural value chains, among others. The climate change impact has recently been one of the challenges to achieving food security in sub-Saharan Africa through excessive flood and drought spells, which affect food supplies, distribution and seasonal cultivation.

These are mostly biophysical and socio-economic factors. The cultural perspectives underpinning agricultural productivity, sustainability and associated issues are often overlooked. Besides human capital, research and development (R & D), technology, finance and innovations, other factors such as values, beliefs, attitudes, taboos, myths and behaviors do influence agricultural factor productivity in many ways. Culture and religion have shaped labor, capital and material productivity from the perspectives of work ethics, achievement motivation and individualistic or collective practices [8,9,10]. The mainstream definition of productivity focuses on the relationship between input and output in a lineal manner of growth or non-growth [11]. Very limited studies have paid attention to the broader impact of socio-cultural factors of productivity [8,9,10,12]. In the study on the social meanings and cultural functions associated with yam (*Dioscorea* spp.) cultivation in southern Nigeria, Obidiegwu et al. [12] argue that yam farming and production are associated with many spiritual, religious, social and cultural meanings and values that have traditionally and historically shaped the existence, relationship and livelihood pattern of the population in the region (see also [13]).

Yam farming supports food security goals being one of the major sources of calories and micronutrients for a greater proportion of the world's population in the tropical and sub-tropical environment [14,15]. Yam exists in multiple varieties (about 600) cultivated in Africa, Asia, parts of South America, as well as the Caribbean and the South Pacific islands [16]. Yam-based agriculture in West Africa is recorded to be over 500 years old [17], but actual domestication is noted to have taken place along an axis at the forest-savannah ecotone in the eastern part of West Africa [18] and along the Niger River plains [19]. Nigeria is credited with the most advanced yam culture and civilization in the world [20]. According to the FAOSTAT statistic database [3], Nigeria is at the forefront of yam production with about 65% (about 50 million metric tons) contribution to the world's output. But yam farming has been linked with a range of biophysical and socio-cultural issues that impact productivity. Much less is known of how the socio-cultural meanings and values linked to yam and its production process influence their productivity. Our present study moves beyond understanding the biophysical, socio-cultural, religious and spiritual issues to examine their implications for yam productivity within the broader context of further untangling the challenges associated with food security attainment for Nigeria. We explored these issues by the example of the Obudu community in northern Cross River State, south eastern Nigeria. Our paper is organized into segments. We discussed the geography of the Obudu community, Nigeria, in relation to the geographical, historical and socio-cultural aspects of yam farming immediately following our introduction. The second segment describes the study methods including communities under study, methods of data collection, analysis, ethical procedures and possible limitations. The findings section follows the study methods. The final segment focuses on discussions of findings and concluding remarks.

2. Obudu community: environment, socio-cultural issues and yam farming

2.1. Location, ethnic and demographic structures

Obudu is located at latitude 6°40' and longitude 9°10'. It has a total land size of 459.458 km^2 [22] and is bordered in the south by Boki, in the east by Obanliku, in the west by Ogoja and Bekwarra local government areas in Cross River State and in the north by Vandeika local government area in Benue State. Obudu is home to the clans of Bette, Obanliku, Bendi, Utugwang, Ukpe-Alege, Utanga- Becheve, Bekwarra and Mbube, who all lived as autonomous communities sharing kinship being the sons of Agba. [23] (Figure 1). These traditional clans are now composed into the local government political administrative area called Obudu. They are locally administered by a traditional structure led by village chiefs and clan heads who are coordinated by the Paramount traditional ruler who is answerable to the Local Government Political Chairman who is the head of the political administrative structure of Obudu local government area.

The Obudu people speak five languages based on the number of tribes above. These five languages are inter-spoken by the eight clans as listed above with Bette ranking the largest. There is no clear cut demographic delimitation classifying which languages are spoken by each tribe as diverse tribes adopt several languages as it appeals to each family's preference. In Ubang, men speak a different language from women, though they understand each other. There is a local belief that God stepped his mighty feet on Ubang land as a gigantic footprint, which is left indelible in the community till date [23]. Settlements in the local government area include Akim, Atikpe, Begiaba, Beniabe, Betukwe, Babwabie uya, Babwabie, Betukwe, Igalaba, Obudu, Obuabung, Okolo obudu, Ohong, Okoshe. Obudu have some clusters of heterogeneous national and ethnic groups comprising of the Cameroonians, Hausas, Igbos, Igedes, Yorubas and Tivs, among others, who have integrated into the various subcommunities on account of migration, marriages and businesses. Obudu has a total population of 161,457 with 81,537 males and 79,920 females [22], most of whom have achieved various levels of basic formal and higher education.

2.2. Socio-cultural beliefs and practices

Over 90% of the population are Christians, who co-exist with other religious groups including the Muslims and the traditional religion worshippers. There is, however, a tendency of syncretism among the various religious groups, which manifests through ancestral worship, sacrifices, libation, and beliefs in witchcrafts, myths, taboos, charms etc. Eko et al. [24] explain that the prevalence of these beliefs has shaped the course of many practices, ceremonies, and festivals, for instance, the

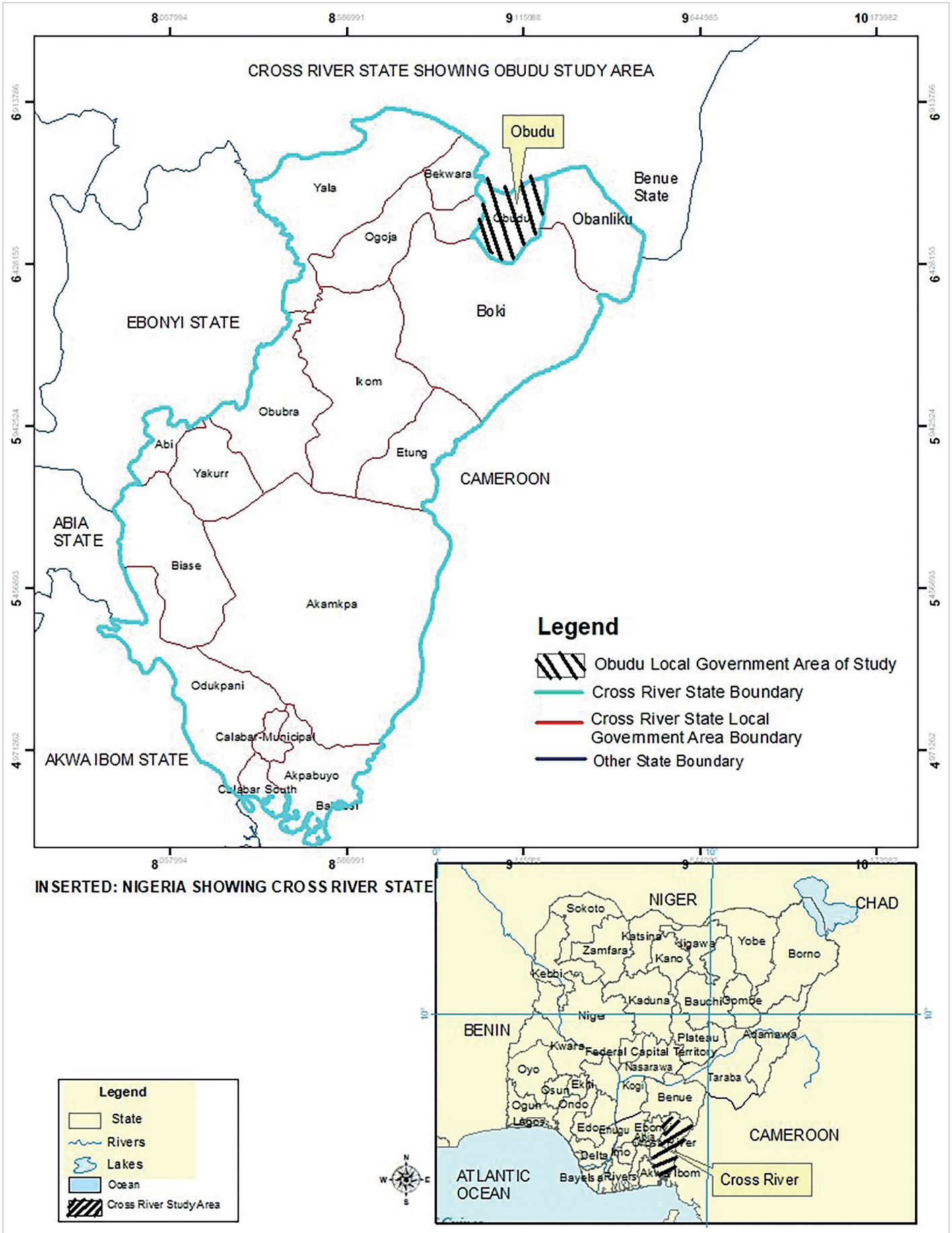

Figure 1. **Cross River State showing Obudu insert Nigeria showing Cross River State. (Designed by the Authors, 2022 using ArcGIS10.4 and GRID3 shapefiles)**

Рисунок 1. **Штат Кросс-Ривер с указанием Обуду. Вставка: Нигерия с указанием штата Кросс-Ривер (создано авторами в 2022 г., используя шейп-файлы ArcGIS10.4 и GRID3)**

designation of special days, when no economic and related activities can be conducted. Saturdays are popularly reserved for major traditions and festivals during which all forms of farming activities are prohibited.

2.3. Economic activities

Obudu is dominantly a rural region. Consequently, the larger proportion of the population (over 90%) is estimated to live in the rural areas and are involved in subsistent and semi-subsistent activities dominated by farming, trades, skill crafts, commerce, among others. Farming and related land-based activities are rainfed and seasonal, shaped by the rhythm of rainfall and temperature. Typically, public education is poor in rural settlements in Nigeria, which is reflected in low literacy level among the population. Under this circumstance, most social and economic activities are shaped by the tradition, cultural beliefs and local knowledge of the ecological environment with implications for productivity and sustainable practices.

3. Study methods, ethics and limitations

This paper is a product of a fieldwork activity on a doctoral program on 'food systems, livelihood and culture: a study on yam in South-South Nigeria' in September 2021. The fieldwork took place in the Obudu community in northern Cross River, Nigeria. The fieldwork process was largely qualitative and used interviews, public meetings, focus group discussions, local informants, review of literature, including secondary and grey literature and keen observation. Our interviews mostly targeted two demographic categories (60 years and above, and below 60 years) to understand generational differences and associated impact on yam farming. We also classified the population into native and non-native groups to be able to delve deep into their socio-cultural differences and associated impacts on yam farming.

We successfully conducted a total of sixty in-depth and semi-structured interviews, three focus groups with women, native and non-native population (each focus group had a maximum of eight participants), two public meetings (initial public meeting was used to explain the project and seek cooperation while the last public meeting was used to share and triangulate findings). The public meetings were organized at the villages' Council with wider representation from all demographic and gender-based categories. The first public meeting had thirteen participants, while the second had eighteen. Apart from the farming population, we also interviewed two traditional rulers and eight opinion holders. A single interview lasted, on average, between 55 minutes and one hour. Four local informants were used to facilitate our community entry, interaction with interviewees, clarification of issues and communication with the local elders and chiefs. Our respective individual experiences and familiarities with the local customs and traditions were equally useful.

We took notes of important information and issues that helped to clarify and strengthen our discussions. We had several follow-up interviews through mobile phones and e-mails, as well as in-person interviews to clarify issues, share findings and probe into some unexpected results. We used the Internet in search of relevant literature and visited public libraries and institutions for grey and other local publications. We applied the highest ethical standard of anonymity, confidentiality, informed consents and ability to withdraw from participation at any time. Our project also passed through stringent ethical approval from the Department of Geography Ethical Approval Board during the process of approving the doctoral project title and proposal, for which this paper is a part. All our data were interpreted, coded, thematized and analyzed. Narratives were collected and used for strengthening discussions. We also used tables, percentages and some quotes to strengthen our discussion of findings.

A limitation of this study is that it was performed in a single community (Obudu) as the starting point. We acknowledge that Obudu alone cannot give adequate representation of the vast, diverse and heterogeneous population of South-South Nigeria with hundreds of ethnic groups. These heterogeneous ethnic groups have vast and diverse perspectives, knowledge and norms associated with yam agriculture, which can hardly be captured by this small study area. Our study only focused on the qualitative perspective. It would make good sense to situate analysis on crop productivity in a balance of qualitative and quantitative parameters. These limitations relate much to funding limitations. Given that research on this subject is rare in Nigeria, this study stands to benefit the international community with literature, stimulate debate and lay good foundation and opportunity for further studies including cross-cutting thematic issues.

4. Results and discussion

4.1. Socio-demographic and economic characteristics of the respondents

Fifty-three percent of the respondents were in the age group of 60 years and above, while 47% were in the group of below 60 years of age. Fifty-six percent of the respondents were males and 44% were female participants. Fifty-four percent of the respondents acknowledged Christianity as their religion. Six percent admitted that they occasionally attend church especially during thanksgiving services for new yam harvest. They see themselves as practicing traditional religion insisting that most of the other respondents that claim to be Christians do so because of the social stigmatization attached with public association with the traditional religion. Forty-eight percent of the respondents were natives of Obudu with strong family and kinship, while 12% were the first or second generation of non-native settlers. Twelve percent of the respondents have attained tertiary level of education, 18% have attained secondary education, while 24% have achieved different levels of primary education. Eight percent admitted not having participated in formal education. Occupationally, 18% of the respondents combined yam farming with public services. Forty-two percent of the respondents were employed in other small scale economic activities including trading, masonry, processing, and all kinds of skill crafts, to mention but a few.

4.2. Socio-cultural perspectives on yam farming

Native farmers dominated farming operation (90%) over non-natives (10%), and largely depended on the traditional methods of farming practices including soil fertility determination, manual labor, non-use of chemicals (fertilizers, herbicides, pesticides), use of native seedlings, gendered distribution of farming tasks and responsibilities, the practice of shifting cultivation, and adherence to traditional beliefs and ritual practices, among several others (Table 1).

The majority of the non-natives were migrants from the neighboring ethnic regions of Igbo, Bekwara and Ogoja (all in Nigeria). They arrived in the region mostly for reasons of trade and marital relationships. Non-natives were noted to be more business minded, and more likely to embrace modern yam farming methods: *'…they are more aggressive, businesslike, individualistic and more likely to experiment on innovative and modern methods…'*, stated a male respondent in his early 50s. A female respondent in her early 40s who relocated from Bekwara for the marital reason argued that non-natives are not clearly bound by most of the traditions of the natives. She, however, stated that few general restrictions in fulfillment of traditional religious ceremonies and beliefs also affect non-natives including traditional restriction of farming activities on certain days.

Table 1. **Yam related cultural practices and implication for productivity**
Таблица 1. **Связанные с ямсом культурные практики и их значение для производительности**

Yam related cultural practices and routines	Remarks
Worship of yam deities and ancestors	— varies among ethnic groups — manifests in sacrifices of living beings — productivity of yam is believed to be determined by spiritual forces — excessive devotion to the gods of yam limits the introduction and acceptability of modern methods of farming and improving yam productivity
Yam ownership and cultivation is highly gendered	— culturally, women do not own or inherit land and cannot take an independent decision on yam farming — yam cultivation is exclusively the preserve of the male gender — 9oor or absence of participation of women limits labor expansion in the business
Excessive fixation on indigenous and native species (varieties)	— only indigenous and native species (varieties) are acceptable for traditional and ritual ceremonies — this attitude rarely allows for experimentation on improved varieties
Land rotation is still a traditional land-use management practice	— land inheritance is generational — traditional approach to soil fertility and quality management — in the context of rising population, excessive fragmentation limits mechanization and large-scale cultivation
The cultural practice of throwing outside pieces of harvested yams to prevent the deceased owner from gaining access to farm	— much yam tubers are wasted in the process once the owner dies
Twins in a family	— yam farming families publicly show off their twins signifying fertility and blessings. Associating marital fecundity with the 'goddesses' of yam
Exponential rise in marriage during harvesting season A yam test reveals the potential of a bride distinguishing who can manage a home or not. The potential bride is given a yam tuber to peel while the family gathers and watch	— procreation is encouraged — a strategy for increasing the family labor pool — a wife's ineffectiveness in home management is identified… if she peels from the head down. It is then concluded she will be incapable of managing the home.
Farming close to river banks/watersheds	— has conservation values
Yam and its symbolic values	— yam symbolizes status, wealth and privileges — in some aspect, full scale commercialization amounts to a taboo and is unacceptable — commercial cultivation is severely restricted

Authors, 2021 (Field work)

In determining the fertility of soils for yam cultivation, all the respondents who adhered to the traditional methods claimed they always look out for the coloration of the soil, with the fertile soil taking on the black or reddish color, while the white soil has to be avoided: *'…it is not every land that is fertile…we depend on the color of the soil to determine its yield prospects…fertile land range from the black to reddish color …'* noted a respondent aged 62. Soil fertility determination alone is often not the key deciding principle for improvement in yam yields and outputs. Careful choice of species (varieties) and other management practices are critical. All the respondents placed premium on varieties with 70% indicating high preference for the native species (varieties). Taste, texture and cost differences, in addition to availability and easy access were listed to support their preference: *'…yam cultivated with chemical fertilizers hardly attract sales patronage among our people who are adept at spotting the taste difference…if you need urgent money, you may likely not secure market because most people is not likely to buy…'* argued a male respondent in his late 40s. Limited exposure or non-exposure to many other yam varieties as well as the rare use of yam tubers cultivated with the aid of chemical fertilizers probably account for inability to gain fast adjustments in attitudes toward other species.

Other cultural beliefs and practices bordering on gender discrimination, religious ceremonies and land management were also explored (Table 2).

Sixty percent of the respondents said yam farming was highly gendered, 10% agreed on gender-based workload imbalance to a certain extent, another 10% disagreed, while 20% of the respondents were neutral. Most of the respondents (80%) in the 'disagree' category were non-natives, while the remaining 20% have been shaped by educational attainment and some measure of social mobility including exposure to best practices. Men's tasks traditionally revolve around construction of yam molds, planting, stalking, trailing and harvesting. Women, on the other hand, are traditionally involved in tasks such as weeding and, on rare instances, could be allowed planting. Given that women could be allowed planting yam, it means the traditional and perceived division of tasks and responsibilities may not be spiritually sacrosanct between the genders, it is rather historically and socially entrenched through a long period of socialization and practices. Regarding the 'weeding' task, a male respondent in his late 60s noted as follows: *'…women's traditional role in yam cultivation is weeding, reason being that it is a meticulous task which demands an appropriate attention and skills, which most men do not have the time and patience to engage in…'*

Table 2. **Yam related beliefs and traditions**
Таблица 2. **Связанные с ямсом убеждения и традиции**

YAM RELATED TRADITION	SUBSCRIPTION SCALE							
	Yes	%	No	%	Somehow	%	Neutral	%
Deification	42	70	6	10	12	20	Nil	**Nil**
Gendered practices	36	60	6	10	6	10	12	**20**
Native species (varieties)	42	70	6	10	Nil	Nil	12	**20**
Land rotation/ inheritance	48	80	6	10	Nil	Nil	6	**10**
Throwing pieces of yam outside for the gods	36	60	18	30	Nil	Nil	6	**10**
Twins in family	30	50	12	20	6	10	12	**20**
Marriage during yam festivals	36	60	12	20	6	10	6	**10**
Farming close to river banks	12	20	36	60	6	10	6	**10**

Authors, 2021 (Field Work)

The religious festival popularly called the 'new yam' festival is an important element in the Obudu age-long religious festivals that feature rites of sacrifices, obeisance, libation, fetish and other practices in referential respect to the 'goddesses' of yam fertility. Different ethnic groups designate special days for their respective yam ceremonies. Obudu's yearly festivals traditionally called 'Kipam fufua' are fixed on the first Saturday in September every year always coinciding with new yam harvest. A female respondent in her early 60s gave some details of the Obudu yam ceremony as follows: *'…this period is reserved for*

merrymaking…most youths are often carefree in partying…falling victims to fatal accidents…often believed to be part of the sacrifices to the gods…' She insisted that opting out of the tradition endangers families, and misfortunes such as low yam yield and farm accidents are attributable to their unwillingness to comply.

Other forms of labor and land management practices were equally identified in the process of yam farming. Shared, communal and rotational labor practices and exchanges, shifting cultivation and avoidance of farming in fragile ecologies were part of the traditional mode of yam farming in Obudu. The majority of the respondents practiced communal/shared/exchange labor and on rotational basis among themselves. This has been noted to save cost and achieve optimal labor power output with minimal cost inputs for members. Land management practices also formed part of our interview. Common practices identified include shifting cultivation and land rotation, and avoidance of farming in fragile and marginal areas. Sixty percent of the respondents would clearly avoid farming close to river banks/watersheds, while 20% would go ahead. We have learnt that violating the tradition will carry some spiritual and ecological consequences that reflect negatively on yam yield and performance. Our findings resonate with previous findings by [14,25] to the effect that ecological consequences of inappropriate land use management are linked to some spiritual breaches through human activities. These findings were reported in the geographical region similar to this study, and clearly underline the role of the traditional religion in fostering land use conservation and ecological sustainability.

4.3. Implication for yam productivity

'Yield abundance', 'bumper harvest', 'soil fertility', 'output/seed input ratio', 'yield per yam crop stand' were all the indices that were used to discuss the fecundity and productivity of farmlands and yam yield per planting season. Productivity was assessed on the basis of the difference in yearly returns on investment in labor, inputs and finances, though such assessment was not based on quantitative parameters. Most importantly, communal happiness is believed to rest on the harmonious relationship with the 'goddesses' of fertility, which is partly expressed in their annual merry making events that come with their yearly celebration in 'new yam festival'. Yam farming was perceived by over 70% of the respondents as more of a cultural occupation nested in beliefs, taboos, myths, sacrifices and spirituality, serving as a rallying driver for collective and social engagements. How much do these beliefs shape yield, fertility and profit outcomes?

All the native farmers made some references directly or indirectly to the 'goddess' of fertility when discussing yield outcomes, and perceive all yam related traditional practices as normal referential respect to the 'goddess': *'…from the planting to harvesting phase, our community has to follow the laid-down tradition that encourages sacrifices, libation, taboos and many forms of ceremonies to protect our yam crop and sustain their yield…'*, argued an elderly male respondent who should be in his early 70s. He cited an instance bordering on how human twins are often treated: *'…if a family has twins as members during cultivation, the first two sticks are inserted into the ground and made to cross. Upon harvest time, yam is harvested early and the twins eat first before other members of the household…'* Associating marital fecundity with the 'goddesses' of yam broadens the notion of productivity beyond quantitative and material outputs. Yam farming families tend to desire this prestigious public show of fertility if blessed with a twin. However, if this ritual is violated due to ignorance of the tradition by any twin family, there will probably be no disastrous results unlike the so-called 'nsobo udia' (decreased yam production), which would happen according to the belief of the Ibibio ethnic group.

The yield trend was also estimated over the 30-year period as a measure to assess how perceived cultural factors contribute to productivity of yam. The yield trend displays a decreasing pattern measured from 1992 to 2022 (Table 3).

Table 3. **Ratio of yield trend and yam crop yield trend**
Таблица 3. **Соотношение урожайности и урожайности ямса**

YEARS	INCREASING	%	DECREASING	%	STAGNANT	%	CANNOT SAY	%
1992–2002	42	70	6	10	6	10	12	20
2003–2012	30	50	6	10	6	10	18	30
2013–2022	30	50	12	20	6	10	12	20

Authors, 2021. (Field work)

Seventy percent of the respondents agreed that the yields in 1992–2002 were significantly higher. A male respondent in his late 60s argued that there used to be higher yield output and bumper harvest compared to current yields, though they are not bad.

The 2003–2012 and 2013–2022 periods indicate a fairly stable yield output of 50% for each period, respectively, which is significantly lower than the yields in the period of 1992–2002. Between 20% and 30% of the respondents could not indicate their responses to this particular question. Most of the respondents under this category belong to the non-native farmers. Some respondents who were able to assess the performance trend blamed decreases and declining productivity on inability to adhere strictly to the cultural traditions. However, few other respondents went further and pointed to other human factors that probably led to poor yam yield for the community, including decreasing fallow duration, population pressure and inability to embrace modern farming methods, among other factors. Generally, 80% of the respondents believed traditional and spiritual factors largely shape yam cultivation processes, which tend to undermine farmers' ability to adapt to the innovative and modern production process in some cases. Most of these respondents were not aware of the innovative and modern production process as there were limited extension services across the study area. Ninety percent of the yam farmers owned radio sets, which were supposed to connect them to public information services, with 60% of the socially mobile non-natives and the younger demographic groups acknowledging adoption of one or more innovative modern farming technologies.

Social factors were equally mentioned among the determining drivers of yam crop farming and yield outcome. These included labor management processes, large family size, social and economic mobility of farmers and the availability of financial, self-help and cooperative support structures. As discussed earlier, most of the farmers agreed that shared and communal labor enhances performance and productivity. A respondent in his late 50's explained that in Kutia community shared and communal labor can be divided into two categories. The community farm worker groups are further subdivided into age grade groups. Community age grade groupings include the youths, middle aged and elderly labor groupings. These groupings have different sizes starting from five farmers depending on the demand of a landowner. The norm is that a farmer invites a group to his farm by giving a prior date notice. Upon arrival at the farm, they execute their farming tasks with the farmer supporting them with meals and drinks. This is most often accompanied by singing folklore songs to ensure the resilience and speed in the execution of the task. A respondent, however, explained that singing is an individual task and not a group thing and is done voluntarily depending on the mood influenced by how they are

entertained by the farmer. These communal farm groups contribute to productivity outcome through extensive land cultivation. If some farmers are not in a right relationship with the community, they will depend on paid private groups of small farm workers who are less likely to achieve much compared to a large group of communal farmers. The different farm groupings are known by different names including *Bebua baundie beh* and *Bebua akapaha*. According to the respondents, farm associations are getting increasingly competitive and have variously contributed to enhancing the collective effort and yield performance.

Shared and communal labor contributes to the expansion of a farm size as well as enhances an increase in the quantity of yam crop planted per season: *'…it would be practically impossible to increase any farm size and quantity of yam planted with a small labor size…it does not cost much to belong to a group but the benefit is large…'*, noted a female respondent who should be in her late 40s. Another female respondent in her late 40s also stated as follows: *'…the involvement of a large number of individuals in weeding through communal efforts incentivizes farmers and potential farmers to expand their farm operation and enhance the productivity of their efforts…'*. Some respondents also described the impact of large family sizes, level of education, extent of social exposure and access to necessary information as vital to the productivity of yam farming. The yam harvesting season provides an opportunity for selecting hardworking ladies for marriage basically aimed at increasing family sizes as security and insurance for farm labor and productivity: *'…it is mostly during this [harvest] season that elders choose wives for their children…in order to be able to identify a good woman, a yam test, in which a potential bride is given a tuber of yam to peel and pound, is conducted while the family watches…if the woman peels from the head down, it is concluded that the woman is bad and will not be able to manage the home…the woman that keeps the head will be judged as good and more likely to preserve the future at least being able to plan for the next yam planting season …'* Social and economic mobility determined by the level of educational attainment, financial autonomy, access to information and exposure to the best and innovative practices shaped the productivity of yam farming. The majority of the non-natives (over 90%) and few of the natives (less than 10%) who discussed and embraced the positive impact of modern farming were more educationally and economically empowered and could give account of the productivity of their farming efforts as well as the improvement recorded in outputs.

The Obudu yam festival is the traditional public show of yam harvest aimed to thank gods and ancestors for the help in farm yield. The yield is often socio-culturally perceived by different community groups as a result of diligence or god's favor depending on each belief system. Folklore reveals that there used to be great competitions where different farmers gathered with their yam produce to compare which was the largest and to determine the best farmer with traditional farming management skills. The largest yam yield was publicly chosen and the participants were awarded with different prizes by the community and local government to motivate more farmers. These competitions are still carried out, but a respondent explained that they are not as grand as before, hence do not promote competition for more productivity in the next farming season as they used to. However, another respondent believes that the Obudu yam festival still has its awe of yam yield presentation as most farmers during the cultivation seasons strive to be classed amongst the best yam farmers. This prompts exceptional diligence of a farmer in the process of cultivation and also promotes productivity and better yield.

Yam farming in Obudu is largely shaped by the tradition, religion, beliefs, taboos, myths, spirituality and social relationship. Two broad categories of ethnic natives and non-natives, and two sub-demographic categories consisting of the age group of 60 years and above (majority) and a numerically low group of people aged below 60 years are engaged in yam farming. The native and the 'aged' majority of the population tended to be more conservative in their farming approach exhibiting deeper attachment to the tradition and less likely to embrace modern farming practices. Their socio-demographic and economic status are dominantly low (less educational attainment, low level of social exposure), relatively poor financial autonomy, etc). On the contrary, the non-natives and the younger demographic groups, on average, were relatively better socially exposed), relatively socially mobile, had some measure of higher education, and were relatively more open to the modern farming approach, though not completely averse and dismissive of the traditions of the community. At least 80% in this demographic category voluntarily participated in some elements of the yearly yam festivals, besides some traditionally mandatory activities.

Over 50% of the interviewees believed a declining productivity occurred over the years. About 10% disagreed probably because their judgment may not be based on material outputs alone (the quantity of yam tubers produced). While the non-natives and the relatively young and mobile population advocated for the improvement in yam farming practices through the introduction of chemical and mechanical means, the natives and the relatively older generations never gave consideration to such changes. The fear that they may undermine their socio-cultural tradition may be responsible for such conservative attitudes. Differences in education and social exposure probably could explain such an attitudinal gap. Low population in Obudu implies less pressure on available agricultural land, and may less likely lend the needed impetus for a change in the direction of disrupting the cultural tradition.

Yam farming in Obudu has the relatively stable socio-cultural history. The question of how the mode of cultivation has shaped productivity is best answered from individual or cultural perspectives of what productivity entails. From the capitalist standpoint, productivity may be measured from the perspective of lineal progress and quantitative improvement in terms of financial profit and other forms of improvement in material outcomes, even at the expense of the ecosystem and social stabilization. While this sense may align well with the western capitalist norms of material prosperity, it may not necessarily be consistent with the African concept of prosperity and productivity in the holistic sense of unity of human and nature [26]. Productivity from the perspective of our study population embraces a range of ecological and socio-cultural aspects, as well as human well-being. The respondents placed their emphasis on and gave priority to the health and continuous functioning of the ecosystem. Inability to secure bumper yam harvest at a particular season will most likely force collective imaginations and reflections on what probably went wrong in the harmony and relationship of humans, nature and culture. Our findings demonstrate that most respondents rarely fix their thoughts and expectations on the quantity and tons of yam tubers at the expense of the overall health and integrity of the ecological system that makes sustainable production and human existence possible.

5. Conclusion

Our research had set out to qualitatively determine an impact of the socio-cultural tradition on yam farming in Nigeria by the example of the Obudu community, South-South region. We have observed that yam farming in Nigeria is nested in the socio-cultural tradition encapsulated in taboos, myths, customs, beliefs, libation, spirituality etc. We have also found out that ethnic and demographic groups with the strongest influence on

yam economy are the 'natives' and 'older' generations, who are still fixated on the values of the cultural tradition. This implies that in the coming years between 2023–2032, while natural ecological health of yam farms will be upheld through cultural production, there may be some level of decline in yam crop yield in most farms. The socially mobile and younger generation had 60% positive disposition towards adoption of modern yam production innovations; however this generation is still dominated by the 'natives' and 'older' generation groupings who are inclined to the cultural tradition of yam production.

When measuring in the quantitative, capitalist and western-based values, we have found out a decreasing productivity and performance in yield outputs, though not so significant. However, if productivity is to be measured outside the prism of the western capitalist standard, our findings have touched on a range of indices of what the respondents perceived as measures of productivity, which are rather more holistic and account for the harmony of ecological, socio-cultural and human interests. We conclude that a more rigorous quantitative and long-term trend analysis should be conducted to assess the productivity performance trend associated with the natural ecological health and yam outputs for the study area. It is also important for studies to look beyond an improvement in material productivity. Other non-material indices of productivity should be explored.

6. Declarations Availability of Data and Material

Primary data was gathered from fieldwork using the qualitative methodology through interviews, public meetings, focus group discussions, local informants and keen observations. There was a review of literature, including secondary and grey literatures. Data was readily available and ethically collected to reveal views of respondents in two demographic categories (60 years and above and below 60 years) in order to understand generational differences and associated impact on yam farming.

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Eti-obong Ema primarily contributed at all stages of this work, which was supervised and edited by Dr. Emmanuel Akpabio, and Jude Ejikeme Obidiegwu participated in the final edits and reviews	Эти-обонг Эма внесла основной вклад на всех этапах этой работы, которой руководил и редактировал рукопись доктор Эммануэль Акпабио, а Джуд Эджикеме Обидиегву участвовал в окончательном редактировании и корректировке
Conflict of interest	**Конфликт интересов**
The authors declare no conflict of interest in this study. The authors also declare the funders had no part in the design of the study, nor in the collection, analyses, or interpretation of data. The writing of the manuscript and decision to publish the results rest solely on the authors.	Авторы заявляют об отсутствии конфликта интересов в данном исследовании. Авторы также заявляют, что спонсоры не принимали участия ни в разработке исследования, ни в сборе, анализе или интерпретации данных. Написание рукописи и решение о публикации результатов является исключительно результатом решения авторов.