

# Perception of Agrochemical Use and Organic Farming in Makurdi, Benue State

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**Abstract** - In many parts of the world, the market for food from organic farms is growing, especially as consumers have become more aware of food-safety issues, environmental preservation and wildlife protection. The aim of this study was therefore to evaluate farmers and consumer perception of organic farming and issues associated with agrochemical use in Makurdi, Benue State of Nigeria. Structured interview schedule containing both close and open ended questions was administered to 150 respondents (farmers and consumers) consisting of 94 males and 56 females. Data were analyzed using simple descriptive statistical instruments of frequency counts and percentages. Chi-squared test was employed as test of significance. 56% of respondents had a positive perception towards organic farming while 38% had a negative perception and 6% were undecided. Even though 58.67% agree that fertilizers and pesticides are effective, with 40% disagreeing and 1.33% undecided, 90.66% agreed that these agrochemicals can damage the environment, 7.34% disagreed and 2% were undecided. The study showed that organic farming and organic food are cheaper than conventional (or industrial) where 79.33 and 58.67% agreed, 18.00 and 30.67% disagreed and 2.67 and 10.66% were undecided, respectively. There were significant relationships ( $P \leq 0.05$ ) between respondents' gender, age, educational background, respondent type and perception of organic farming and agrochemical use.

**Keywords** - Agrochemical Use; Organic Farming; Perception

## I. INTRODUCTION

No group of chemicals is used as considerably as agrochemicals in the arsenal of man's perennial battle with competitors for food, fibre, health and welfare. Yet no other class of chemical technologies is more affected by the rift between common experience and perceived threat of unfavourable effect [1]. For more than three decades, studies of public perceptions of risks have persistently scored pesticide use among "risky activities" [2].

Possible cancer hazards have been the most debated health issue related to pesticide use for more than 50 years. The public perceives pesticides in food are a serious cancer risk in spite of epidemiologic studies that indicate the major preventable risk factors are smoking, dietary imbalances, endogenous hormones, and inflammation (chronic infections) [3]. Ecological correlations, indirect exposure estimates, small sample size and lack of control are confounding factors. In spite of the considerable research efforts, including many lifelong carcinogenicity tests of pesticides, none is listed as a human carcinogen [4]. Given dose and exposure time considerations, that situation is unlikely to change. This is remarkable given the lay perception of the link between pesticide toxicology and carcinogenicity [2].

The term "organic farming" refers to a cultivation system devoid of any synthetic aid, whether that is in the form of genetic modification or applied synthetic fertilizers and pesticides. It is defined as the use of "farming practices that may be agro-ecological, sustainable, or ecological; utilizing natural (non-synthetic) nutrient-cycling processes; excluding or rarely using synthetic pesticides; and sustaining or regenerating soil quality" [5]. The goal of organic farming is to "enhance soil fertility, prevent soil erosion, promote and enhance biological diversity, and minimize the risk to human and animal health and natural resources" [6]. Organic farming has become one of the most favoured options for long-term sustainability and production of safe, highly nutritious food. Organic farming is practiced in over 100 countries worldwide, and, in 2012, there were over 26 million hectares managed under organic farming techniques. Of this total, Australia had the biggest share (43.3%) with its 11.3 million hectares; Argentina was a distant second with 2.8 million hectares [7].

While the organic food movement is alive and well in the United States and the developed countries, there are those who argue that it can never be more than a niche market. This is because yields are lower than in conventional farming, so producing the bulk of the globe's diet will require agricultural techniques that use fertilizers and other agrochemicals. The researchers think that irrespective of the size of the gap in yield, there can still be good reasons for choosing organic farming. These may include reducing the burden on the local environment, the exhaustibility of natural resources and biodiversity, but also ethical reasons relating to animal welfare and genetically modified organisms. Another reason could be the relative scarcity or affordability of artificial fertilizers and crop protection agents. Organic agriculture can also be valuable as an experimental site for testing more sustainable conventional farming techniques.

According to [8], Nigeria appears to be at the early stage of the development of organic agriculture, with very few farms or projects claiming to be organic and even fewer operating a recognised form of certified organic agriculture [9]. An Internet search for organic agriculture developments in Nigeria reveals a few entries. The organisation, World-Wide Opportunities on Organic Farms (WWOOF), which offers volunteers the chance to gain short term experience on organic farms, lists four opportunities in Nigeria: an organic farm which sells most of its farm crops, while some goes into humanitarian and personal

consumption; a 30-hectare farm growing fruits, food crops and livestock production organically; the All Nigeria Organic Farmers Association, a co-operative formed to assist local farmers in learning organic systems; and the Food Basket of Nigeria, producing various arable and cash crops in small holdings mainly using organic means.

In many parts of the world, the market for food from organic farms is growing, especially as consumers have become more aware of food-safety issues, environmental preservation and wildlife protection. Despite this, not much attempt has been made in this part of the world, to evaluate perceptions of farmers and consumers towards organic farming. Though necessarily based on incomplete and unverified (or unreliable) information, perception is equated to reality for most practical purposes and guides human behaviour in general (BusinessDictionary.com). This study is important because public perceptions of these farming 'tools' have great potential in shaping future agricultural policies. The study gauges public perception of issues associated with conventional and alternative farming systems.

The primary objectives of this research were to:

- i. Evaluate farmers and consumers perception of production and consumption of organic farming food
- ii. Elicit farmers and consumers perception of agrochemical use on food crops and environment
- iii. Establish if there are significant relationships between gender, age, educational background, type of respondent and perception of agrochemical use and organic farming

## II. METHODOLOGY

### A. Study Area

This study was conducted in Makurdi, the capital city of Benue State. Located between latitude 7°43'50"N and longitude 8°32'10"E, Makurdi lies on the banks of the Benue River, a major tributary of the Niger River. It is also located on the main narrow gauge railway line running north from Port Harcourt, although this is not currently functioning. A very warm town with temperatures ranging from 21°C to 35°C and a southern Guinea Savannah vegetation, the annual rainfall averages 1,200 - 1,500mm. These factors coupled with very fertile soil and high relative humidity, contribute to why Benue state is referred to as the Food Basket of the Nation. Agriculture is the predominant occupation of the Benue people, and their major crops include yam, soy beans, sesame, cassava, maize, oil palm, sweet potato, plantain, oranges and mangoes.

### B. Sampling Technique

The population involved in this study consists of farmers and consumers in Makurdi. Random sampling technique was used to locate farmers in the Beetseh and Tse - Anyamkor villages both in Makurdi local government area, and consumers in the University of Agriculture community in Makurdi.

### C. Data Collection and Analysis

Structured interview schedule consisting of both open and close ended questions was employed in generating data from the primary sources (respondents). Most of the survey items were close ended. For example, survey respondents were asked to choose between a bag of fertilizer and an equivalent mass of organic manure, conventional and organic farming in terms of comparative yield, compare cost of products and cost of farming system and state sources of supply of agrochemicals. Open ended questions included: Listing crops on which organic manure is used and enumerating problems associated with use of agrochemicals.

The objectives of this research were investigated in part by asking respondents to react to these statements:

- the yields are higher in organic farming than in conventional farming.
- organic farming is more expensive than conventional farming.
- conventionally grown food is cheaper than organic food.
- list perceived risks associated with agrochemicals.
- enumerate some benefits derivable from use of agrochemicals.
- name three crops for which you use organic manure.

Before answering survey questions, respondents were armed with the same baseline information on basic definitions of organic farming and agrochemicals. Organic farming was simply defined as vegetable and livestock production using natural sources of nutrients (such as compost, crop residues, manure) and natural methods of crop protection and weed control, instead of using synthetic or inorganic fertilizers. An agrochemical was defined as a chemical such as fertilizer, hormone, pesticide or soil treatment that improves the production of crops.

Data generated were analyzed using descriptive statistical tools of frequency count and percentages. An inferential statistical tool, Chi-square test was employed to determine if there is any correlation or relationship between age, gender, educational background, respondent type and perception of organic farming. The relationships of the same parameters to agrochemical use were also tested.

### III. RESULTS AND DISCUSSION

Demographic details of respondents, which bear relevance to perception, such as gender, age, educational background and respondent type (whether respondent is a consumer or farmer) are displayed in Table I. Analysis of the results revealed that majority of respondents (80.7%) were between ages 21-30. This might imply that in the sample area, numerous younger people are engaged in farming. This is not farfetched as unemployment is driving many youths 'back to land'. In agreement with [8], who reported that most farmers in their study had formal education, 91.3% of respondents in this study had post-primary education. This observation not only provided assurance that the concepts were well understood, but implies that the communities will have high adoption rate of innovations related to organic farming and other agricultural policies.

TABLE I DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS (N = 150)

VARIABLES	FREQUENCY	PERCENTAGE
Gender		
Female	56	37.3
Male	94	62.6
Age (yrs)		
41 - 50	06	4.0
31 - 40	20	13.3
21 - 30	121	80.7
< 20	03	2.0
Educational background		
Primary education	13	8.7
Secondary education	54	36.0
Tertiary education	83	55.3
Type of respondent		
Farmer	78	52.0
Consumer	72	48.0

#### A. Perception of Organic Farming

Perception is the way in which something is regarded, understood or interpreted (Oxford Dictionary). It is a particular way of understanding or thinking about something (Macmillan Dictionary). Perception of respondents to organic farming was assessed by asking them to react to negative and positive statements. Their responses were recorded on a five-point Likert scale of SA (Strongly Agreed), A (Agreed), U (Undecided), D (Disagreed), SD (Strongly Disagreed), which were scored 5, 4, 3, 2, and 1, respectively, for positive statements, and 1, 2, 3, 4, and 5, respectively, for negative statements. Individual scores were collated and classified. The lowest score was 25, highest 118 and mean score was 69. Respondents with a score less than 70 were categorised as having negative perception about organic farming, while those who scored 70 and above were categorised as having positive perception of organic farming.

Generally speaking, 56% of respondents had positive perception of organic farming, 38 % negative and 6% were indifferent. Of this 56%, 36.2% of the male respondents had positive perception of organic farming and organic food as against 89.3% females. This is similar to the finding of [10] that women have higher risk perceptions than men for food safety hazards in the United States of America. All respondents within the age group 41-50 and 75% of 31-40 had positive perception of organic farming while only 52% of the 21-30 age group were positively disposed to it. 86.7% of respondents with tertiary education, 34.4% with secondary education background and all with primary education had positive perception of organic farming. The last group were all farmers and their response was attributed to their inability to source and afford agrochemicals, so they settled for organic farming not by choice, but as a last resort. Taking the results of this study alongside the findings of [11] and [12] that the level of utilization of organic farming practices is low in Benue and Nasarawa States respectively, it is worrisome that farmers are high in knowledge and positive perception, but low in practice.

Considering respondent type, 26.9% of farmers as against 87.5% consumers had positive perception of organic farming. Globally speaking, the yield of crops from organic farming is on average 20% lower than crops from conventional farming. In countries where conventional agriculture is well-developed, such as the Netherlands and Denmark, this figure is higher, i.e. 26% [7]. Farmers perception in this study may therefore be an indication that farmers are more interested in higher yields in a bid to maximize profit and minimize cost.

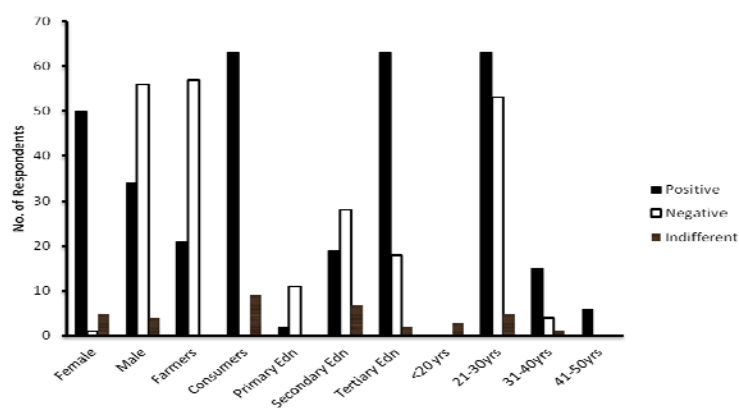


Fig. 1 Perception of organic farming

Consumers however, are more concerned about their health and their wallet since it was also revealed in this study that food from organic farms were cheaper (79.3% respondents agreed to this). This cheaper cost may be due to the higher aesthetic value and bigger sizes compared with products from conventional farms. This finding is contrary to the FAO report that certified organic products are generally more expensive than their conventional counterparts. Even the product of non-certified organic systems is usually consumed by households or sold locally (e.g. urban and village markets) at the same price as their conventional counterparts [13]. Crops on which farmers use organic manure include okra, fluted pumpkin leaves, tomatoes, pepper, pineapples and garden eggs.

#### B. Perception of Agrochemical Use

A total of 58.67% of the respondents in this study had positive perception of agrochemical use, 40% negative while 1.33% were undecided. Of this total, 77% males as against 26.7% females had positive perception of agrochemical use. Reference [14] earlier reported that women appeared to perceive pesticide use in food crops as a greater food safety risk than was perceived by men. 50% of respondents aged 41-50, 90% of those aged 31-40 and 60% of the 21-30 age group had positive perception of agrochemicals. 57.8% of the respondents with tertiary education, 55.6% of those with secondary and 77% of those with primary education had positive perception of agrochemical use. The latter group of respondents were all farmers, which informs their high perception. The obvious reason for this is that for the average farmer, the higher the yield from cultivated land the better. For respondent type, the results of this study show that all of the farmers had positive perception of agrochemical use and only 13.9% of the consumers had this positive disposition. Interestingly, 90.66% of all respondents agree that agrochemicals, when not used as directed can damage the environment. Some of the adverse effects listed by respondents are shown in Table II.

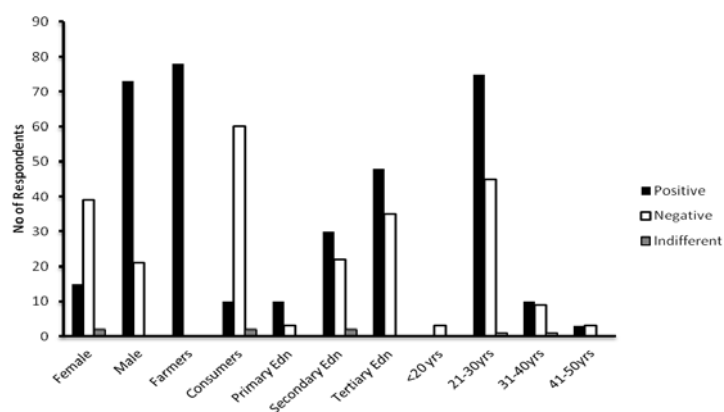


Fig. 2 Perception of agrochemical use

TABLE II ADVERSE EFFECTS OF AGROCHEMICAL USE

Adverse effect	*Frequency	Percentage
Effects microorganisms in soil	69	23.1
Increases soil acidity	53	17.7
Pollutes the environment	68	22.7
Hazardous to health of user	81	27.2
Kills insects that pollinate	1	0.3
Damages plants when in contact	27	9.0
Total	299	100

\*Total is greater than the sample size as multiple entries were allowed for each respondent

### C. Chi-Squared Tests

Chi-squared tests were run on the data generated from this study. Results of the test indicated that there was a significant relationship ( $P = 0.00$ ) between respondents' gender, age, educational background, respondent type and perception of organic farming. Details of Chi-squared test result for gender and perception of organic farming are displayed on Table III. The other parameters of age, educational background and respondent type all had  $P=0.00$ , indicating significant relationships.

TABLE III CHI-SQUARED TEST OF GENDER AND PERCEPTION OF ORGANIC FARMING

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-square	49.798	2	.000
Likelihood Ratio	62.396	2	.000
Linear-by-Linear Association	22.109	1	.000
N of valid Cases	150		

Chi-squared test results for age and perception of agrochemical use are displayed on Table IV, representative of the other parameters of gender, educational background and respondent type all of which had  $P=0.00$ .

TABLE IV CHI-SQUARED TEST OF AGE AND PERCEPTION OF AGROCHEMICAL USE

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-square	26.229	6	.000
Likelihood Ratio	35.997	6	.000
Linear-by-Linear Association	9.843	1	.002
N of valid Cases	150		

### IV. CONCLUSION

The findings of this study revealed positive perception of organic farming and agrochemical use with significant relationships between gender, age, educational background and respondent type (that is whether respondent is a farmer or consumer). This indicates that the communities will have high adoption rate of innovations related to organic farming and other agricultural policies. The snag, however, is that recent studies in the same geopolitical zone (North central) report low practice of organic farming. This gap between knowledge or perception and practice can be bridged by better understanding of the system and government provision of enabling environments (e.g. provision of credit facilities, training on technicalities) to farmers. The results of this study also provide empirical data for policy information towards mitigation of climate change in Nigeria.

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