

## **Mushroom as A Strategy to Reduce Food Insecurity in Tharaka Nthi County**

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**Abstract:** Food insecurity has negatively affected livelihoods both in rural and urban communities especially in Asia and Sub-Saharan Africa. Some communities are victims of food insecurity due to unsustainable dietary choices. Mushrooms can be part of the solution to world's food shortage as well as health problems. The popularity of the mushroom has been growing in many parts of Kenya. Although mushroom has high value, no market in Tharaka Nthi County provides the produce for sale. Preliminary surveys were conducted in Chuka, Tharaka and Maara and it was noted that the wild edible mushroom types were highly existent in this County in March and November, but the community seemed not to understand the usefulness of the product in food and nutrition security. Only two large hotels in the County were observed as utilizing mushroom flour for making appetizer. Generally the mushroom was indicated as not popular in Tharaka Nthi County because of; lack of knowledge on food, nutritional and medicinal value, fear for poisonous nature, unpalatable taste, high perish ability, lack of knowledge on value addition and preparation. Some of the suggestions given for enhancing utilisation of this product in the communities were; education on how to distinguish between poisonous and non poisonous mushrooms, sensitization by advertisement through media, use of entertainment in drama, songs, poems among others, fortification of mushroom with other foods especially children's food, commercialization of mushroom by experts, exchange program through cultural workshops and seminars to enhance training of various groups on how to prepare mushroom, training of women and youth groups, use of medical prescriptions, introduction of cultivated mushroom in the area.

**Keywords:** Mushroom, Utilization, Production, Tharaka Nithi County

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### **I. INTRODUCTION**

Food insecurity has negatively affected livelihoods both in rural and urban communities especially in Asia and Sub-Saharan Africa (Food and Agricultural Organization (FAO, 2007). Some communities are victims of food insecurity due to unsustainable dietary choices. In line with development goals and the Kenya's Vision 2030, there is need to develop strategies that expand dietary choice circles as well as increase agricultural productivity for food security and incomes in order to improve livelihoods(Ogalo, 2012). This can be enhanced through introduction and utilisation of high value crops like mushrooms.

Mushrooms can be part of the solution to world's food shortage as well as health problems because of the fact that they occupy a place above vegetables and legumes but below the first class proteins in meat, fish and poultry; and also because they are endowed with bioactive compounds that are of medicinal value (Boa 2004 and Chang 2004). Mushrooms are popular valuable foods because they are low in calories, carbohydrates, fat, and sodium; also, they are cholesterol-free. Besides, mushrooms provide important nutrients, including selenium, potassium, riboflavin, niacin, vitamin D, proteins, and fiber and they are important for their healing capacities and properties in traditional medicine (Ishara 2015). The nutrition and medicinal values of mushrooms can also be ideal for vulnerable groups in the society such as children, breast feeding mothers, the old and the sick especially those suffering from diabetes, heart diseases, cancer and HIV/aids.

Chang and Miles (2004) observed that mushrooms utilize agricultural wastes, e.g. cereal straws, maize stocks, bean stock, Cotton husks, maize cobs, coffee husks, coffee pulp, paper waste, papyrus, water hyacinth, banana fronds for growth. Therefore mushroom cultivation fits in very well with sustainable farming and has several advantages in that it uses agricultural waste products, and also acts as a good soil conditioner (Oei 2005). In the areas they are produced mushroom arise from lignocellulosic wastes, yet they become beautiful and nourishing. They can greatly benefit the environmental conditions because they biosynthesize their own food from agricultural crop residues which could otherwise have caused health hazards. They can be used as a means of promoting equitable economic growth in the society. The lignocellulosic wastes are available in all

corners of the world and they can be used in cultivation of mushroom which can lead to white agricultural revolution especially in the least developed areas.

There is a growing demand for mushroom products in Sub-Saharan Africa. In Kenya, 38 out of 42 tribes are known to use mushrooms as food, though the key wild mushroom traders are found in Western and Coastal Kenya (Gateri 2013). Also many immigrants and visitors from Asian, European and American origin utilise the mushroom. This justifies the need to exploit every opportunity in the promotion and increasing the capacities for mushroom production, both wild and cultivated. Although mushroom production was introduced into the Kenya in 1969, Wambua (2004) describes the mushroom industry in Kenya as still in its infancy and is growing slowly and to many people, its growing is still a myth because there is a lack of communication between the researchers in this field and the farmers, and the exchange of cultural knowledge is rather poor. The cultivation and utilisation have been hampered by lack of information, extension, research and reluctance of those in possession of skills to share with interested parties (FAO 2007).

Tharaka Nithi is one of the Counties where there is massive growth of wild mushroom yet the nutritional and medicinal utilisation is minimal. The County has high tree cover which favours growth of some wild mushrooms, but sources of information indicate that these nutritional and medicinal commodities are seldom utilized. The preliminary study therefore sought to; identify the common types of mushroom that grow in Tharaka Nithi County, investigate the level of awareness on usefulness of the mushroom and determine factors affecting the acceptability of the mushroom with the aim of promoting production and utilization in the County.

## **II. METHODOLOGY**

The study was undertaken in Tharaka-Nithi county in Eastern Kenya between April 2016 and November 2016. Tharaka-Nithi County is on the south Eastern side of Mt. Kenya at 0.30°S, 38.06°E and lies at an elevation of 600–1500 m (Mairura et al., 2000). The area is largely semi-arid and receives a bimodal pattern of rainfall, which is <1000 mm per year (Njeru et al., 2013). The county residents are subsistence farmers with intensively managed crop–livestock enterprises and slope cultivation that cover up to 60 % (Recha et al., 2012). The agricultural sector is dominated by coffee, tea, bananas, beans, macadamia, mangoes, sorghum and livestock production that comprises of dairy cattle, goats and sheep. There is a dense population of trees which favours growth of some mushroom species.

Data was collected using field surveys, questionnaires, interviews, key informant interviews and focus group discussions in a sample of 400 respondents which included household heads, market vendors, hotel staff, nutritionists, change agents, administrators and other community members. Field surveys involved use of field sampling where various mushroom types of edible wild mushrooms growing in about 10 locations were collected and identified. Indigenous Knowledge was used to identify the edible mushroom. Household heads were guided in the identification of the edible mushroom species existent in the County. The researchers used indigenous knowledge and charts with clear pictures of various wild mushroom varieties to guide the identification. Interviews were also used to collect more data about awareness about mushrooms from 5 purposively selected vendors in each of the following markets: Magumoni, Etuguru, Chera,, Chuka, Kathuko, Kaaanwa, Gathwana, Marima, Chogoria, and Marimanti. Data was also collected using key informant interviews with two nutritionists and two change agents in the County in order to determine importance and acceptability of the mushrooms in the area.

Questionnaires were used to collect data on acceptability of mushrooms from at least one manager and 4 waiters from each of the 5 well established hotels that were purposively sampled in the County. Focus group discussions (FGDs) were held to discuss the potential and acceptability of the mushroom in the County. The FGDs involved community members, hotel staff, market vendors, food nutritionists, administrative officers and change agents. The FGDs were held for purposes of conducting SWOT analysis (Strength, weaknesses, opportunities and threats) on performance and acceptability of mushroom in Tharaka Nithi County. The data collected was analysed using percentages and frequencies after which it was presented using tables and figures.

## **III. RESULTS AND DISCUSSION**

### **3.1. The wild mushroom existing in Tharaka Nthi County.**

Four varieties of mushroom were found to be existent in the County. The varieties were; Oyster (20%) shiitake (60%), Enoki (10%), and portabella (10%). The mushrooms grow in rotting plant remains and on barks of dead stumps of trees. They are commonly called “Makuno” in Tharaka Nthi County. The mushrooms grow in two seasons; between October and November and between March and April. According to Gezer and Oguzhan (2015), mushrooms grow based on the type of environment and soils where they are grown. According to Oei (2005) probably occurrence of rainfall leads to the growth of the mycelia on these dead rotting plant material.

**3.2 Awareness about the value of Mushroom**

Results of the study indicated that the level of awareness about the growing and the value of mushrooms was less in the County. The data collected on awareness, utilization and value of mushroom on a sample of 400 people is indicated in Table 1.

**Table 1:** Observation on the awareness, utilization and value of mushroom in Tharaka Nithi County

Description	Num	
	Yes	No
Have seen the mushroom	100%	0%
Have eaten the mushrooms	40%	60%
Know the value of mushrooms	2%	98%

Results of the study indicated that Tharaka Nithi community were familiar with the appearance of the mushrooms, but a minimal percentage had eaten or knew their values. The findings somehow agree with observations by Munyanziza (2005) that, though mushrooms form an integral part of a long standing cultural practice which is passed on from generations to generations in many Kenyan communities, consumption is however hampered by cultural bias in some communities and lack of adequate knowledge on value and edibility of the various species.

**3.3. Factors affecting the acceptability of the mushrooms in the County**

Results of the study on factors that negatively affect acceptability of mushrooms in Tharaka Nithi County are shown in Table 2.

**Table 2: Factors affecting the acceptability of the mushrooms in the County**

Factors that negatively affect acceptability of mushroom	Percentage (%) of population affected.
1. No cultural value	92%
2. Lack of skills for preparation of mushrooms	90%
3. Fear about poisonous nature of mushrooms	82%
4. Lack of knowledge about the mushrooms' value	60%
5. Dislike of the mushroom taste	30%

According to the results, the highest percentage of the respondents did not accept the mushrooms because of the beliefs that it had no cultural value (92%) and that mushrooms were poisonous(82%). This findings are in tandem with Ndungu et al. (2014), who observed that although the wild mushrooms form part of a long standing cultural practice in many communities, many people shy off from such wild sources due to fear of poisoning and lack of awareness about their value.

A significant number of respondents failed to accept mushrooms because of lack of skill to prepare (90%), lack of knowledge about the value (60%) and dislike of the taste of the mushrooms (30%). Accordingly, Ongoche et al., (2017), noted that factors like level of awareness, previous experience, level of education and availability of markets are among the factors that influence acceptability of mushroom in various communities.

Previous studies also assert that gender and age are also important in determining the attitude towards the mushroom.

**3.4. SWOT Analysis on mushroom production in Tharaka Nthi**

Using the information gathered a strength, weakness, opportunities and threats (SWOT) analysing on mushroom production in Tharaka Nithi was performed and the results are indicated in Table 3 below.

**Table 3: SWOT Analysis on mushroom production in Tharaka Nthi**

Strengths for mushrooms in Tharaka Nithi	Opportunities for Mushrooms in Tharaka Nithi
1. Wild mushroom grow in abundance in two seasons in the County	1. The dense tree population favours the growth of the wild mushroom.
2. Most wild mushrooms existent in the county are edible	2. Existence of diverse cultures in the County, increases chances for acculturation and marketability of the mushrooms.
3. The mushrooms can be used as food, medicine and soil conditioner.	3. Presence of nutritionists and change agents in the County.
4. Mushroom can be used as a source of	

income 5. Mushroom can be cultivated. 6. Mushroom can be dried and stored for longer periods of time	4. Existence of food insecurity in some parts of the County. 5. Presence of the hotel industry in the County
<b>Weaknesses</b>	<b>Threats</b>
1. Lack of knowledge about value of mushrooms 2. Dislike of the mushroom taste 3. lack knowledge and skills on preparation of mushroom 4. Low marketability	1. Fear about poisonous mushroom 2. Negative cultural perceptions about mushroom 3. The mushrooms are seasonal.

Some of the strengths stated about the wild mushrooms in the County are that; the mushrooms grow abundantly in two seasons each year, most are edible, medicinal and soil conditioners. According to Ishara et al., (2015), protein-Energy Malnutrition (PEM) and micronutrient deficiencies are currently the most important nutritional problems in most countries and they can be solved using mushroom flours and their blends with maize flour. Velverde et al., (2015) also asserts that mushrooms act as antibacterial, immune system enhancer and cholesterol lowering agents; additionally, they are important sources of bioactive compounds and as a result of these properties, some mushroom extracts are used to promote human health and are found as dietary supplements. It was also noted that the mushrooms could be used as source of income to households, they can be cultivated favourably and they can have a long shelf span if well processed. This observation corroborates observation by Gateri et al. (2008) who pointed out that mushrooms could also be used as an alternative source of income to uplift the living standards of poor farmers through commercialisation. Manju et al expressed urgent need for imparting technical know-how to women and households so that they can adopt mushroom production as an income generating activity.

Results of the study indicated that there were many opportunities for growth and utilisation of the mushrooms in the County. Some of the opportunities mentioned were; existence of dense tree population which favours the growth of the wild mushroom, diverse cultures that increase chances for acculturation and marketability of the mushrooms, hotel industry, nutritionists and change agents. It was also noted the food insecurity in some parts of the County could create opportunity for utilisation of the commodity by the community members. Acculturation could enable exchange of knowledge and skills on value, utilisation, preparation as well as indigenous ways to distinguish the non poisonous mushrooms. The hotel industry could be useful in exposing and marketing of the products while the nutritionists and the change agents could be useful in sensitization and creation of awareness about the importance of the product. According to Ishara (2015), a large variety of mushrooms have been utilized traditionally in many different cultures for the maintenance of health, as well as in the prevention and treatment of diseases through their immunomodulatory and antineoplastic properties. Many communities that utilize wild mushroom use indigenous knowledge to collect them from forests, roads or homesteads (Ndungu et al., 2014).

**3.6 How to enhance acceptance of mushroom in Tharaka Nthi County.**

The informants and interviewees made suggestions on how to enhance acceptance of mushroom in Tharaka Nthi County. The suggestions were classified into two categories; Capacity Building and Commercialization.

**3.6.1 Capacity building.**

The suggestions given for capacity building in effort to enhance acceptability of mushroom in the County were: Educating people on how to distinguish between poisonous and non poisonous mushroom, Development of exchange program through workshops and seminars to enhance training of various groups on production and processing of mushroom. Through the exchange program, both indigenous and modern knowledge and technology can be exchanged between different cultural groups. Other strategies suggested were: Sensitization of women and youth groups by use of entertainment programs like drama, songs, and poems, Advertisement through media, Dietary recommendations for medical purposes and Availing of mushroom recipes to trigger their consumption. Manju et al. (2012) found that there is a significant impact of awareness and training programmes in disseminating the knowledge of mushroom cultivation and utilisation.

### 3.6.2 Commercialization

The suggestions given for capacity building in effort to enhance acceptability of mushroom in the County were: Linking small scale farmers through contracts to market outlets such as hotels, supermarkets, vulnerable groups, Fortification of mushroom with other foods especially children's food and that of people with dietary food requirements, Value addition of mushroom through drying and packaging, milling for other confectionery uses and Introduction of cultivated mushroom in the area.

## IV. CONCLUSION AND RECOMMENDATION

Mushrooms can be part of the solution to world's food shortage in Tharaka Nthi County. The negative attitude towards acceptance and utilization of the product in the area has been attributed to lack of awareness about the value as well as lack of knowledge and skills on the management. The growth of the mushroom in the County has more strengths and opportunities than weaknesses and threats. The acceptance of mushroom production and utilization can be enhanced through capacity building which includes educating people on how to distinguish between poisonous and non poisonous mushroom, training of various groups on how to prepare mushroom. The acceptance could also be enhanced through commercialisation which includes fortification of mushroom with other foods, value addition and cultivation of mushroom.

Agricultural policies that promote mushroom production and utilisation should therefore be developed especially in this era of climate change to be able to sustain the environment for current and future generations. Mushroom cultivation can demonstrate a great impact on agriculture and environment, which contributes greatly to socioeconomic human welfare.

There is need for different stakeholders to work together at all levels to promote positive attitude on mushroom production and utilisation in order to increase productivity and diversification of food products. Further research need to be done to establish sustainable methods for management as well as value addition on mushrooms in the County

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