

## Edible Insects of the Niger Delta Area in Nigeria.

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### Abstract.

The use of insects as food by the people of the Niger Delta in Nigeria is not new. A survey of the insects used by the people of this region revealed a total of twenty species used as food. The species cut across six orders namely: Isoptera, Orthoptera, Coleoptera, Lepidoptera, Hemiptera and Diptera. Order Coleoptera had the highest number of species (6) followed closely by orders Lepidoptera and Orthoptera with 5 species each. The species consumed differed in each of the assessed states however, the most commonly consumed species were termites recording 29% on a pie-chart followed closely by *R. phoenicis* larva with 22%. These insects are sourced from the wild. The different times in the year they are harvested are listed. They are prepared for eating either by boiling, frying or roasting while some are eaten raw. These insects form an integral part of the people of the Niger Delta region of my country as they are consumed by all ages in the population.

**Key words:** Entomophagy, Niger Delta, Nigeria, Wild

### 1. Introduction.

The consumption of insects as food is described by the word Entomophagy. Entomophagy is a common culture in many parts of the world including Africa, Asia, Australia, Central and South America and New Zealand but uncommon and even taboos in some societies (Weiss and Mann (1985); McElroy and Townsend (1989); Sagers and Gray (1991) and Gordon (1998). The entomophagous culture sometimes includes the consumption of arachnids (tarantulas mainly) and myriapods (centipedes mainly).

Entomophagy is found among humans and some other taxonomic groups including birds, reptiles and amphibians. Entomophagous species also spread across the insect orders notably the Dictyoptera (mantids); Hemiptera (Reduviids); Hymenoptera (Apocrita). Some of the more popular insects eaten around the world are found in Orders Orthoptera (crickets; *Brachytripes membranaceus* (Drury); Grasshoppers e.g. *Zonocerus variegates* (Linn.), Locust e.g. *Locusta migratoria migratoriodes* ((R. and F.), (the migratory locust), *Nomadacris septemfasciata* (Serville) (the red locust) and *Schistocerca gregaria* (Forskål) (the desert locust); Hymenoptera e.g. *Apis mellifera* (Linn.); Isoptera e.g. *Macrotermes bellicosus* (Smeathman); Lepidoptera e.g. the mopane worm-caterpillar of *Gonimbrasia belina* (Westwood) (Forte, 2004); Coleoptera e.g. *Rhynchophorus phoenicis* (Fabr.), *Eretes sticticus* (Linn.), etc. The culture of insect farming has not yet been developed and most edible insects are harvested from the wild (DeFoliart 1995) e.g. the giant cricket, *Brachytripes* (= *Brachytripes*) *membranaceus*, which is a common pest of garden roots, is dug up, roasted, and eaten as a relish (Harris 1940).

Insects are rich in protein, vitamins and mineral salts. They are a good source of B-vitamins and iron (Van Huis, 2003). Fromme (2005) reported that insects often contained more protein, fats and carbohydrates than the equivalent of beef or fish. They also contain a higher value of energy than soybeans, maize, beef, fish, lentils and other beans (Fromme, 2005). A United Nations (FAO, 2004) report stated that caterpillars of many species are rich in potassium, calcium, magnesium, zinc and iron as well as B-vitamins. MacEvily (2000) reported that in some ethnic groups, insects provide 5 – 10 % of annual protein intake as well as fats, calories, vitamins and minerals.

Consumption of insects as food in Nigeria is not new (DeFoliart, 2002). Ene (1963) noted that many educated and urbanized West Africans were either ignorant or reluctant to admit the existence of certain indigenous customs such as the consumption of insects. By means of a questionnaire survey, Ene (1963) showed that a high percentage of West Africans had some knowledge of entomophagy among the population. The bulk of respondents to the questionnaire was from Nigeria, Ghana and Cameroun undergraduate students of Agriculture, Medicine and Zoology and included a few Nigerian lecturers and their wives. In another report, Ivbijaro (1990), however, expressed delight that information was being gathered on food insects, which, in Nigeria, were important sources of high food protein among rural dwellers and a growing delicacy to many city dwellers.

Fasoranti and Ajiboye (1993) and Banjo *et al.*, (2006) studied insect consumption by humans in western parts of Nigeria. Banjo *et al.*, (2006) reported that fourteen insect species were consumed as food in south western Nigeria. They include *Macrotermes bellicosus*, (termites: Isoptera); *Brachytripes spp.*, *Zonocerus variegates*, *Cytacanthacris naeruginosus unicolor* (Uvarow), (Orthoptera); *Analeptes triafasciata*, *Oryctes boas* (Fabr.), *Rhynchophorus phoenicis* (Fabr.) (Coleoptera); *Anaphes infracta* (Walsingham), *A. Recticulata* (Walker), *A. Venata* (Butler) and *Cirina forda* (Westwood) (Lepidoptera). These insects are consumed either in one or more of the stages of development in the life history of an insect (egg, larva, pupa and adult). Grubs of the raphia palm

weevil, *Rhyncophorus phoenicis* (Fabr.) are fried and eaten in several parts of western Nigeria, in Edo, Delta and Anambra states. Active marketing of the fried grubs takes place in these states. It can be seen hawked along major roads and markets in Edo and Delta States of Nigeria (Ekrakene and Igeleke, 2007). Adult termites are usually caught while on their nuptial flight or collected from the ground after they had shed their wings and then roasted and eaten. Reports revealed that the variegated grasshopper (*Zonocerus variegatus*) which has a large dry season population in south western Nigeria is eaten in Akoko area of Ondo state (Banjo *et al.*, 2006).

The Niger Delta region in Nigeria spans across Abia, Akwa Ibom, Bayelsa, Cross Rivers, Delta, Edo, Imo, Ondo and Rivers states. This area is known as the producer of Nigeria's strongest foreign earner- oil. The area is rich in flora and fauna. The main occupation of the local communities is fishing and farming. The people inhabiting this area have different languages, tradition and culture. Entomophagy is yet an untapped area in this region and has potentials of reducing poverty and malnourishment among the people. This work is thus aimed at

- Documenting the edible insect species used as food by the people of the Niger Delta area of Nigeria and how this practice cuts across the different ages in the population.
- Document their availability, source material(s) and mode of preparation.

## 2. Materials and methods

A questionnaire was developed, structured to get information of insects used as food in the Niger Delta region, Nigeria. The questionnaires were distributed across the states of the Niger Delta region of Nigeria; Abia, Akwa Ibom, Bayelsa, Cross Rivers, Delta, Edo, Ondo and River states. The respondents' ages were at least 10 or less while ages 70 years or above were last in the categories in each of the communities assessed. The ages were ranged: 0-14, 15-30, 31-44, 45-60 and 60 above. In instances when they were illiterate, interviews were conducted using the questions posed in the questionnaire. Different ages were accessed to ascertain how entomophagy as a practice spreads across the population. Also from the response, a detailed list of the insect species consumed as food in the region will be documented. Percentages were calculated to show the differences in preference for the various species listed and how the practice spreads among the ages accessed while a bar chart was used to represent how the various insects are consumed across the nine States.

## 3. Results.

### 3.1 Insect species used as food

Information from the questionnaire survey reveals that a total of twenty species of insect are eaten as food by indigenes of the nine states in the Delta region of Nigeria. The species are from six orders namely; Isoptera, Orthoptera, Coleoptera, Lepidoptera, Hemiptera, Dictyoptera and Diptera. The various stages in their life cycle in which the individual insects are consumed were documented and are shown in Table 1a. The highest number of species, six (6) came from the Coleoptera while the Lepidoptera with five (5) and Orthoptera with four (4) constitute the second and third grade. Orders Hemiptera had two (2) species while Dictyoptera and Diptera had the least with each recording one (1) species each. Details on the taxonomic position as well as the vernacular names for most of the insect species that are consumed by members of the Niger Delta are also shown.

The respondents also yielded information on the months of the year when the listed insects were available. Some of the insects e.g *R. Phoenicis*, *Zonocerus variegates* e.t.c are available all year round while others are not. The responses also provided information on source materials from which the insects were harvested which included crops and food items (Table 1b).

The percentages recorded for each of the species in the entire region are represented in a bar chart shown in Fig 1. Termites, especially the winged reproductives featured in all the States and had the highest percentage of respondent (28.51%) indicating interest in its consumption. This was followed by *R. phoenicis* (the palm weevil) especially its larval stage with 23.69% and then cricket and grasshopper which both recorded 18.07% and 10.76% .

Termites are harvested during the annual nuptial flight as reported by Banjo *et al.* (2006) in south western Nigeria, the peak period of their population. Tobih (2011) reported a peak period for the yam beetle (*Heteroligus spp*) that is synchronized with the time of farming and harvesting of yam tubers in Delta State and this time was the same with that indicated for its availability by the respondents.

The materials from which the insects are harvested showed clearly and support Lale (2010) and Mariod *et al.* (2011) report that insects co-exist with us and form a part of the food chain. Mariod *et al.* (2011) reported that the melon and sorghum bugs are commonly eaten in some Sudanese communities as a source of lipid and protein.

The percentage numbers for each of the species in the nine states are shown in fig 2. The highest percentage for the use of the Palm weevil (*R. phoenicis*) as food was from Bayelsa with 16.95%. In Bayelsa, however Bees

recorded the highest percentage for individual species consumed. A total of eight species were indicated as consumed by respondents in this state. The species include lepidopterous larvae, crickets, termites, yam beetle, palm weevil, bee, locust and cockroach, consumed unintentionally.

In Delta state, the highest percentage was for *Heteroligus meles* (yam beetle) followed by *Brachytrypes membranaceus* (cricket) with 40.00% and 22.22% respectively. A total of nine species were recorded.

Abia state recorded the highest percentage for Termite and Grasshopper consumption with percentages 17.46% and 36.57% respectively. It was only from Abia that the housefly maggots were listed as consumed unintentionally. Nine species were listed.

The highest percentage for consumption of larvae of Lepidopteran species (33.33%) was from Imo state. The consumption of praying mantids was solely in this state and it was also in this state that the unintentional consumption of the rice weevil was recorded.

Ondo state recorded the highest percentages for three species; bean weevil (62.56%), Locust (38.46%) and Rhinoceros beetle (37.93%). Ten species were recorded as used as food by the people of Ondo state.

One of the interesting findings of this study is the acknowledged involuntary consumption of *Musca domestica* by the respondents in Abia State in prepared Ogiri used as a local spice. This is actually an honest response as many people do not usually succeed in cleaning dried fish indigenes except that “the maggot in the fish is meat”. However, the major result of this questionnaire survey carried out in the Niger Delta region of Nigeria is the revelation of extensive entomophagy among the citizens of this region. This region is part of West African region in which Ene (1963) had reported significant entomophagy. Ethnic and cultural differences with regard to degree of entomophagy and the species of insects eaten were recorded. The gaps observed in some of the states (e.g. Bayelsa) shows that some of the listed insects are absent from such states. DeFoliart (2002) recorded similar differences in his bibliographic account on the human use of insects as a food resource among the people of the countries in the bulge of West Africa (on the southern coast from Nigeria westward) and to the east Chad, Sudan, Ethiopia, Somalia. Similar results were recorded by van Huis (2003) with the edible insects of the sub Saharan region of Africa. In our case the differences are likely to have arisen from the availability of species in different parts of the region. For instance, table 4.2 shows that more respondent eat crickets in State like Delta which have more land in which crickets can grow than in Bayelsa and Rivers with more water and swamp than land. It is remarkable that more respondents in Akwa Ibom, Delta and Ondo than in Edo and Imo report eating locust. The implied occurrence of locusts in these States is interesting. Locusts are, normally, inhabitants of drier grassland regions than the vegetation of these three states. The feed material on which they harvested locust was cassava and this crop is widely cultivated in this area.

### 3.2 Entomophagy among the various age brackets assessed.

Entomophagy as practiced among the various ages in the individuals sampled are shown in Table 2. The percentages of ‘yes’ and ‘no’ among the respondent in the region from the various age groups assessed are shown in Fig 4.3. Most respondent below the age of 60 acknowledged the practice of entomophagy, but among those above 60 years of age, the consumption of insect as food is 50/50.

## 4.0 DISCUSSION

Entomophagy is welcomed among the people of the Niger Delta region; it is not new and it cuts across all ages. This is evidenced by the responses obtained from the indigenes of the region where a total of nineteen different species were documented as used as food. Ethnic and cultural differences as reported by DeFoliart (2002), was observed for the various states surveyed. Akwa Ibom, Cross Rivers and Ondo States recorded ten different species used as food; Delta, Abia, Imo recorded nine while Rivers, Bayelsa and Edo states recorded eight, seven and six species respectively. Termite (*Macrotermes sp.*) featured in all states; recording the highest percentage for individuals indicating interest in its consumption in 8 of the accessed states (Table 1). However, in Delta state, Cricket (*B. membranaceus*) topped the list followed by the Palm weevil larva (*R. phoenicis*) with termite following. Roasting, boiling and frying in oil were the various methods recorded for preparing the insects for consumption however some were recorded as taken raw (e.g. larva of *R. phoenicis*, winged reproductives of *Macrotermes sp.*). Unintentional entomophagy was recorded and the species listed included the bean weevil, rice weevil, housefly larva/maggots and the egg plant larva.

Availability of fourteen of the insects as indicated by the responses obtained showed that majority (eleven species of the fourteen) are harvested all year round (see Table 1b). However, two of the species (crickets and locust) have peak periods synchronised with time of farming and growth/harvesting of the plant material on which they are obtained. Two of the species are harvested at specific times of the year: termites during the annual nuptial flight (as reported by Banjo *et al.*, (2006) in south western Nigeria) and the yam beetle (*Heteroligus spp*) during harvesting of yam tubers (as reported by Tobih, 2011). The materials from which the

insects are harvested showed clearly and support Lale (2010) report that insects co-exist with us and form a part of the food chain.

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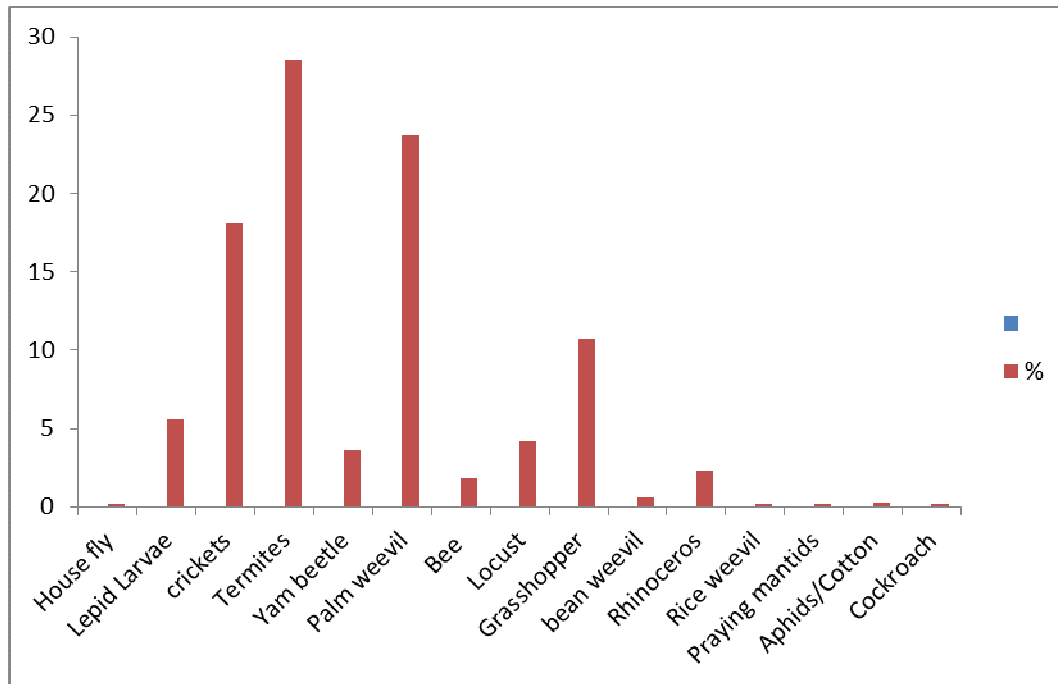
**Table 1a: List of insects consumed by people of the Niger Delta region of Nigeria showing the life stage utilized as food.**

	<b>Insect species</b>	<b>Common name</b>	<b>Local names</b>	<b>Order of insect</b>	<b>Stages consumed</b>
1	<i>Macrotermes sp.</i>	Termites	'Akube/'Aku' (Igbo) (winged form), 'Mkpu/'Akrika (Igbo) (soldier form), 'Ijere, 'Nsusu' (Ibo), 'Ititang' (Eik), 'Irikhun (Bini)', Ndube' (winged form), 'Ebu'/'Mbuwa (Igbo)' (Queen).	Isoptera	Adults: queen, soldiers, winged reproductives, workers
2	<i>Brachytrypes membranaceus</i>	Crickets	'Ntee'/'Mbuwa' (Ibo), 'Mbuzo' /Ntekru' (Igbo), 'Zizin/Ngeru /Esinah/Idiang', 'Asen', 'Deinasen-sen (Efik)', Oro (Isoko)	Orthoptera	Adults
3	Species uncertain	Locust	'Unu-unu', 'Atatat', 'Igurube' (Igbo)	Orthoptera	Adults
4	<i>Zonocerus sp.</i>	Grasshopper	'Abaka' (Isoko),	Orthoptera	Adults
5		Praying mantids	'Ngelengele' (Igbo)	Orthoptera	Adults
6	<i>Rhynchophorus phoenicis</i>	Palm weevil/ Edible worm	'Orhu', 'Okhin' (Bini), 'Nten', 'Eruru' or 'Erungwo' or 'Nza' (Igbo), 'odo', 'ikolo', 'edon' (larval form), 'Kpakpajioko' (Isoko), 'Akparakpa' (Igbo), (Adult form).	Coleoptera	Larva, Pupa and Adults
7	<i>Rhinoceros oryctes</i>	Rhinoceros	'Ogbenah', 'Ekod- nnok' (Efik)	Coleoptera	Larva, Pupa and Adults
8	<i>Heteroligus meles</i>	Yam beetle	'ebe' (Igbo), 'ofe' (Isoko)	Coleoptera	Larva, Pupa and Adults
9	<i>Sitophilus oryzae</i>	Rice weevil (unintentional)	'Utu=urosu', 'Nchonu' (Igbo)	Coleoptera	Larva, Pupa and Adults
10	<i>Callosobruchus maculatus</i>	Bean beetle (unintentional)	'efen idiom', 'ikoli'	Coleoptera	Larva, Pupa and Adults
11	<i>Dermestes maculatus</i>	Fish/hides beetle		Coleoptera	Larva, Pupa and Adults
12	<i>Daraba (Sceloides) laisalis</i>	Egg fruit borers	Utu-Agnara (Igbo)	Lepidoptera	Larva, Pupa
13	<i>Gonimbrasia belina</i>	Mopane worm	'Nwa-igu', 'Mbele' (Igbo)	Lepidoptera	Larva, Pupa
14	Species uncertain	species uncertain	'O'lolo' (Igbo)	Lepidoptera	Larva, Pupa
15	Species uncertain	species uncertain	'Avuvu' (Igbo)	Lepidoptera	Larva, Pupa
16	Species uncertain	species uncertain	'Dinmo abalabala'/'abalabala' (Igbo)	Lepidoptera	Larva, Pupa
17	<i>Apis mellifera</i>	Bees	'Eyongona', 'Purow', Nkukumbepoyoriyo (Efik)'	Hymenoptera	Larva, Pupa and Adults
18	species uncertain	Cotton stainer		Hemiptera	Adults
19	species uncertain	Aphids		Hemiptera	Adults
20	<i>Musca domestica</i>	House flies		Diptera	Larva/maggot

**Table 1b: Availability of insects and the Source material from which they are harvested: either from the wild or from food materials**

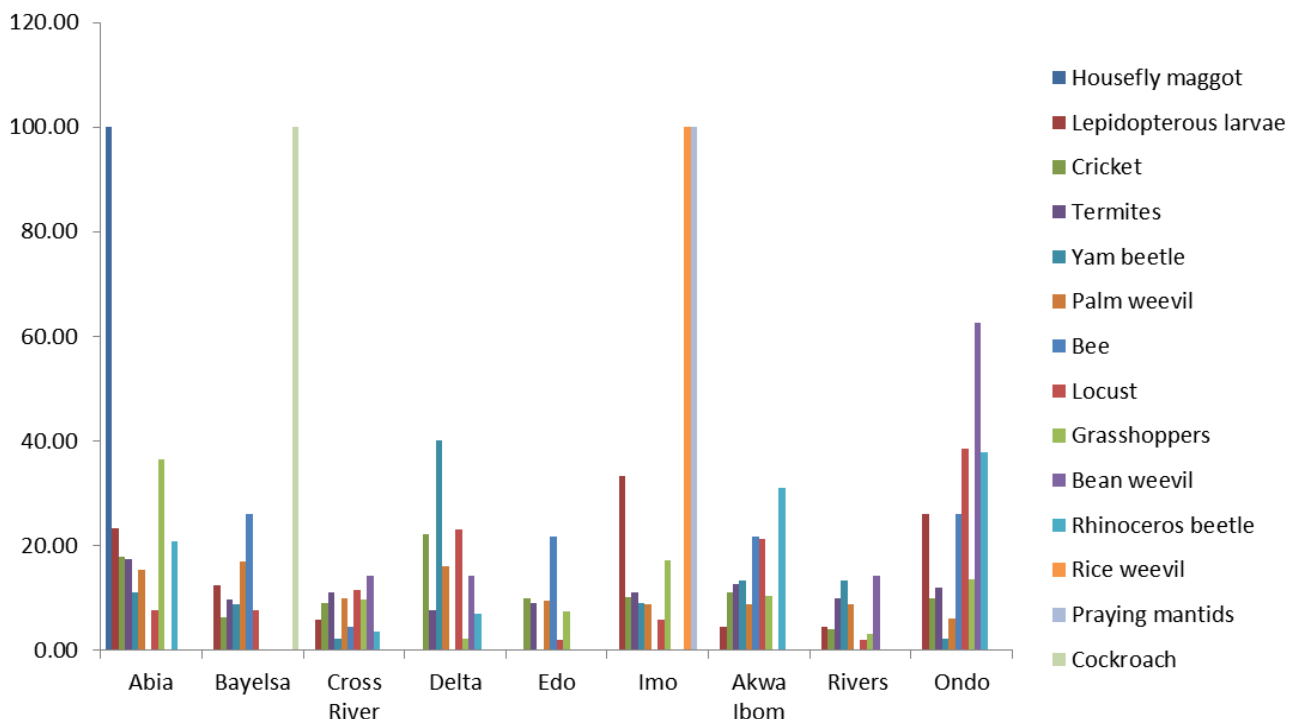
S/N	Insect species	Source material	Mode of preparation/consumption	Availability
1	Termite	Wood, decaying material and ground	Roasting, frying in oil; eaten raw.	Occasionally (March/mid April - May and in September)
2	<i>Rhynchophorus phoenicis</i>	Palm trees	Roasting, frying in oil, eaten raw	All year round
3	Grasshopper ( <i>Zonocerus variegatus</i> )	Cassava leaf	Roasting	All year round
4	Bee	Flower	frying in oil	All year round
5	Cricket	Yam, root of crops	Roasting	March – June
6	Cockroach	food items, household properties and Faeces	Prepared with food	All year round
7	Locust	Cassava leaf and other vegetables	frying in oil	All year round/ occasionally
8	Rhinoceros	Tree tissues/palm wine	Roasting	All year round
9	Yam beetle	Yam tubers	Roasting	September-October
10	Maggots (larvae of flies)	Unintentionally included in 'Ogiri' during preparation	*	All year round
11	Rice weevil	Rice grains; Unintentionally included in rice meal	Boiled with rice	All year round
12	Bean beetle.	Been seeds; Unintentionally included in bean meal	Boiled with beans	All year round
13	Praying mantids	Plant leaf	Not mentioned	Occasionally
14	'Igu'	Bread fruit	Frying in oil	

\* 'Ogiri' seeds are put out to dry and after a certain stage; they are packed and covered in appropriate containers. Maggots that develop in these are heated (in another drying process) and pounded together. Ogiri is obtained from the seeds of the Castor oil plant.



**Fig 1:** Showing how respondents indicated their interest in consumption of the various insect species listed.



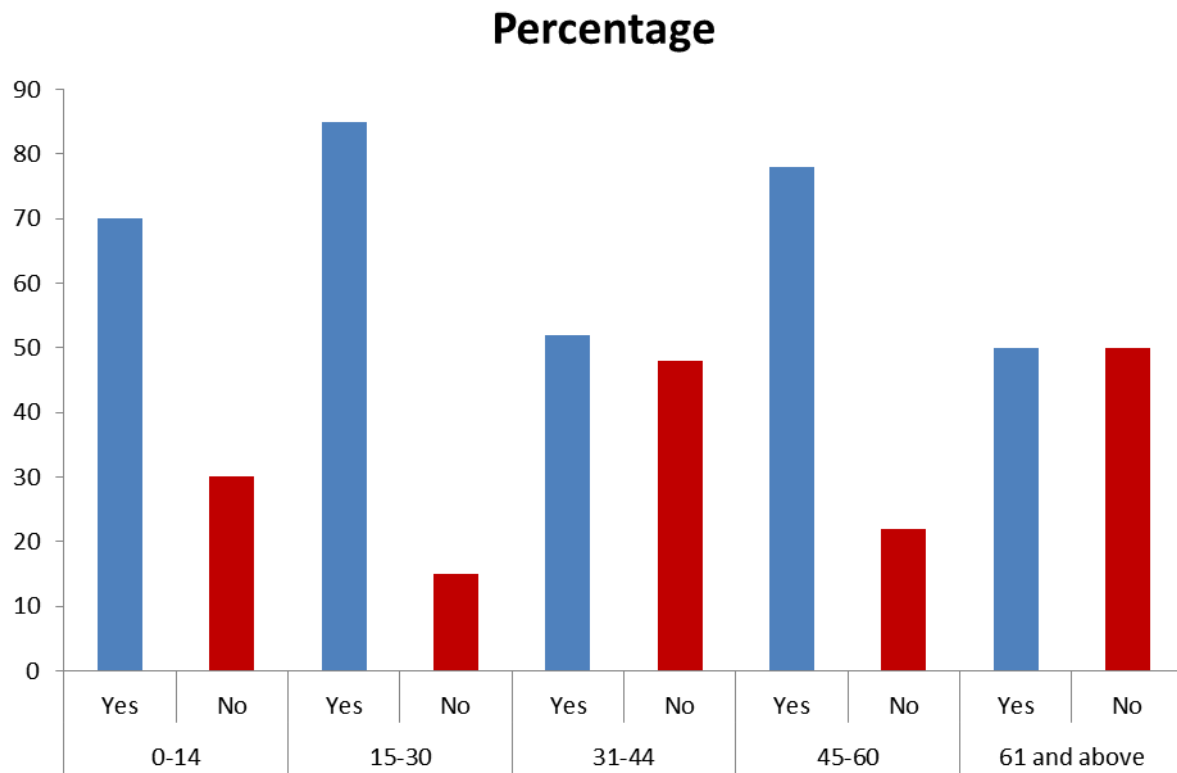


**Fig. 2:** Percentage number of respondents that indicated consumption of the listed insects from the States assessed

**Table 2:** Entomophagy among the various age brackets (in percentages)

Age Bracket	0 - 14		15 -30		31 -44		45 - 60		Above 60	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Abia	67	33	93	07	90	10	100	00	75	25
Imo	83	17	96	4	87	13	62	38	67	33
Cross Rivers	100	00	79	21	95	05	100	00	33	67
Delta	100	00	69	31	81	19	83	17	75	25
Ondo	25	75	77	23	66	34	63	37	14	86
Akwa Ibom	50	50	93	07	87	13	78	22	67	33
Rivers	100	00	64	36	87	13	100	00	50	50
Edo	100	00	71	29	81	19	80	20	50	50





**Fig 3: Entomophagy as it spreads across the ages of the respondents.**