Edible Insect Consumption in the South Eastern Nigeria

Ebenebe, Cordelia Ifeyinwa and Okpoko Valentine Obinna

Abstract: Edible insect consumption in the south eastern Nigeria was studied to ascertain the factors that limit insect consumption, the factors that promote insect consumption, the types of insect preferred by the south eastern people of Nigeria, age bracket that consumes insect the most, the policies to be adopted to increase insect consumption in the region. Three methods of data collection were used in the investigation: questionnaire structured in such a way that respondents tick yes or no in response to questions, questionnaires structured in such a way that respondent tick the column that expressed their feeling using four point Likert – type scale: Strongly agree - 4 points, Agree t= 3 points, Disagree - 2 points and Strongly disagree -1 point and oral interview. The population was drawn from the 21 Local Government Areas that make up Anambra State, a state that have full representation of people in the south east region. The result showed that level of acceptance of insect as food was least among the young people within 10-25 years of age (5.71%) and greatest among people above 25 years (50.24%). Cricket was found to be the most preferred insect but termite was the most consumed (25.95% out of 67.86% of those that eat insects as 32.14% do not eat insect at all), but termite was the most consumed (67% in the rural areas and 56% in the urban centres) because its availability as people can collect commercial quantities during their nuptial flight. Malnutrition and poverty were the factors that promote insect consumption as was seen during the civil war, such that after the war insect consumption became associated with poverty making people to lose interest in insect consumption. Of the policies that will encourage entomophagy: public awareness campaign, incorporation of insects into highly cherished foods, establishment of insect farms and processing of insects into more desirable forms: waffles, puff balls, advertisement on radio and television as well as serving in social functions by highly placed individuals scored acceptable points as policies that will promote entomophagy in this region.

Index Terms: Factors affecting entomophagy in south eastern Nigeria

1. Introduction

Consumption of edible insect (Entomophagy) is one major strategy to counter the existing problems of malnutrition in Nigeria. FAO [1] recommended consumption of 34g of animal protein per person per day for normal growth and development but in Nigeria animal protein consumption level is at 7-10g/person/day while her counterparts like Somalia and Mauritania were getting 32-34g respectively FAO 1985 cited in [2]. To bridge the gap between animal protein deficit and human population growth rate many alternative protein sources especially microlivestock has been integrated into traditional farming system in compliance with FAO [3] recommendation, yet animal protein deficit in the country is still unresolved. This is because the human population grows at the rate of 3% per annum while animal production grows at the rate of 2% per annum [4]. Farming and consumption of edible insects becomes an important tool in improving the animal protein supply in the country.

Insect consumption is indigenous to Nigeria and most other African nations, but real farming and intentional consumption to improve nutrition is limited by many composite factors. The merits of the use of insect as food have been expressed in several reports “[5]. Onigbinde [6] also elucidated the high nutritional value of fatty acids found in edible insects, according to them, edible insects has fatty acids with high iodine content, an indication of the degree of unsaturation of the oil. The iodine content some insect oils like Silkworm oil 117, lepodothoraceous larva oil 112-119 and 108.6 -118 in phytophagous chrysomelids were reported by Wigglesworth 1976 cited in [6]. Edible insects are also reported to be rich in minerals and vitamins especially iron, magnesium, zinc and thiamine, riboflavin respectively [17].

However, despite the numerous health and nutritional benefits of edible insects many people still find it absurd to eat insects i.e. to practice entomophagy, so eating of insects is relegated to the background as a practice by the poor rural communities “[18] and [19]”, except for a few insects eaten by both urban and rural communities as delicacies. In recent time, when FAO and WHO are reawakening the interest of humanity towards entomophagy, it becomes imperative to assess the factors that militate against and those that promote entomophagy as basic considerations in charting the course for popularizing of entomophagy in a country like Nigeria where low intake of animal protein is responsible for many clinical and subclinical disease conditions especially among the infants.

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2. Materials and Methods

The study aimed at assessing the state of edible insect consumption in the south eastern Nigeria using Anambra State as a case study. Anambra State lies between the latitudes 7°E and 7°9'E and longitudes 6°6’N and 6°17’N while its geographical coordinates are 6°10'0" North, 7° 4' 0" East. It is the eight most populous State in the Federal republic of Nigeria and the second most densely populated State in Nigeria after Lagos State with an estimated density of 1,500 – 2000 persons per square kilometer, covering an area of 4,419sqm with an average of 4,055,048 people in accordance with 2006 census. Thus the State is one of those grossly affected by food shortage problems in Nigeria. The State is made up of 21 local Government Areas. Thus to address the investigation intended in this study, a pretested and validated, structured questionnaire titled “State of Edible Insect Consumption in South eastern Nigeria” was used to elicit information required in this study. Four hundred and twenty respondents drawn from the 21 L.G.As in the State (20 respondents per LGA comprising people within 10 - 25 years, 26 -40 years, 41 -55 years, > 56 years almost equal in the population) were used for the study. The questionnaires were structured in two forms: one where the respondents will tick yes (√) and no (X) and the other where respondents were expected to tick the column which best describe their opinion, in this case the measurement scale for the instrument is a four point Likert-type scale [19] in which Strongly agree scored four points (4 points), Agree three points (3 points), Disagree two points (2 points) and Strongly Disagree one point (1 point). The instruments were administered personally to ensure 100% retrieval and also to encourage the respondents to complete the questionnaires on the basis of personal opinion rather than being influenced by other people’s view. It also provided opportunity for oral interview on respondents. Besides personal administration of the instrument further eliminated delay and time loss often associated with data collection. The raw data collected were organized, tabulated and the first part was analyzed using frequencies and percentages while the second part was analyzed using additional descriptive statistics: means, standard deviation and variance, using cut off mean.

3. Results

The result on the acceptance insect within the various age bracket is presented in Table 1, and this shows that acceptance of insect was generally low among the younger generation (i.e. between 10 - 25 years old) with percentage of 5.71% while insect consumption was highest among people over 56 years old with percentage of 50.24%. Table 2 showed that 32.14% of the respondents do not favour any insect, but of the 67.86% that consume insects, cricket was the most preferred edible insect (25.92%), followed by the winged termite (20%) and the African palm weevil (15.95%). However, termite was the most consumed insects (57%) while rhinocerous beetle was the least consumed (Table 3). Of the factors militating against insect consumption in the region presented in Table 4, lifestyle was highest with percentage of 51.19%, followed by seasonality of the insects with percentage of 44.28%, while in Table 5 malnutrition (36.43%) and poverty (32.09%) got the highest percentage on factors that promote entomophagy. A similar trend was obtained for time period when entomophagy was at its peak during the war (61.90%) as the respondents believed that poverty and malnutrition was high during the war Table 6. The most outstanding reasons why a lot of people will not practice entomophagy is presented in Table 7, while Table 8 shows certain policies that will encourage entomophagy.
## Table 1: Acceptance level of Insect within the Various Age bracket

<table>
<thead>
<tr>
<th>Age Bracket (Years)</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 - 25</td>
<td>24</td>
<td>5.71</td>
</tr>
<tr>
<td>26 – 40</td>
<td>69</td>
<td>16.43</td>
</tr>
<tr>
<td>41 – 55</td>
<td>116</td>
<td>27.62</td>
</tr>
<tr>
<td>&gt; 55</td>
<td>211</td>
<td>50.24</td>
</tr>
</tbody>
</table>

*(Size 5 x 25cm)*

## Table 2: Most Consumed Insects in the Urban and Rural Areas

<table>
<thead>
<tr>
<th>Type of Insects</th>
<th>Rural (%)</th>
<th>Urban (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil</td>
<td>-</td>
<td>38</td>
</tr>
<tr>
<td>Cricket</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Termite</td>
<td>67</td>
<td>56</td>
</tr>
<tr>
<td>APW</td>
<td>28</td>
<td>6</td>
</tr>
<tr>
<td>Grasshopper</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Locust</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rhinocerous beetle</td>
<td>5</td>
<td>-</td>
</tr>
</tbody>
</table>

APW: African Palm weevil (*Rhyncophorus phoenicis*), *(Size 7.5 x 25cm)*

## Table 3: Preference level of Common Edible Insect

<table>
<thead>
<tr>
<th>Type of Insects</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>135</td>
<td>32.14</td>
</tr>
<tr>
<td>Cricket</td>
<td>109</td>
<td>25.95</td>
</tr>
<tr>
<td>Termite</td>
<td>84</td>
<td>20.00</td>
</tr>
<tr>
<td>* APW</td>
<td>67</td>
<td>15.95</td>
</tr>
<tr>
<td>Grasshopper</td>
<td>13</td>
<td>3.09</td>
</tr>
<tr>
<td>Locust</td>
<td>8</td>
<td>1.09</td>
</tr>
<tr>
<td>Rhinocerous beetle</td>
<td>44</td>
<td>0.95</td>
</tr>
</tbody>
</table>

* APW – African Palm weevil, size 8 x 25cm

## Table 4: Limiting Factors to the Practice of Entomophagy
### Table 5: Factors Promoting the Practice of Entomophagy

<table>
<thead>
<tr>
<th>Factors</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malnutrition</td>
<td>153</td>
<td>36.43</td>
</tr>
<tr>
<td>Poverty</td>
<td>139</td>
<td>33.09</td>
</tr>
<tr>
<td>Religion</td>
<td>10</td>
<td>2.38</td>
</tr>
<tr>
<td>Enlightenment</td>
<td>118</td>
<td>28.09</td>
</tr>
</tbody>
</table>

### Table 6: Time Period When Insect was at its Peak

<table>
<thead>
<tr>
<th>Time</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before the Civil War</td>
<td>113</td>
<td>26.90</td>
</tr>
<tr>
<td>During the War</td>
<td>260</td>
<td>61.90</td>
</tr>
<tr>
<td>After the Civil War</td>
<td>46</td>
<td>10.95</td>
</tr>
</tbody>
</table>

### Table 7: Reasons For Not Practicing Entomophagy

<table>
<thead>
<tr>
<th>Insects</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Termites</td>
<td>Associated with breakdown of coffin and corpse buried underground</td>
</tr>
<tr>
<td>Variegated Grasshopper</td>
<td>i. Obnoxious odour associated with evil spirit in some communities</td>
</tr>
<tr>
<td></td>
<td>ii. Unpleasant spots</td>
</tr>
<tr>
<td>African Palm weevil</td>
<td>Appears like a bloated maggot (Housefly larvae)</td>
</tr>
<tr>
<td>Rhinoceros beetle</td>
<td>Some grow in goat manure and so they are unhygienic</td>
</tr>
<tr>
<td>Cricket</td>
<td>i. Unavailability</td>
</tr>
<tr>
<td></td>
<td>ii. Regarded as Food for children</td>
</tr>
</tbody>
</table>

### Table 8: Conditions that will encourage Entomophagy

<table>
<thead>
<tr>
<th>S/N</th>
<th>Items</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
<th>∑X</th>
<th>XDecision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Entomophagy can be promoted in Nigeria by Awareness Campaign</td>
<td>150</td>
<td>113</td>
<td>15</td>
<td>0</td>
<td>969</td>
<td>3.48</td>
</tr>
<tr>
<td>2.</td>
<td>Incorporation of insects into other feeds will boost their consumption</td>
<td>78</td>
<td>66</td>
<td>47</td>
<td>21</td>
<td>625</td>
<td>2.95</td>
</tr>
<tr>
<td>3.</td>
<td>Improving the hygiene during harvesting and sales will make more people to accept insect consumption</td>
<td>93</td>
<td>68</td>
<td>48</td>
<td>37</td>
<td>709</td>
<td>2.56</td>
</tr>
<tr>
<td>4.</td>
<td>Compelling caterers and hoteliers to include insects in their menu will encourage insect eating</td>
<td>37</td>
<td>41</td>
<td>106</td>
<td>64</td>
<td>547</td>
<td>2.02</td>
</tr>
<tr>
<td>5.</td>
<td>Increasing the cost of conventional meat sources through heavy taxation on dealers will help to promote entomophagy</td>
<td>43</td>
<td>49</td>
<td>118</td>
<td>73</td>
<td>677</td>
<td>2.39</td>
</tr>
<tr>
<td>6.</td>
<td>Having many edible insect farms will increase Entomophagy</td>
<td>73</td>
<td>81</td>
<td>25</td>
<td>9</td>
<td>594</td>
<td>3.15</td>
</tr>
<tr>
<td>7.</td>
<td>Processing of insect into more durable forms like waffle, puffed balls and chips will promote its consumption</td>
<td>107</td>
<td>111</td>
<td>0</td>
<td>3</td>
<td>764</td>
<td>3.45</td>
</tr>
</tbody>
</table>
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Discussion

The low level of acceptance of entomophagy among young people corroborates the report of Prof Sareno Stranges, Director of Clinical Epidemiology of Warwick University and Dr. Ngianga, Principal Research Fellow in the Warwick University, who warned that the Western life style spells danger for public health in Nigeria as it has greatly influenced the dietary habit of many people in Africa leading to growing obesity epidemic in Nigeria. Nutrition transition with alarming figures on diet related diseases is already catching up in developing world. The influence of western culture on African feeding habit seems to be more pronounced in urban area than in the rural community. Sharma et al. (1996) and Mennen et al. (2000) reported that the urban lifestyle in Africa is characterized by changes in dietary habits involving an increase in consumption of refined sugars and saturated fat and a reduction in fibre intake as majority depend on imported foods. The rural community still depends on natural foods. African palm weevil is one of those natural foods largely consumed in the rural community. Of the respondents that dwell in the urban centres 38% do not eat any form of insects at all.

Although cricket (Gymnogryllus lucens) was the most preferred insect, the termite was the most consumed both in the rural and the urban centres, this may be attributed to the scarcity of cricket. Termites are collected by women and children during their nuptial flight usually during the rainy season and sold in both urban and rural markets. Crickets are not social insects so it is difficult to collect them in large numbers. Thus on the factors that limit insect consumption, seasonality ranks second (44.28%) behind life style (51.19%). Alamu et al. (2013) reported the influence of season in availability of common insects consumed in Nigeria. According to them, Rhinocerous beetle (Oryctes monoceros) is more common between June –July, Termites (Macrotermes bellicosus) between May to July, Cricket (Gymnogryllus lucens) July to September, variegated grasshopper (Zonocerus variegatus) between November and April, only the APW (Rhyncophorus phoenicis) is available all through the year. This necessitates a study into the ecology and biology of these insects to devise means of mass producing the insects in established farms like other conventional livestock as a strategy to promote their consumption.

Result on the factors that promote entomophagy in Table 5 showed that malnutrition and poverty are the most considered factors. This corroborates the findings on Table 6 that showed that entomophagy was more common during the civil war when poverty and malnutrition was at their peak in this region, so people resorted to insect to curb the menace of malnutrition especially Kwashiokor. However, the after effect of this is that insect eating is still associated with poverty, so the rich dropped the habit for the poor, especially those in rural communities.

Of the policies that will encourage entomophagy presented in Table 8, public awareness campaign, incorporation of insects into highly cherished foods, establishing of insect farms and processing into more desirable forms: waffles, puff balls, advertisement on radio and television as well as serving in social functions by highly placed individuals scored acceptable points. Advertising can have a large impact on adoption of dietary lifestyle as it creates an association between food and good times or positive outcomes.

Conclusion

We conclude that insect flour should be incorporated into foods like noodles, waffles, biscuits and other highly cherished foods to avoid the absurdity of the feeling of eating insects while ensuring increase protein intake in the country at large. Such foods should also be served in Important functions by government and highly placed individuals as a measure to promote entomophagy in the country. Additional research should also be made on nutrient and other requirements of the insects to increase their productivity.

Acknowledgment

We acknowledge the Dean of the Faculty of Agriculture, Prof. Lucy Nwuba who created a conducive environment for research work on insect.

References


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8. Integration of insects into TV/ Radio adverts will promote entomophagy
87 123 12 1 742 3.33 Accepted
9. Serving of insect at the social functions organized by highly placed individuals will promote entomophagy
54 58 33 23 512 3.04 Accepted

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References


Fig 3a: African Palm weevil (*Rhyncophorus phoenicis*) in its Natural Habitat (Rotting Palm Trunk)

Fig 3c: Ready to eat roasted *Rhyncophorus phoenicis* larva
Fig 3b: *Rhyncophorus phoenicis* larva
Oryctes monoceros  Macrotermes bellicosus  Rhyncophorus phoenicus

Fig 2: Cricket (Gymnogryllus lucens)