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FACTORS ASSOCIATED WITH RURAL YOUTHS' INVOLVEMENT IN NONFARM ACTIVITIES IN KEBBI STATE, NIGERIA

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ABSTRACT
Rural youths are faced with the difficulty of maintaining their livelihoods despite the availability of vast farming resources. Due to insecurity in some parts of the study area, the able-bodied youth have deserted the farming areas looking for survival in non-farming activities. Some who are into farming activities are still engaged in nonfarm activities as coping strategies during the off-season. The study assessed the extent of rural youth involvement in nonfarm activities. Specifically, it described the socioeconomic characteristics of the respondents, examined the nonfarm activities in which they are involved, their level of involvement, and examined respondents' perceptions of nonfarm activities. A multi-stage random sampling procedure was used to select 360 respondents. The primary data was collected through a pre-tested interview schedule, and percentage, frequency counts, tables and charts were deployed to analyse the data. Results show that the mean age of respondents was 33.4 years. Most of the respondents (81.2%) were males and married (90.0%). The majority (90.1%) were moderately involved in nonfarm activities, the respondents were involved in marketing ($\bar{x}$=2.46), agro-processing ($\bar{x}$=1.58) and distribution ($\bar{x}$=1.40). Meanwhile, the respondents were less involved in health work ($\bar{x}$=1.00), and motorcycle/bicycle repairing ($\bar{x}$=1.01) and had a favourable perception of nonfarm activities. There was a significant relationship between respondents' age (r=0.174), farming experience(r=0.158), household size(r=0.153), and their involvement in nonfarm activities; the relationship between respondents' involvement in nonfarm activities and perception was insignificant (r=-0.006). The skills acquisition program should be made available at all levels to encourage rural youth to stay in rural areas.
Keywords: Rural youth, Perception, Non-farm, Activities, Insecurity

INTRODUCTION
In the second quarter of 2023, the agricultural sector generated about 21 per cent of Nigeria's gross domestic product. The largest contribution was crop production, which accounted for almost 19 per cent of GDP. Agriculture accounts for a significant portion of Nigeria's GDP and is a key activity for the country's economy after oil. However, agricultural activities provide livelihoods for many Nigerians, while the wealth generated by oil only reaches a limited section of the people (Statistica, 2023). The potential of the agricultural sector to employ the team youth population in the country is enormous if the conflict and other armed unrest are tackled by the government.

Of recent, the worsening insecurity issues in some parts of the country have significantly contributed to the food security and employment issues. These armed conflicts have disrupted agricultural activities which is the main source of employment for the rural youths. This has hampered food production and supply as many farmers especially youths are unable to visit their farms for fear of attack by bandits and armed men (Abdulkareem, 2023). The ugly incident has forced many rural youths to desert their farms and seek employment elsewhere. Many public commentators have attributed the worsening insecurity in some parts of the country to poor governance unemployment and the quick money syndrome currently affecting many youths. The insecurity challenges have also increased the number of unemployed youths in the country apart from the Covid-19 pandemic which has compounded these challenges by causing widespread job losses across all sectors. Many businesses have downsized or closed completely due to lockdowns imposed by the government to curtail the spread of the virus (Olufemi, 2023).

However, this has resulted in many rural youths finding it difficult to maintain a livelihood which is why poverty is pervasive among them. Many studies have been conducted in this area; Abdullahi *et al*. (2020); Agbarevo (2019); Nmeregini *et al*. (2019); Olayide and Chidinma (2018); Umunnakwe, (2014);

and Agu (2013). None of these studies has focused on how insecurity forced rural youths to be involved in non-farm activities as a source of livelihood. The present study looked at non-farm activities the rural youths are involved in the level of their involvement and their perception of non-farm activities and isolated factors associated with rural youth involvement in non-farm activities to provide policy recommendations that will guide policy formulation. Hence this study's specific objectives are to:

i. Describe the socioeconomic characteristics of the respondents;
ii. identify the non-farm activities the respondents are involved in and their level of involvement;
iii. examine the respondents' perceptions of non-farm activities; and
iv. isolate the factors influencing respondents' involvement in non-farm activities.

METHODOLOGY

The study sample was drawn from rural communities in Kebbi State using a multi-stage sampling procedure. The state is divided into four agricultural extension zones, namely: Argungu Zone I, Bunza Zone II, Zuru Zone III, and Yauri Zone IV. Zone One is made up of eight Local Government Areas; Zone Two comprises six Local Government Areas, Zone Three comprises four Local Government Areas, and Zone Four comprises three Local Government Areas. In the first stage, in each of the four agricultural extension zones, two LGAs were randomly selected. In the second stage, three rural communities were randomly selected from each LGAs, making a total of twenty-four rural communities. In the final stage, fifteen rural youths were randomly selected from each rural community to give a total of 360 respondents. Data collected were subjected to descriptive (such as mean frequency count, tables, and charts) statistical analysis. Factor analysis was used to isolate factors associated with rural youth involvement in nonfarm activities in Kebbi State, Nigeria.

The dependent variable (Involvement) was measured on a scale of 1-4 where 1= not involved, 2 = involved, 3=rarely involved, and 4= always involved. The perception of nonfarm activities was measured against a five-point Likert scale statement. Options strongly agree, agree, undecided, disagree, and strongly disagree were scored 5,4,3,2 and 1 point, respectively.

RESULTS AND DISCUSSIONS

Table 1 shows that the mean age of respondents was 33.4 years, with a standard deviation of 4.91 years, while the majority (48.6%) of rural youths' were between 28-34 years of age. This finding implies that the respondents are in their active and productive age, full of vitality and agility, and capable of taking risks. The results in Table 1 also show that most respondents (81.2%) were male and married (90.0%) with a mean household size of 10.2±4.66 members.

The consequence is that married men have dominated the nonfarm sector, which means they have responsibilities of taking care of their large families, hence, their involvement in nonfarm activities to make ends meet. This result is in harmony with the results of Sani (2023); Ibrahim, Torimiro, Adamu and Ojo (2020) who reported male dominants and large household sizes in the Northern part of Nigeria. While cultural factors could be one of the reasons for female non-involvement in nonfarm activities, high prestige that could be accorded to ownership of large household size in the study area.

Figure 1 reveals that the majority (64.1%) of the respondents had an annual income of ₦200,001 – 846,666.00 with an average yearly income of ₦429,000.00±1,679,039.23. The high value of standard deviation observed showed that income inequality exists among the respondents in the study area. Income is the primary driving force in any economic activity. From the result, it could be observed that the respondents are low-income earners, and this may not be unconnected with the fact that farming activities in the study area have declined in recent times due to security challenges bedevilling some parts of the study area; the rural youth are forced to take solace in nonfarm activities to make a living.

Table 1: Distribution of respondents by personal and demographic characteristics

Variables	Frequency	Percentage	Mean	Std. deviation
Age(years)			33.4	4.91
≤20	1	0.5		
21-27	29	13.2		
28-34	107	48.6		
≥35	83	37.7		
Sex				
Male	180	81.8		
Female	40	18.2		
Marital Status				
Single	10	4.5		
Married	198	90.0		
Divorced	3	1.4		
Widow/widower	9	4.1		
Household size			10.2	4.66
≤00	6	2.7		
1-8	82	37.3		
9-17	119	54.1		
≥18	13	5.9		

Source: Field survey, 2020

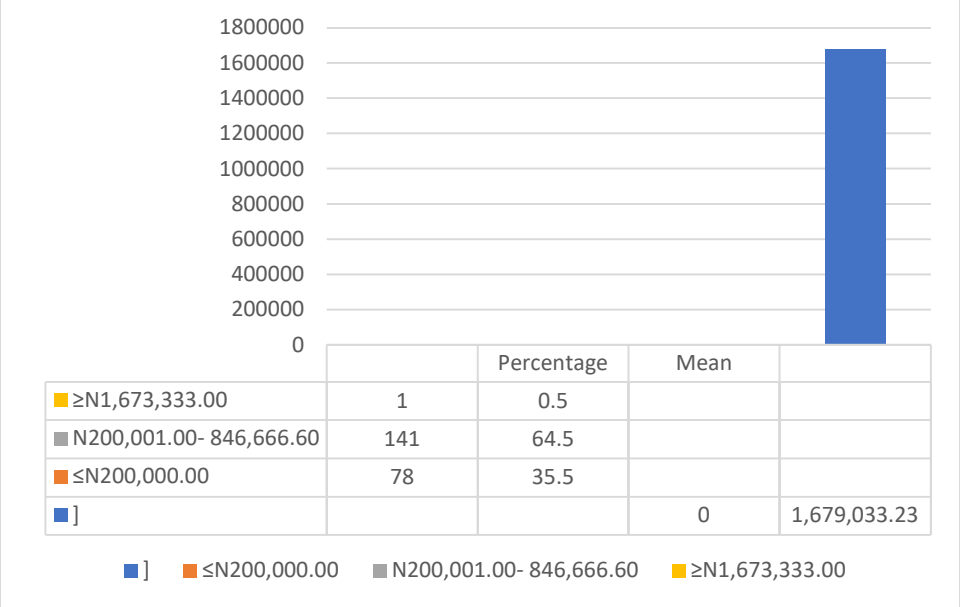

Figure 1: Distribution of respondents according to their annual income (~~N~~)

Rural youths' involvement in nonfarm activities

Results in Table 2 shows that the most commonly non-farm activities involved ny respondents were marketing, agro-processing, distribution, transportation, handicraft, retail activities with the mean value of ($\bar{x}$=2.463); ($\bar{x}$=1.577); ($\bar{x}$ =1.400); ($\bar{x}$=1.363); ($\bar{x}$=1.313); ($\bar{x}$ =.272), respectively and they were less involved in health work ($\bar{x}$ =1.00). It shows clearly that these activities were the most desired and important to the respondents. The results agree with that of Issa (2019); Nmeregini *et al.,* (2019); and Olayide and Chidinma (2018) who reported that most of the respondents were involved in the transportation, marketing and selling of farm produce. The reason for respondents' involvement in the aforementioned activities it could be that the activities require fewer skills and technical competence. Similarly, Table 3 indicates that the majority (90.1%) of the respondents were moderately involved in non-farm activities, (9.1) of the rural youths' had a low involvement in non-farm activities, and only a few (0.5%) were highly involved in non-farm activities.

Table 2: Rural youths' involvement in nonfarm activities

Nonfarm activities	Mean	Std. deviation	Rank
Marketing	2.463	1.198	1st
Agro-processing	1.577	0.843	2nd
Distribution	1.400	0.718	3rd
Transportation	1.363	0.718	4th
Handicraft	1.313	0.889	5th
Retailing	1.272	0.687	6th
Teaching/civil service	1.213	0.692	7th
Tailoring	1.150	0.634	8th
Petty trading	1.131	0.319	9th
Bakeries	1.095	0.463	10th
Knitting	1.081	0.385	11th
Hired labour	1.059	0.359	12th
Manufacturing	1.050	0.329	13th
Construction	1.040	0.321	14th
Mining	1.040	0.275	14th
Local party agent/council member	1.040	0.258	14th
Bricklaying	1.040	0.258	14th
Rental services	1.036	0.250	15
Tourism	1.031	0.259	16th
Barbing	1.031	0.221	16th
Carpentry	1.031	0.259	16th
Mechanics	1.022	0.177	17th
Pottery	1.022	0.177	17th
Selling traditional medicine	1.022	0.177	17th
Motorcycle/bicycle repairing	1.022	0.177	17th
Shoe repairing/shining	1.013	0.150	18th
Heath work	1.000	0.000	19th

Source: Field survey, 2020

Table 3: Overall level of rural youths' involvement in non-farm activities

Total involvement Score	Frequency	Percentage
Low (≤25.1)	20	9.1
Moderate (26.1-38.1)	199	90.1
High (≥39+)	1	0.5

Source: Field survey, 2020 (Mean= 33.33)

Item analysis of measures of perception of nonfarm activities

Results in Table 4 show that 47.7% of rural youth strongly agree that nonfarm activities are good for the family, nonfarm activities reduce the time one spends on the farm (68.2%) and that involvement in nonfarm activities can improve someone's living condition (49.5%). Meanwhile, 52.7% strongly disagreed that nonfarm activities are an additional burden that nonfarm activities are only good for female folk (60.9) or that nonfarm activities are only useful during ceremonies (67.3%).

Table 4: Distribution of rural youths' according to their perception of nonfarm activities

Perception statements	SA	A	U	D	SD
Nonfarm activities are good for the family	37.3	47.7	4.1	10.5	0.5
Nonfarm activities reduce the time one spends on the farm	68.2	23.6	2.3	5.5	0.5
Nonfarm activities are insurance against crop failure	28.6	28.2	22.7	18.6	1.8
Nonfarm activities are an additional burden	8.2	11.4	16.8	52.7	10.9
Nonfarm activities can improve someone's living condition	49.5	28.6	13.6	5.0	3.2
Nonfarm activities are mere suffering	11.4	40.9	16.8	18.2	12.7
Nonfarm activities are just a waste of time	6.8	7.3	5.9	41.4	38.6
Nonfarm activities are not good for me	5.0	5.0	4.1	24.1	1.8
Nonfarm activities are only good for female folk	5.5	4.1	10.9	18.6	60.9
Nonfarm activities are only useful during ceremonies	4.5	2.3	2.7	23.2	67.3

Source: Field survey, 2020

SA= Strongly Agree, A= Agree, U= Undecided, D= Disagree, SD=Strongly Disagree

Relationship between respondents selected socioeconomic characteristics and involvement in non-farm activities

Table 5 shows that there were significant relationships between respondent's age (r=0.174), years of farming experience (r=0.158), and the number of children(r=0.153) and their involvement in non-farm activities. This infers that as the age, years of farming, and number of children of rural youths increases they tend to be more involved in non-farm activities.

Table 5: Correlation analysis showing the relationship between rural youths' involvement in non-farm activities and selected socioeconomic characteristics

Socioeconomic variables	r=value	p=value
Age	0.174**	0.010
Years of farming experience	0.158*	0.019
Number of children	0.153*	0.024
Household size	0.036	0.597
Number of wives	0.015	0.821
Annual income	0.021	0.760
Farm size	0.088	0.191
Years of education	-0.064	0.371

Source: Field survey, 2020

**Correlation is significant at 0.01 level (2 tailed)

*Correlation is significant at 0.05 level (2-tailed)

Relationship between perception of non-farm activities and their involvement

Table 6 shows there was no significant relationship between perception and involvement in non-farm activities (r=-0.006, p=0.932). The higher the respondents' perception of non-farm activities did not inform their involvement in non-farm activities.

Table 6: Correlation analysis showing the relationship between respondents' involvement in non-farm activities and their perception of non-farm activities

Variable	r=value	p=value
Perception	-0.006	0.932

Source: Field survey, 2020

CONCLUSION AND RECOMMENDATIONS

The study concluded that respondents were young, and married, the majority were male and demographic, socioeconomic and livelihood factors are major factors associated with rural youth involvement in nonfarm activities. The respondents were moderately involved in nonfarm activities and had an indifferent perception of nonfarm activities. It is recommended that the government at all levels should provide security, especially in rural areas, and ease the affairs of youth in agriculture so that youth can remain in the agricultural sector and see agriculture as a sustainable career option.

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USAGE OF INDIGENOUS FAMILY PLANNING PRACTICES AMONG RURAL NURSING MOTHERS IN IBARAPA CENTRAL LOCAL GOVERNMENT AREA OF OYO STATE, NIGERIA

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ABSTRACT
This study assessed the usage of indigenous family planning practices among rural nursing mothers in Ibarapa Central Local Government Area of Oyo State, Nigeria. Specifically, the study described the socio-economic characteristics of respondents, identified indigenous family planning practices used by respondents, and identified challenges associated with the use of indigenous family planning practices by respondents. Primary data were collected using an interview guide administered to 102 nursing mothers who were selected using a multistage sampling procedure. Data collected were analysed using frequency, percentages, Pearson Product Moment Correlation (PPMC) and Chi-square at 0.05 level of significance. Results show that the mean age of the nursing mothers was 30.9 years, and the mean household size was 6 persons. Also, 36.3% had no formal education while 31.4% had secondary education. The indigenous family planning practices used by the majority of the respondents were sperm-killing agents (77.5%), withdrawal (76.5%) and continual breastfeeding (67.6%). Very severe challenges faced by the majority of the respondents were carefree (66.7%), religious barriers (87.3%) and fast-changing social environments (89.2%). Factors significantly associated with the use of indigenous family planning practices were age (r=0.26), household size (r=0.48), marital status (χ^2=73.32), primary occupation (χ^2=135.05), educational level (χ^2=84.46). This study concludes that sperm-killing agents, withdrawal and continual breastfeeding were the commonly used indigenous family planning practices of rural nursing mothers in Ibarapa Central Local Government Area of Oyo State, Nigeria. The study recommends an awareness campaign of the health benefits of using family planning among religious leaders and why women should take it so seriously.
Keywords: Indigenous family planning, Nursing mothers, Primary healthcare, Sperm-killing agent, Religion barrier

INTRODUCTION

To curb the high rate of population growth that the nation is presently experiencing, there is a need to harness the use of family planning practices as a strategy. However, the acceptance rate of this strategy or practice is still very low (Adedini, Ntoimo and Alex-Ojei. 2023; Fadeyibi, Alade, Adebayo, Erinfolami, Mustapha, and Yaradua, 2020). Several studies have shown that despite the efforts made by the government in this direction, family planning in Nigeria remains largely insignificant (Uhuo, Oguaka and Egba, 2020). Similarly, Do *et al*., (2020) noted that where knowledge of family planning is high among youth unwanted pregnancies and high birth rates reign in Nigeria.

Family planning, according to the World Health Organization (WHO, 2020) is a way of thinking and living which is voluntarily adopted based on attitude, knowledge, and decisions made by individuals and couples to promote the welfare and health of the family. In essence, family planning serves as a step to better living and development of individuals which contributes effectively to the social and economic development of the country. The concept of family planning and contraceptives is not a female-sex phenomenon; male sterilization, withdrawal, use of herbs, periodic abstinence, condoms, and other contraceptive methods are being used by men (Imam and Khan, 2019). Where traditional methods are preferred by couples, women in such families need the support of their men to effectively practice safe contraception. In Nigeria, this is added to associated costs and factors that affect family planning adoption and use of contraceptives (Oyedele, 2021).

The use of contraceptives as a motivational strategy to avoid unwanted pregnancy has been found unacceptable in more than four out of ten women within one year of adoption (Akamike, Okedo-Alex and Eze, 2016; Olubodun, Balogun and Ogunsilu, 2020). The correct use of contraceptive methods enables women to actively participate in family planning and at the same time to participate fully in working life. Family planning plays an important role in reducing malnutrition and improving child survival and maternal health (Omoge *et al*., 2022).

Knowledge of the cultural and traditional beliefs of people concerning maternal, and child

health and the use of contraceptive practices is significantly higher in rural communities (Ikechukwu *et al*. 2020). Some of the traditional contraceptive methods include calendar method, withdrawal, and folk methods (Anate, Balogun, Olubodun, and Adejimi, 2021), cervical mucus and lactational amenorrhea methods are examples of traditional contraceptive methods (Rabiu and Rufa'i, 2018). Other traditional methods of contraception that are particularly prevalent in Africa include virginity verification and the use of traditional medicines and herbs (Uhuo *et al*., 2020). Olowolafe (2021) listed traditional family planning to include the withdrawal method, use of barrier method, use of the local ring, herbal preparation, incantation recitation, jumping after sex, taking salt after coitus and charms. A literature review by Moroole *et al*., (2020) listed the indigenous contraception commonly used in rural Nigeria including: alcoholic drinks; padlock on labia; douching; standard days method; withdrawal; waistband; armlet/armband; traditional ring; postpartum abstinence; and drinking herbs.

In a decade, traditional family planning has existed, our forefathers have been practising family planning on their own, but this family planning has no scientific rationale, that is, there is no evidence of success or failure (Adedin *et al*. 2023). However, this traditional method of family planning is associated with socioeconomic factors, cultural beliefs and cultural practices (Ojih *et al*., 2023). There are many other unreported traditional contraceptive methods applicable to rural women in literature. Thus, there is a need to explore diverse indigenous knowledge towards family planning practices in rural communities in Nigeria. Indigenous contraception is known to include all-natural and traditional contraception. It may also include the use of herbs.

Government investment in health services is low and there is a need to promote the use of indigenous and modern lifestyle behaviour to facilitate the adoption of family planning methods. However, problems which emanate from unwanted pregnancy are caused by inadequate access to preferred methods (Sinai *et al*., 2019). The majority of users of modern family planning practices discontinue use or switch methods within their first year of adoption due to several reasons which include contraceptive failure and desire for pregnancies, side effects with negative health outcomes among others (Anate *et al*., 2021). The failure of modern contraceptives is related to user personal attributes, characteristics of the method used, the quality of the family planning services and supply factors (Sinai *et al*., 2019). The reported side effects associated with modern contraception aroused an interest in indigenous contraception. For example, the World Health Organization (WHO, 2018) factsheet lists traditional methods of contraception for family planning/contraception. However, people are still encouraged to adopt modern contraceptives such as contraceptive pills, injections, intrauterine devices (IUD), condoms and sterilization as a panacea to family planning despite their side effects (Moroole *et al*., 2020; Ajayi *et al*., 2018). Both natural and traditional techniques of African indigenous contraception can offer women safe and effective alternative contraceptive options for preventing unwanted pregnancies. It is therefore important to create an enabling environment for the seamless fusion of indigenous and scientific knowledge of family planning methods required to maintain optimal sexual health. It is based on this background that this study assessed the use of indigenous family planning among rural nursing mothers in Ibarapa Central Local Government Area of Oyo State, Nigeria. Therefore, the following objectives were:

1. To describe the socio-economic characteristics of the rural nursing mothers in Ibarapa Central Local Government Area of Oyo State;
2. To identify indigenous family planning practices used by rural nursing mothers in the study area; and
3. To ascertain the challenges encountered while using the usage of indigenous family planning practices by rural nursing mothers in the study area;

Hypothesis of the study: There is no significant relationship between selected socio-economic characteristics of rural nursing mothers and indigenous family planning practices used.

METHODOLOGY

The study area is Ibarapa Central Local Government Area (LGA) of Oyo State. The LGA consists of two principal towns which are Igboora and Idere with its headquarters at Igboora. It comprises of 10 political wards which encompasses several primary health care centres. The area lies on the longitude 7 ° 26 0'N and latitude 3º 17 ' O'E. Agriculture is the major occupation of the people in the area. Three prominent primary health care (PHC) centres in Igboora, Ibarapa Central Local Government Area of Oyo State, namely: (i) Isale-oba C.A.C Igboora, (ii) Igbole PHC Igboora, and (iii) Oke-Odo PHC Igboora.

The population of the study comprised 514 registered nursing mothers in Isale-oba C.A.C Igboora (114), Igbole PHC Igboora (200) and Oke-

Odo PHC igboora (200). From the population, 20% were randomly selected to give Isale-oba C.A.C Igboora (22), Igbole PHC Igboora (40) and Oke Odo PHC Igboora (40), giving a total sample size of 102 nursing mothers used as respondents.

Age and household size were measured in ratio while marital status, educational level and occupation were categorical variables measured at the nominal level. Use of indigenous family planning was measured as used =1 and not used =0 while challenges were measured as very severe=3, severe =2 and not severe =1. Data collected were analyzed using descriptive and inferential statistics such as Pearson Product Moment Correlation (PPMC) and Chi-square analysis.

RESULTS AND DISCUSSION

Socioeconomic characteristics of rural nursing Mothers

Table 1 shows that the mean age and household size of nursing mothers were 30.9±12.62 years and 6±1.73 persons respectively. This implies that the majority of nursing mothers do not have late marriages and could use family members as family labour when needed. They could be considered as youths who are expected to high adopt the use of family planning. This agrees with Do, Hutchinson, Omoluabi, Akinyemi and Akano (2020) who noted the knowledge of family planning is high among youth but unwanted pregnancies and high birth rates reign. Most (65.7 %) of the respondents were married and had trading (59.8%) as their major occupation while 36.3% had no formal education. This implies that nursing mothers in the study area are predominantly traders. This is contrary to Olubodun *et al*. (2020) where it was noted that farming was the major occupation of women in the rural areas of Nigeria.

Regarding education of the respondents, most of the respondents had one form of formal education or the other with primary education (21.5%), secondary education (31.4%) and tertiary education (4.9%) giving a total of 57.8% literacy. Even though the percentage of nursery mothers who had tertiary education is low, it could be agreed upon that the nursing mothers had formal education. In this case, a reasonable number of nursing mothers in the study area are expected to be able to read and write. This level of education may support the uptake of indigenous methods of conceptive for family planning to carry out their trading activities. In line with this assertion, the study noted that women are more likely to use family planning methods as educational and employment opportunities for women improve and they fully contribute to the economic well-being of the family (Kassim, 2020).

Indigenous family planning practices used by rural nursing mothers

According to results presented in Table 2, the majority (77.5%) of the respondents used sperm-killing agents including hot water with or without plain concentrated solutions of salt, alum, vinegar, lemon, potassium or caustic as indigenous family planning practice. Another practice common among the majority (76.5%) was the withdrawal method. The withdrawal method has been considered in literature as age long effective method of preventing pregnancy with only 4 percent possibility if the male partner withdraws before ejaculation, although some traditions in Africa consider it a taboo to splash human sperms outside (Moroole *et al*., 2020). Continual breastfeeding method is another practice used among the majority (67.6%) of the respondents. Lactation is a natural defence against pregnancy (Sridhar and Salcedo, 2017). The lactational amenorrhea method (LAM) is the specific name given to the use of breastfeeding as a dedicated technique of contraception (Sridhar and Salcedo, 2017). Though lactational amenorrhea can rival the efficacy of the best modern approaches, women must experience pregnancy to use it. If the mother is nursing, she is delaying the return of fertility (Sridhar and Salcedo, 2017). Suckling induces a reduction in gonadotropin-releasing hormone, luteinizing hormone and follicle-stimulating hormone release, resulting in amenorrhea25. Breastfeeding in Nigeria is used for child spacing (Uhuo *et al*., 2020). LAM is unquestionably cost-effective, as breastfeeding alone provides adequate nutrition and fluid intake through the first 6 months, and breast milk is considered a healthier option than its substitutes for infants in low-resource settings. LAM is 98-99% effective during the first six months after childbirth in women practising exclusive breastfeeding (Moroole *et al*., 2020).

Religion self-discipline used among an appreciable number of the respondents (47.1%) is similar to abstinence during a religious exercise called Postpartum abstinence. Postpartum abstinence refers to abstaining from sexual relations after childbirth. This is a common technique deep-rooted in the cultures of different communities worldwide with varying duration. A major form of contraception in pre-colonial Nigerian societies was abstinence from sex during breastfeeding (Oyedele *et al*. 2021).

Table 1: Distribution of respondents according to socioeconomic characteristics

Variables	Frequency	Percentage	Mean	Std. Dev.
Age (years)				
<25	5	4.9		
26 – 35	59	57.8	30.9	12.62
36 – 45	31	30.4		
46 and above	7	6.9		
Marital status				
Single	9	8.8		
Married	67	65.7		
Widowed	21	21.6		
Separated	5	4.9		
Occupation				
Farming	33	33.2		
Civil servant	3	2.9		
Trading	61	59.8		
Artisan	5	4.8		
Household size (persons)				
1 – 5	51	49.9		
5 – 10	46	45	6.00	1.73
< 10	5	4.9		
Educational level attained				
No formal education	37	36.3		
Adult education	6	5.9		
Primary education	22	21.5		
Secondary education	32	31.4		
Tertiary education	5	4.9		

Source: Field survey, 2017

Table 2: Distribution of rural nursing mothers based on indigenous family planning practices used

Indigenous Family	**Used**	
	Frequency	**Percentage**
Use of sperm-killing agents e.g hot water with or without plain concentrated solutions of salt, alum, Vinegar, lemon, potassium or caustic soda	79	77.5
Withdrawal	78	76.5
Continual breastfeeding	69	67.6
Religion self-discipline	48	47.1

Source: Field survey, 2017

Challenges encountered while using indigenous family planning practice among rural nursing mothers

Table 3 reveals that the majority of the respondents indicated very severe challenges including a fast-changing environment as a result of civilization (89.2%), religious barriers (87.3%), and the non-challant attitude of the nursing mothers (66.7%). This implies that civilization, religion and care for local family planning practices are the most influencing factors responsible for the extinction of indigenous family planning practices. The position of Babalola, Loehr, Oyenubi, Akiode, and Mobley (2019) on contraceptive usage foregrounds the dilemma involved in reproductive healthcare in Nigeria. The most populous Black nation in the world battling serious economic challenges also has its level of contraceptive usage among the lowest worldwide.

Table 3: Distribution of rural nursing mothers based on challenges associated with the usage of indigenous family planning practices

Challenges	Very Severe	Severe	Not Severe
Non-challant attitude of nursing mothers	68 (66.7)	5 (4.9)	29 (28.4)
Religion barrier	89 (87.3)	11 (10.8)	2 (1.9)
Inaccessibility to the practices	18 (17.6)	5 (4.9)	79 (77.5)
Wrong usage of the practices	6 (5.9)	7 (6.9)	89 (87.2)
Fast-changing social environment	91 (89.2)	8 (7.9)	3 (2.9)

Source: Field survey, 2017

Relationship between selected personal characteristics of rural nursing mothers and indigenous family planning practices used

Results in Table 4 indicate that a significant relationship existed between age (r 0.26), household size (r-0.48), marital status (r =73.32), Occupation (r = 135.05), and indigenous family planning practices used. This finding is in line with a report by Anate *et al*. (2021) who found that the use of family planning in rural Nigeria was significantly related to the age of women.

The educational level attained (x^2=84.46) by the women showed a significant relationship with the use of family planning. This finding indicated that attainment of formal education promotes the use of contraceptives among nursing mothers in the study area. This finding is consistent with previous studies that indicated education as a required factor in the use of conceptive among women (Olayiwola, Kazeem, and Fuein, 2021; Woldeamanuel, Gessese, Demie, Handebo and Biratu, 2023).

Findings further imply that household size for example is influenced by the indigenous family planning practices used. A little or no use of family planning by rural nursing mothers might amount to an increase in the number of pregnant cases which in turn leads to high household size. Also, nursing mothers' educational level might influence the usage of the practices or not. That is, there is the possibility of an educated fellow being more exposed to different methods as a result of acquired knowledge. These findings support Ojih *et al*. (2023) submission that the socio-economic characteristics of the population were significant predictors of contraceptive use in Nigeria.

Table 4: Test of the relationship between socioeconomic characteristics of respondents and indigenous family planning practices used

Variables	r-value	p-value
Age	0.26	0.001*
Household size	0.48	0.030*
	Chi-square (χ^2)	
Marital status	73.32	0.000*
Occupation	135.05	0.000*
Educational level attained	84.46	0.000*

*Significant

CONCLUSION AND RECOMMENDATIONS

The study assessed the use of indigenous family planning among rural nursing mothers in Ibarapa Central Local Government Area of Oyo State, Nigeria. Based on the findings, this study concludes that rural nursing mothers mainly used sperm-killing agents such as hot plain water with or without concentrated solutions of salt as a good source of indigenous family planning practices followed using withdrawal methods and continual breastfeeding. Age, household size, marital status, occupation, and educational status of the rural nursing mothers support the choice of indigenous family planning methods used. Religious barriers and a fast-changing environment because of civilization present very severe challenges to the use of indigenous family planning methods among rural nursing mothers. The study thus recommends an awareness campaign of the health benefits of using family planning among religious leaders and why women should take it so seriously. Maternal health care intervention programmes by government and non-governmental organizations aimed to increase the use of contraceptives among rural nursing mothers in the study area should focus on adult nursing mothers, married, and educated nursing mothers while the under-aged nursing mothers (teenagers) should be discouraged through awareness campaign but uptake the use of family planning.

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REGIONAL DISPARITY AND DETERMINANTS OF ZERO-DOSE VACCINATION AT BIRTH AMONG CHILDREN AGED 0-24 MONTHS IN NIGERIA

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ABSTRACT
Primary vaccination at birth is a vital precaution to ensure the early protection of children against diseases and death. There is a regional variation of birth vaccination in Nigeria, which is against the SDG goals channelled towards achieving universal health coverage and eradicating communicable and non-communicable diseases. This study examined Nigeria's regional disparity and determinants of zero-dose vaccination at birth. The study used a child-recode dataset from the Nigeria Demographic and Health Survey (NDHS, 2018). A sample of 4,634 children of women of reproductive age was considered the sample size. The outcome variable is zero-dose vaccination based on when a child does not receive a dose of HBV, OPV and BCG at birth. Frequency count, percentage and chi-square were used to analyze the data. The result showed that the northeast and northwest had the highest prevalence of zero-dose vaccination for children at birth (80.4% and 78.4%, respectively). The individual and community-based interventions needed to eliminate low birth vaccination should consider the place of delivery, number of antenatal visits, religion, education, household decision making and exposure to mass media.
Keywords: Zero-Dose Vaccination, Regional Disparity, and Health Facility.

INTRODUCTION

One of public health's most successful strategies for managing and eradicating dangerous and often fatal diseases is vaccination at birth, which has proven to be one of the most efficient preventive measures (Masters *et al*., 2019). At birth, all African children must get vaccinated against polio, hepatitis B, and the bacteria Bacillus Calmette Guerin (BCG). Some African nations continue to have dismal rates, like Nigeria (31% in 2018), Ethiopia (43% in 2019), Uganda (55% in 2016), and Ghana (57% in 2014) (Agboola *et al*., 2015; Galadima *et al*., 2021). National standards advocate giving these vaccines to newborns within 24 hours and up to 14 days post-delivery; however, BCG can be administered until 12 months of age (Ibraheem *et al*., 2019). Children from the lowest socioeconomic quintiles, those with no formal education, and those living in rural areas are disproportionately affected by the persistent regional and national gaps in Nigeria's vaccination coverage. Vaccine antigens provide the most significant protection against vaccine-preventable diseases when given at the appropriate time. Thus, children must get their shots on time (Ibraheem *et al*., 2019).

Some studies have suggested that early receipt of vaccines be a part of the assessment of immunisation programmes (David *et al*., 2020; Ibraheem *et al*., 2022; Sadoh *et al*., 2013). Investigating the regional variation of birth vaccination in Nigeria is essential for promoting child health, aligning with global health goals, identifying barriers, informing policy development, promoting equity, and facilitating data-driven decision-making. This research can significantly improve immunization coverage and, consequently, public health outcomes in Nigeria. However, the broad objective of the study is to investigate the regional disparity and determinants of zero-dose immunisation at birth in Nigeria. This study addresses the following specific objectives:

i) Examine the prevalence of zero-dose vaccination at birth across regions in Nigeria.
ii) Ascertain the background characteristics associated with zero-dose vaccination at birth across regions in Nigeria.
iii) Determine community factors associated with zero-dose vaccination at birth across regions in Nigeria.

METHODOLOGY

This study was conducted in Nigeria, which comprises 774 Local Government Areas (LGAs), distributed throughout its 36 states and the Federal Capital Territory (FCT). The sample frame for this study was drawn from Nigeria Demographic and Health Surveys (NDHS) 2018 using the 2006 Federal Republic of Nigeria Population and Housing Census conducted by the National Population Commission.

The 2006 Enumeration Area (EA) census frame makes up the principal sampling unit (PSU) for the NDHS 2018. A stratified sample was chosen in two rounds for the 2018 Nigeria Demographic and Health Survey suing stratification sampling technique. Both urban and rural areas were assigned to each state. Using a probability proportional to their size, 1,400 EAs were chosen in stage 1. A household listing operation was assigned to each EA, and the generated household lists served as the foundation for the second stage sample frame. About 42,000 households were included in the second stage's sample, with 30 households in each cluster. Tablets were used to list

the households, and a computer program randomly selected the families. According to instructions, only members of pre-selected homes were to be the subject of interviews. To prevent bias, no substitutions or adjustments were allowed during the implementation phases in the pre-selected homes.

This study focused on children between ages 0 and 24 months, using a child recode file of Nigeria Demographic and Health Surveys (NDHS) 2018; the sample size encompasses all children aged 0 to 24 months who were either permanent residents or overnight guests in their families on the night preceding the survey. After appropriate data management, the total sample size used for the study was 4,634 children.

The prevalence of zero-dose vaccination at birth was measured by asking the parents to show evidence that their child or children under 24 months received a dose of Hepatitis B (HBV), Polio (OPV 0), and Bacillus Calmette–Guérin (BCG) at birth. Those who have evidence to have received the vaccines at birth were scored 0 while those who did not receive any vaccine were scored 1 (This is because children younger than 24 months who did not receive a dose of these vaccines were our primary concern). Children older than 24 months were not considered, which served as the exclusion criteria.

While background characteristics associated with zero-dose vaccination at birth were measured were place of delivery (home, public facility), antenatal care visit (no visit, 1-3 visits, 4-7 visits, 8 visits above), birth order (1^{st}, 2^{nd}-3^{rd}, 4^{th}-5^{th}, 6 children above), mother's age (15-19 years, 20-24 years, 25-29 years, 30-34 years, 35 years above) and place of residence (urban, rural). Other factors considered were women's level of education, religion, household type (monogamous, polygamous) and exposure to mass media among other factors. Community characteristics such as education level, poverty, health decision-making, and exposure to mass media were considered as contextual variables. The community factors were derived from the cluster number (v001), the educational level among those reported secondary education was retained to denote community literacy, and those reported poorer and poorest were used to measure community poverty, when woman alone decided on the health the community decision making was derived and when women reported exposure to radio, newspaper and television the community exposure to mass media was derived.

Data were analyzed using frequency distribution, percentage, bar graphs, chi-square and multilevel binary logistics regression. The intraclass correlation coefficient (ICC) and the proportional change in variance were used to symbolize random influences. The following model explicitly explains this: $y_{ij} = \beta_0 + \beta_{1k}x_{1kij} + \beta_{2k}x_{2kj} + u_j + e_{ij}$

y_{ij}: log-odds of zero-dose vaccination at birth by child i in cluster (community) j;

β_0: intercept (average likelihood of zero-dose vaccination at birth);

β_{1k}: coefficients for the individual-level variables;

x_{1kij}: individual-level covariates (age group, education, religion, wealth; Index, etc.) for mothers i in community j;β_{2k}: coefficients for the community-level variables;

x_{2kj}: community-level covariates (education, poverty, decision-making, exposure to mass media);

u_j: community-level random effect;

e_{ij}: error terms for the individual level.

RESULTS AND DISCUSSION

Prevalence of zero-dose vaccination at birth

Figure 1 shows that North-east (80.4%) and North-west (78.4%) had the highest prevalence of zero-dose vaccination at birth. This was followed by North-central (58.6%) and the least regions to experience zero-dose vaccination at birth were South-west (23.9%) and South-east (42.0%). This prevalence of zero-dose vaccination across regions was higher than 16.5% of zero-dose among children age 12-59 months in Sub-sahara Africa (Ozigbu *et al*., 2022). According to Sato, (2023), it was reported that the prevalence of children zero-dose in Nigeria among children reduced from 61% to 40% in 2003 to 2018. The disparities in vaccination rates may indicate broader health inequities in different parts of the country. Regions with a higher prevalence of zero-dose vaccination are more vulnerable to vaccine-preventable diseases. This vulnerability can lead to outbreaks of diseases that could otherwise be prevented through timely vaccination. It emphasizes the need for urgent and targeted vaccination campaigns in these regions to protect the health of infants and the community.

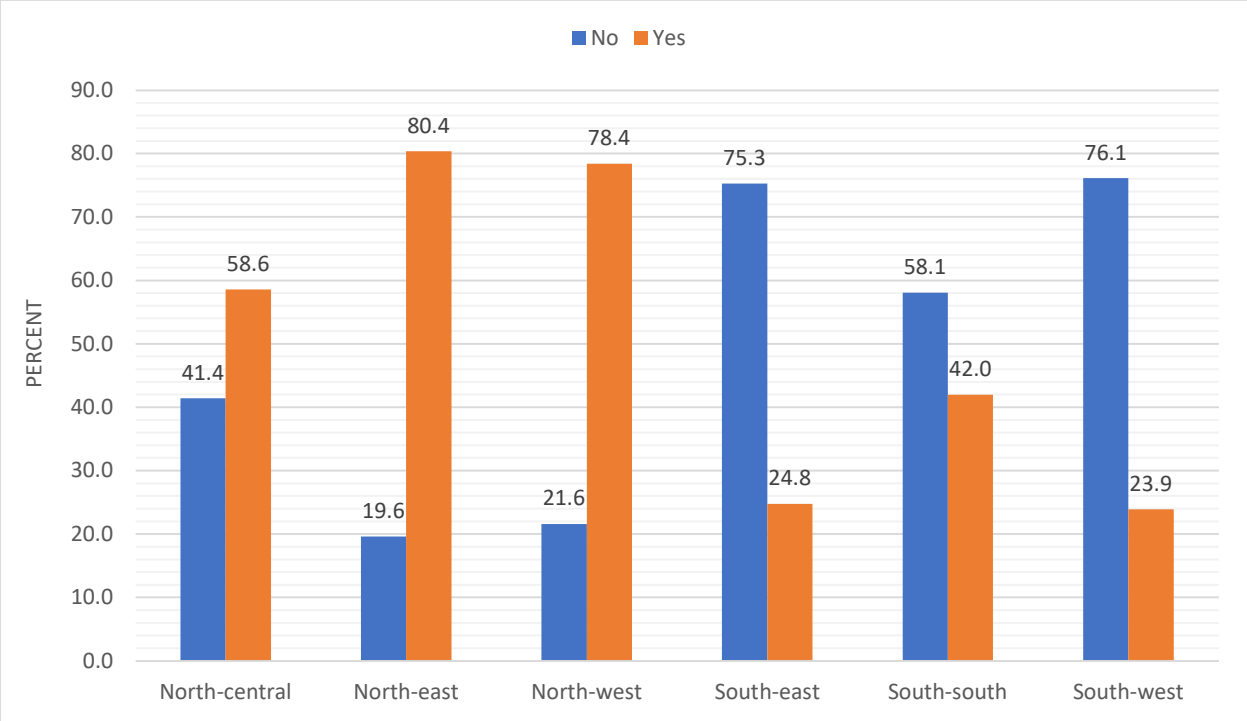

Figure 1: Regional Differential of Zero-dose Vaccination at Birth
Source: Author Construct, 2022 (NDHS 2018).

Distribution by background characteristics

Table 1 reveals the distribution by background characteristics, it was reported that children aged less than 1 year old were 32.5%, followed by those reported at 1 year (37.1%) and those reported at age 2 years were 30.4%. The majority (51.9%) of the children were male and delivered at home (66.0%). One-third reported children with no antenatal care visit (33.6%), most of the birth orders were greater or equal to 6 children (31.5%), followed by 2nd or 3rd birth order (31.3%) and the least reported first order (12.0%). Mothers aged 15-29 years were more reported (50.3%) and more than half resided in rural areas (67.4%). More than half of mothers had no formal education (55.9%) whereby only 44.7% of husband had no formal education (44.7%). This was similar to the findings by Lawal *et al*., (2023) who stated that only 7% of the respondents had tertiary education, while a larger percentage (46%) of the women had no formal education.

Furthermore, Table 1 shows that 70.2% of mothers identified as Muslims, poorest (27.6%), from a polygamous household (35.9%) and whose husband alone made the decision (61.5%), while only 40.4% were exposed to mass media.

Table 1: Distribution by background characteristics (n=4,634)

Background characteristics	Frequency	Percentage	Background characteristics	Frequency	Percentage
Age of child			**Religion**		
0	1,505	32.5	Christianity	1,341	29.0
1	1,720	37.1	Islam	3,254	70.2
2	1,408	30.4	Traditional	38	0.8
Sex of child			**Wealth index**		
Male	2,407	51.9	Poorest	1,278	27.6
Female	2,227	48.1	Poorer	1,195	25.8
Place of delivery			Middle	940	20.3
Home	3,056	66.0	Richer	713	15.4
Public facility	1,066	23.0	Richest	507	10.9
Private facility	512	11.0	**Husband Occupation**		
Number of ANC			Not working	48	1.0
No visit	1,555	33.6	Profess/managerial	474	10.2
1-3 visit	838	18.1	clerk/sales/service	1,306	28.2
4-7 visit	1,503	32.4	Agriculture	2,046	44.2
visit above	737	15.9	Manual	760	16.4
Birth order			**Wife's occupation**		
1st	554	12.0	Professional/Managerial	264	5.7
2nd or 3rd	1,452	31.3	clerk/sales/service	3,109	67.1
4th or 5th	1,167	25.2	Agriculture	1,031	22.2
Greater or equal to 6	1,460	31.5	Manual	230	5.0
Age of women			**Family type**		
15-29 yrs	2330	50.3	Monogamous	3,013	65.0
30 yrs and above	2,303	49.7	Polygamous	1,620	35.0
Place of residence			**Household decision making**		
Urban	1,509	32.6	women alone	376	8.1
Rural	3,124	67.4	Both decided	1,408	30.4
Level			Husband alone	2,850	61.5
Women level of education			**Exposure to mass media**		
No formal education	2,590	55.9	Not exposed	1,972	42.6
Primary	632	13.7	Exposed	2,662	57.5
Secondary	1,111	24.0	**Number of living children**		
Higher	300	6.5	1-3 child	2,312	49.9
Husband level of education			Above 3 children	2,322	50.1
No formal education	2,069	44.7			
Primary	644	13.9			
Secondary	1,339	28.9			
Higher	581	12.5			

ANC: Antenatal Care Visit

Distribution of respondents based on association between respondents' characteristics and prevalence of zero-dose vaccination at birth

Table 2 reveals that there was significant relationship between respondents' age of child, {North-central ($\chi2$=27.14; p=0.000); North-east ($\chi2$=16.67; p=0.001); North-west ($\chi2$=17.29; p=0.003), South-east ($\chi2$=39.69; p=0.000), South-south ($\chi2$=20.88; p=0.000) and South-west ($\chi2$=22.77; p=0.000)} and zero-dose vaccination at birth across the country, it was reported that majority of children less than 1 year do not get vaccinated at birth. There was significant association between place of delivery {North-central ($\chi2$=208.64; p=0.000); North-east ($\chi2$=160.22; p=0.001); North-west ($\chi2$=154.51; p=0.003), South-east ($\chi2$=22.03; p=0.000), South-south ($\chi2$=111.58; p=0.000) and South-west ($\chi2$=56.23; p=0.000)} and zero-dose vaccination at

birth across the country, across region it was reported majority of children were give birth to at home, followed by those reported public facility and the least reported private facility. In contrast, Farrenkopf *et al*., (2023) reported that more than one-third of zero dose children were delivered in a facility. There was significant association between number of antenatal care visit {North-central ($\chi2$=201.56; p=0.000); North-east ($\chi2$=137.60; p=0.001); North-west ($\chi2$=292.33; p=0.003), South-east ($\chi2$=17.12; p=0.000), South-south ($\chi2$=108.31; p=0.000) and South-west ($\chi2$=116.32; p=0.000)} and zero-dose vaccination at birth across the country. Lawal *et al*., (2023) reported that number of children who took zero number of vaccines was high among women with no ANC visit. There was also significant association between place of residence and zero-dose vaccination at birth {North-central ($\chi2$=14.94; p=0.0265), North-east ($\chi2$=80.58; p=0.0000), North-west ($\chi2$=63.64; p=0.0000) and South-west ($\chi2$=68.61; p=0.0000)}, it was reported that majority of children in rural areas do not get vaccinated at birth. There is significant association between mother's level of education {North-central ($\chi2$=208.38; p=0.0000); North-east ($\chi2$=117.89; p=0.0000); North-west ($\chi2$=178.93; p=0.0000), South-east ($\chi2$=17.23; p=0.0029), South-south ($\chi2$=31.57; p=0.0003) and South-west ($\chi2$=68.11; p=0.0000)} and zero-dose vaccination at birth across the country.

Similarly, there was significant relationship between respondents' wealth, {North-central ($\chi2$=131.05; p=0.000); North-east ($\chi2$=126.86; p=0.000); North-west ($\chi2$=162.70; p=0.000), South-east ($\chi2$=31.69; p=0.000), South-south ($\chi2$=36.58; p=0.000) and South-west ($\chi2$=74.82; p=0.000)} and prevalence of zero-dose vaccination at birth across the country.

Table 2: Chi-square analysis of association between background characteristics and zero-dose vaccination at birth

Characteristics	North-Central (n= 742)	North-east (n= 866)	North-west (n= 1882)	South-east (n= 324)	South-South (n= 186)	Southwest (n= 634)
Age of child	χ^2=27.14 p=0.000	χ^2=16.67 p=0.001	$\chi2$=17.29 p=0.003	$\chi2$=39.69 p=0.000	$\chi2$=20.88 p=0.000	$\chi2$=22.77 p=0.000
Number of ANC	χ^2=201.56 p=0.0000	$\chi2$=137.60 p=0.0000	$\chi2$=292.33 p=0.0000	$\chi2$=17.12 p=0.0156	$\chi2$=108.31 p=0.0000	$\chi2$=116.32 p=0.0000
Birth Order	$\chi2$=12.90 p=0.0176	$\chi2$=2.75 p=0.5837	$\chi2$=7.50 p=0.1165	$\chi2$=2.68 p=0.5214	$\chi2$=8.84 p=0.0665	$\chi2$=15.86 0.0012
Age of mothers	$\chi2$=23.81 p=0.0016	$\chi2$=8.27 p=0.1896	$\chi2$=4.33 p=0.4611	$\chi2$=4.32 p=0.4369	$\chi2$=2.14 p=0.8000	$\chi2$=1.15 p=0.8935
Mother's level of education	$\chi2$=208.38 p=0.0000	$\chi2$=117.89 p=0.0000	$\chi2$=178.93 p=0.0000	$\chi2$=17.23 p=0.0029	$\chi2$=31.57 p=0.0003	$\chi2$=68.11 p=0.0000
place of residence	$\chi2$=14.94 p=0.027	$\chi2$=80.58 p=0.000	$\chi2$=63.64 p=0.000	$\chi2$=0.80 p=0.476	$\chi2$=8.34 p=0.064	$\chi2$=68.61 p=0.000
Religion	$\chi2$=89.96 p=0.000	$\chi2$=29.59 p=0.000	$\chi2$=125.80 p=0.000	$\chi2$=2.96 p=0.461	$\chi2$=3.49 p=0.323	$\chi2$=8.23 p=0.077
Wealth index	$\chi2$=131.05 p=0.000	$\chi2$=126.86 p=0.000	$\chi2$=162.70 p=0.000	$\chi2$=31.69 p=0.000	$\chi2$=36.58 p=0.000	$\chi2$=74.82 p= 0.000
Family Type	$\chi2$=23.17 p=0.0011	$\chi2$=13.05 p=0.0045	$\chi2$=22.08 p=0.0012	$\chi2$=10.98 p=0.0019	$\chi2$=0.21 p=0.6694	$\chi2$=0.74 p=0.5299
Household Decision Making	$\chi2$=18.83 p=0.0085	$\chi2$=5.63 p=0.2814	$\chi2$=100.37 p=0.0000	$\chi2$=3.47 p=0.4680	$\chi2$=0.69 p=0.7830	$\chi2$=1.65 p=0.5511
Mass media	$\chi2$=106.36 p=0.0000	$\chi2$=52.21 p=0.0000	$\chi2$=78.02 p=0.0000	$\chi2$=12.77 p=0.0015	$\chi2$=1.24 p=0.2832	$\chi2$=6.02 p=0.0480
Number of Living Children	$\chi2$=9.67 p=0.0017	$\chi2$=0.01 p=0.9166	$\chi2$=1.92 p=0.2243	$\chi2$=2.35 p=0.1601	$\chi2$=4.70 p=0.0837	$\chi2$=17.70 p=0.0001

However, the family type and prevalence of zero-dose vaccination at birth vary across the country, significant relationships existed in the North-central (χ^2=23.17; p=0.0011); North-east ($\chi2$=13.05; p=0.0045), North-west ($\chi2$=68.61; p=0.000) and South-south ($\chi2$=10.98; p=0.0019), majority of

children from monogamous family do not get vaccinated at birth. There was significant association between mass media and prevalence of zero-dose vaccination at birth vary across the country, significant relationships existed in the North-central ($\chi2$=106.36; p=0.0000); North-east ($\chi2$=52.21; p=0.0000), North-west ($\chi2$=78.02; p=0.0000), South-south ($\chi2$=12.77; p=0.0015) and South-west ($\chi2$=6.02; p=0.0480), majority of mothers not exposed to mass media in Northern region do not get child vaccinated at birth whereby women that exposed to mass in mass media do not got child vaccinated. This was similar to the study by Farrenkopf *et al*., (2023), who stated that proportion of zero dose children among those whose mothers access TV and radio less than once a week.

Regional predictors of zero-dose vaccination at birth in Nigeria

The results in Table 3 show that women attending 1-3 antenatal care (ANC) visit, 4-7 ANC visits, and 8 ANC visits were less likely to had zero-dose vaccination for children at birth compared to those with no ANC visits (RC), this follows the same pattern in North-central (57%, 78%, 83% respectively), North-east (64%, 88%, 89% respectively) and North-west (74%, 89%, 93% respectively).

Similarly, women attending 4-7 ANC visits and 8 visits above in the South-east (83%, 82% respectively), South-south (96%, 83% respectively), and South-west (81%, 92 respectively) were less likely had zero-dose vaccination for child at birth. This were consistent with those of Etana and Deressa (2012), who found that children whose mothers had ANC were 2.1 times more likely to complete vaccination than those whose mothers did not have ANC. If women receive prenatal care, they have a greater chance of receiving sufficient information about the importance of early immunisation for their offspring. In addition, the processes performed during antenatal care prepare the mother to have a cheerful disposition toward the utilisation of health care for herself and her children.

In the northeast, those having 4^{th}-5^{th} births were 7.10 times more likely to had zero-dose vaccination for child at birth than those having their first birth (RC). This could be because mothers are taking care of more children, preventing them from having regular vaccines for their newborns at delivery time. In contrast, Gill and Devgun (2015) stated that the likelihood of a person being vaccinated was inversely proportional to their birth order. It was shown that those with birth orders of two or less had a likelihood of 2.9 times greater of being fully vaccinated than those with birth orders of three or more. The implication is that as the birth order increases, the likelihood of not vaccinating the child at birth also increases. The suggested reason is that mothers with higher birth orders may face challenges in providing regular vaccines for their newborns, possibly due to the increased responsibilities of caring for multiple children.

The older the age of women, the less likelihood of zero-dose vaccination at birth in North-central and North-east of Nigeria, those reported at age 20-24 yrs (67% and 85% respectively), 25-29yrs (77% and 86% respectively), 30-34yrs (83% and 92% respectively) and 35yrs above (87% and 80% respectively) compared to those reported at age 15-19 yrs (RC). This agrees with previous studies by Adedokun *et al*. (2017) that older women have a greater chance of immunising their children. Young mothers' lack of childcare experience may be blamed for this situation. Caring for ill children is a drain on the time and resources of older mothers who have been there. These mothers would support any effort that reduced the risk of childhood sickness. There is a positive association between the age of women and the likelihood of having their children immunised at birth.

In the South-south, women with secondary education were 95% less likely to had zero-dose vaccination for child at birth compared to women with no formal education (RC). The study by Ophori *et al*. (2014) found that mothers' post-secondary education level was a significant factor in their timely presentation for birth dosage vaccination, lending credence to the assertion that educated women are more likely to prioritise their children's health. Similarly, those reported that husbands had primary and secondary education in North-central were 0.34 times and 0.41 times less likely to had zero-dose vaccination for child at birth than those with no formal education (RC). Also, those reported husbands with higher education were 0.26 times less likely to had zero-dose vaccination for child at birth than those with no formal education (RC). This shows that education for mothers and their husbands is a significant factor in improving child vaccination rates. Promoting education, particularly at the secondary and higher levels, may contribute to a higher awareness and prioritisation of children's health, leading to increased rates of timely vaccination.

Table 3: Multi-level logistic regression of regional predictors of zero-dose vaccination at birth in Nigeria

Category	North-Central OR (95% CI)	North-East OR (95% CI)	North-West OR (95% CI)	South-East OR (95% CI)	South-South OR (95% CI)	South-West OR (95% CI)
Place of Delivery						
Home	**1** (RC)	**1** (RC)	**1** (RC)	**1** (RC)	**1** (RC)	**1** (RC)
Public facility	0.36 (0.21-0.62)***	0.27 (0.13-0.54)***	0.46 (0.27-0.80)**	0.56 (0.20-1.56)	0.04 (0.01-0.31)**	0.60 (0.26-1.37)
Private facility	0.47 (0.25-0.87)*	0.25 (0.03-1.99)	0.46 (0.08-2.59)	0.82 (0.30-2.26)	NA	0.86 (0.33-2.19)
ANC Visit						
No visit	**1** (RC)	**1** (RC)	**1** (RC)	**1** (RC)	**1** (RC)	**1** (RC)
1-3 visit	0.43 (0.23-0.79)**	0.36 (0.16-0.80)*	0.26 (0.14-0.46)***	0.27 (0.06-1.35)	0.37 (0.08-1.67)	0.62 (0.15-2.57)
4-7 visit	0.22 (0.13-0.37)***	0.12 (0.05-0.26)***	0.11 (0.07-0.19)***	0.17 (0.04-0.74)*	0.04 (0.01-0.18)***	0.19 (0.06-0.62)**
Eight visit above	0.17 (0.08-0.39)***	0.11 (0.03-0.43)**	0.07 (0.03-0.21)***	0.18 (0.04-0.82)*	0.17 (0.04-0.81)*	0.08 (0.03-0.27)*
Birth Order						
1st	**1** (RC)	**1** (RC)	**1** (RC)	**1** (RC)	**1** (RC)	**1** (RC)
2nd - 3rd	0.53 (0.27-1.030	2.34 (0.75-7.32)	0.98 (0.41-2.33)	0.91 (0.27-3.09)	4.05 (0.75-21.94)	1.97 (0.75-5.18)
4th - 5th	0.70 (0.23-2.14)	7.10 (1.29-39.06)*	1.71 (0.57-5.13)	0.33 (0.03-3.38)	2.71 (0.12-60.36)	1.04 (0.14-7.93)
> or equal 6	1.51 (0.40-5.62)	4.28 (0.62-29.48)	2.02 (0.59-6.89)	0.31 (0.02-4.05)	1.93 (0.06-57.37)	1.53 (0.16-14.94)
Age of women						
15-19 yrs	**1** (RC)	**1** (RC)	**1** (RC)	**1** (RC)	**1** (RC)	**1** (RC)
20-24 yrs	0.33 (0.13-0.88)*	0.15 (0.03-0.82)*	1.35 (0.48-3.80)	0.44 (0.02-8.82)	0.12 (0.01-2.50)	1.79 (0.12-26.58)
25-29 yrs	0.23 (0.08-0.63)**	0.14 (0.02-0.84)*	0.71 (0.23-2.18)	0.41 (0.02-7.39)	0.11 (0.00-2.68)	1.06 (0.07-16.82)
30-34 yrs	0.17 (0.05-0.51)**	0.08 (0.01-0.51)**	0.51 (0.15-1.72)	0.45 (0.02-8.70)	0.16 (0.01-4.29)	0.63 (0.04-10.25)
35+ yrs	0.13 (0.04-0.42)**	0.20 (0.03-1.40)	0.54 (0.15-1.90)	0.16 (0.01-3.45)	0.12 (0.00-3.11)	0.48 (0.03-8.07)
Women's level of education						
No formal education	**1** (RC)	**1** (RC)	**1** (RC)	**1** (RC)	**1** (RC)	**1** (RC)
primary	0.68 (0.39-1.19)	1.16 (0.50-2.69)	1.04 (0.57-1.89)	1.45 (0.28-7.61)	0.15 (0.01-2.31)	0.84 (0.34-2.10)
secondary	0.55 (0.29-1.02)	0.59 (0.23-1.52)	0.55 (0.27-1.12)	0.89 (0.17-4.75)	0.05 (0.00-0.78)*	1.15 (0.44-2.99)
higher	0.22 (0.04-1.15)	0.48 (0.07-3.26)	0.70 (0.16-3.13)	0.72 (0.07-7.54)	0.22 (0.01-7.06)	0.52 (0.09-3.13)
Husband's level of education						
No formal education	**1** (RC)	**1** (RC)	**1** (RC)	**1** (RC)	**1** (RC)	**1** (RC)
Primary	0.34 (0.17-0.67)**	1.87 (0.73-4.82)	0.75 (0.41-1.40)	2.10 (0.24-18.64)	0.13 (0.00-5.85)	0.52 (0.20-1.35)
Secondary	0.41 (0.22-0.78)**	0.94 (0.42-2.12)	0.58 (0.33-1.02)	1.44 (0.16-12.92)	0.09 (0.00-3.86)	0.43 (0.19-1.00)
Tertiary	0.40 (0.15-1.08)	1.29 (0.39-4.20)	0.48 (0.22-1.04)	NA	0.06 (0.00-3.91)	0.26 (0.07-0.96)*
Community Factors						
Education	0.36 (0.10-1.28)	0.54 (0.06-4.93)	0.11 (0.01-1.03)	1.28 (0.09-18.41)	0.24 (0.02-3.72)	0.18 (0.03-1.00)
Poverty	0.43 (0.14-1.34)	2.79 (0.39-19.78)	0.25 (0.07-0.98)*	0.56 (0.04-7.28)	0.66 (0.03-14.86)	0.88 (0.15-5.08)
Health decision making	2.40 (0.77-7.52)	0.08 (0.01-0.65)*	0.21 (0.04-1.12)	0.52 (0.05-5.71)	1.51 (0.10-23.28)	0.59 (0.12-2.81)
Exposed to mass media	0.32 (0.12-0.88)	8.47 (1.22-58.76)*	0.39 (0.09-1.65)	0.08 (0.01-0.99)*	2.74 (0.09-81.23)	0.38 (0.02-5.76)

Category	North-Central OR (95% CI)	North-East OR (95% CI)	North-West OR (95% CI)	South-East OR (95% CI)	South-South OR (95% CI)	South-West OR (95% CI)
/lnsig2u	-1.10 (-2.66-0.46)	0.70 (0.04-1.36)	0.23 (-0.39-0.85)	0.25(-1.25-1.75)	-9.68 (-63.07-43.70)	-11.10(-70.28-48.08)
sigma_u	0.58 (0.26-1.26)	1.42 (1.02-1.97)	1.12 (0.82-1.53)	1.13(0.54-2.39)	0.01 (0.00 - 1.00)	0.00 (0.00 - 1.00)
rho	0.09 (0.02-0.33)	0.38 (0.24-0.54)	0.28 (0.17-0.41)	0.28 (0.08-0.64)	0.00 (0.00-1.00)	0.00 (0.00-1.00)
LR test of rho=0: chibar2(01)	2.42; P>0.001	35.53; P<0.001	29.83; P<0.001	4.22; P<0.05	0.000019; P>0.05	0.000035; P>0.05
Log-likelihood	-342.00 P<0.001	-287.62; P<0.001	-476.35; P<0.001	-154.74; P>0.05	-68.60; P<0.05	-172.64; P<0.05

OR- Odds Ratio, RC- Reference Category, NA – Not Available, * P-value<0.05, **P-value<0.01, ***P-value<0.001

In the North-west, children living in a poor community were 0.25 times less likely to had zero-dose vaccination at birth. In the northeast, children born to women participating in household decision-making were 92% less likely to had zero-dose vaccination at birth. Furthermore, children born to women exposed to mass media in the northeast were 8.47 more likely to had zero-dose vaccination at birth. In contrast, those exposed to mass media in the southeast were 92% less likely to had zero-dose vaccination for child at birth.

CONCLUSION AND RECOMMENDATIONS

The study indicates that prevalence of zero-dose vaccination at birth was higher in the North-east and North-west of Nigeria. It was discovered that many of the children under 24 months are male, they were delivered at home because their mothers did not have antenatal care visit. It was also reported many of their mothers gave birth to six or more children, they resided in rural areas and had no formal education.

The findings highlighted that significant relationships existed between some characteristics (age of child and wealth index), but the relationship varied among some characteristics (place of residence, religion and age) while there were no significant relation between some characteristics (sex) and prevalence of zero-dose vaccination at birth across the country.

The study recommends the need to promote facility-based births to reduce the likelihood of zero-dose vaccination significantly. Increasing awareness and access to ANC, particularly among women with lower visit rates, is a crucial opportunity to provide information and prepare mothers for the importance of early immunisation. Interventions are proposed to target mothers with multiple children, recognising their challenges regarding childcare and vaccine accessibility. Efforts are suggested to empower and educate older mothers, leveraging their accumulated childcare experience and supportive attitudes toward healthcare utilisation. Promoting maternal and husband education is emphasised, with a call for policymakers to prioritise educational initiatives, especially at the secondary and higher levels. Tailoring community-specific strategies is identified as essential, acknowledging the diverse impacts of community factors on vaccination outcomes. Policymakers and public health professionals are encouraged to customise interventions based on unique circumstances, including economic status, women's empowerment, and the effectiveness of mass media campaigns in each region.

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AWARENESS OF PLATFORM COOPERATIVES AMONG MEMBERS OF LAGOS STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY COMMUNITY

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ABSTRACT
Despite the promotion of cooperatives to raise the livelihood of Nigerians, poverty and income inequality have remained high. The world is also witnessing a rising digitalised economy and conventional cooperatives cannot be enough in these regards. It is therefore necessary to study Platform Cooperatives (PC) that is done on the web. The study investigated the awareness and challenges of PC in the Lagos State University of Science and Technology Community. Convenience sampling was used to select 137 respondents. Data was collected using questionnaires on personal characteristics, awareness and perceived challenges to participation in PC. Frequencies and percentages were used for data presentation. Results show that 44.5% of the respondents were male, 97.9% had higher formal education and 48.2% belonged to conventional cooperative societies. The majority (56.2%) of the respondents were aware of PC while lack of trust in online business (84.7%), poor internet access (84.7%), internet fraud (83.9%) and poor electricity infrastructure (80.3%) were envisaged challenges to participating in PC. The government should promote strong regulations to boost the trust of the people and assure security against fraud for internet-based businesses.
Keywords: Platform cooperative, Digital business, Web trading.

INTRODUCTION

Platform Cooperatives (PC) are a form of business carried out on the web in which exchange processes are consummated and buyers and sellers pay for using the medium and also have the opportunity of sharing from its financial surplus upon subscription (Ogunyemi, *et al*, 2021). The PC is similar to conventional cooperatives (CC). Conventional cooperatives can be consumer, producer or multipurpose cooperatives established for resource intermediation among the members, the cooperating group generates financial surplus from its activities and shares same among the members at the end of the financial year with all having equal voting rights. The only difference is that PC is done through the Internet while CC is done through physical contacts, both promoting the economic fortune of participants (Marathe, 2017). The ownership, operation and benefits of PC are for those using its services with the principles of one man one vote and non-discrimination in line with how Rochdale Pioneers started cooperatives in 1844 as cited in Mayo (2015). On membership, one must be of contractual age, automatically become a member of the PC upon subscription, qualify to consummate exchange process on the internet platform and share from the operational surplus at the end of the financial year.

Notwithstanding the promotion of all forms of conventional cooperatives to raise the livelihood of Nigerians, income inequality has continued to increase. Average income is low and poverty is very high in Nigeria with 40% of her citizens living below 137,430 naira (US$381.75) per year, the country's line of poverty, which translates to US$1 per day (World Bank, 2022). The ugly situation demands for an additional effort like the promotion of PC, the concept that was birthed by Scholz (2014). Scholz (2014) stated PC as a form of cooperative to engender income and wealth distribution in favour of more inhabitants of the world as against any other forms of business that are done through the internet in which the promoters and shareholders take all the profits. Consequently, PC deserves to be given attention in any country to improve the income and wealth of citizens.

Studies on cooperative, Bhuyan (2007); Oduyoye *et al*. (2013); Onugu and Nwankwo (2013); Onugu and Abdulahi (2013); Kassali *et al*. (2013) and International Cooperative Alliance (2015) focused on profitability, marketing, other business management related concepts and none referred PC. So, apart from the early reports of Scholz (2014), Borkin (2019), Zhu and Marjanovic (2021) and the pioneering work of Ogunyemi *et al*. (2021) in Nigeria; literature on PC has remained slim according to Zhu and Marjanovic (2021) and Philipp *et al*., (2021). Ogunyemi *et al*. (2021) reported PC as a cooperative model that is feasible and financially viable in Nigeria among agripreneurs. However, many studies, including Khalfan and Akbar (2006), Al-Alawi and Kuzic (2008), Agwu (2014) and Oluwagbemi (2016), have been done on the challenges of e-business generally but not directly on PC which is operated online as an e-business.

The study adds to the lean literature on PC and exposes intending PC promoters and cooperatives policymakers to the potential and active challenges that can discourage PC implementation and progress in the country. The study is equally important due to

the veritable capacity of PC to reduce income inequality and boost buyers' and seller's income through the web business.

The underpinning motivation for this study, however, emanated from the 30th Annual National Congress of the Rural Sociological Association of Nigeria, when the feasibility of PC was presented. The audience underscored the necessity for a study on the challenges of PC for potential operators, participants and policy inputs in Nigeria. Also, the increasing digital economy in the global terrain adds impetus to the study. The PC operation in Nigeria will increase the share of the country in the world digital business, thus bringing Nigeria from her lagging position in digital applications as reported by Oluwole (2021).

Also, the growing number of internet users in Nigeria through different channels such as mobile phones and computers adds to the spur of studying PC in the country. Internet users are increasing despite information communication technology and internet infrastructural challenges. Internet users rose from 126,078,999 in December 2019 to 154,301,195 in December 2020 (NCC, 2022). There is a growing usage of the internet facilities as a market where buyers and sellers consummate exchange on different commodities and services in all localities in Nigeria, especially in the cities. PC will take advantage of these business opportunities and offer the advantage of bringing buyers and sellers together whereby they also share from the profit of the business platform as members. The adoption of PC will therefore add to income and wealth generation for wider economic agents.

Given the foregoing, it is necessary to examine the possible challenges that PC will face if promoted in the socio-economic and business terrain of Nigeria. The study therefore aimed at analysing awareness of Platform Cooperatives and the limiting factors to promoting and running PC in the study area.

The specific objectives are to:

1. describe the personal characteristics of the respondents
2. ascertain the awareness of the respondents about Platform Cooperatives
3. identify challenges to participation in Platform Cooperatives

METHODOLOGY

The study was carried out in 2022 and adopted convenience sampling to administer questionnaires to 137 respondents within the campus of the Lagos State University of Science and Technology, Ikorodu, Lagos State. The respondents were met in their offices, restaurants or classrooms as applicable. The sampling technique was used to be less costly and efficient for the study. The subject of study, Platform Cooperatives is a new cooperative model that requires interacting with the respondents for them to have clear understanding of it before completing the questionnaire. The adopted sampling technique, though, might not provide representative results, the growing knowledge of conventional cooperatives and e-business among virtually every adult in the university community ensured that the questionnaires were completed as expected to provide comparable findings. Only respondents that were of legal contractual age of 18 years minimum were used. Frequency count and percentage were used for analysis.

The measurement of awareness level has three levels (Gafoor, 2012). According to the author, the first level is the possession of knowledge and/or understanding of any socioeconomic circumstance. The second and third levels of awareness measurement are awareness relating to self-perception in which one gives perspicacity and judgement about herself, reflecting personal peculiarity about a circumstance; and the awareness that is defined by the capability to deal with circumstances, situations or certain tasks, respectively.

Awareness which is defined as understanding and/or knowledge of a situation is adopted for the study in line with Elia (2017). The reason for this is that Platform Cooperatives is a business model that is being put forward for acceptance to improve income generation, distribution and wealth creation. An individual can only give judgment on what he has used or applied directly or indirectly. Likewise, this study does not relate to reflecting individual ability to deal with situations. Awareness is therefore operationalised as:

Awareness = Respondent knowledge of Platform Cooperatives (Aware = Yes and Not Aware = No)

RESULTS AND DISCUSSION

Personal characteristics of respondents

Table 1 shows that the majority (44.5%) of the respondents were male, had minimum of National Diploma (97.8%), 62.04% were within the age bracket of 21 to 40 years while 48.2% belonged to conventional cooperatives.

This result implies that the respondents are young, highly educated and are members of one conventional cooperative or the other hence, have the capacity to understand platform cooperatives. This result is unlike the findings of Ogunyemi *et al*. (2021) where the majority belonged to other forms of conventional cooperatives.

Table 1: Distribution of respondents by personal characteristics (n-137)

Characteristics	Frequency	Percentage
Gender		
Male	61	44.5
Female	76	55.5
Formal Education		
Primary	1	0.7
Secondary	2	1.5
National Diploma (ND)	53	38.7
Higher ND/BSc	55	40.2
PGD/MSc	24	17.5
PhD	2	1.5
Age (Years)		
≤ 20	24	17.5
21 – 40	85	62.0
41 – 61	28	20.4
Membership of conventional cooperatives		
Yes	66	48.2
No	71	51.8
Awareness of Platform Cooperatives		
Yes	77	56.2
No	60	43.8
Total	**137**	**100.0**

Awareness of platform cooperatives among the respondents

Figure 1 indicates that the majority (56.2%) of the respondents were aware of platform cooperatives. This implies that for respondents to be aware of platform cooperatives, they are likely to participate in one although it is in contrary to the findings of Ogunyemi *et al*. (2023) and Ogunyemi *et al*. (2021) that found otherwise.

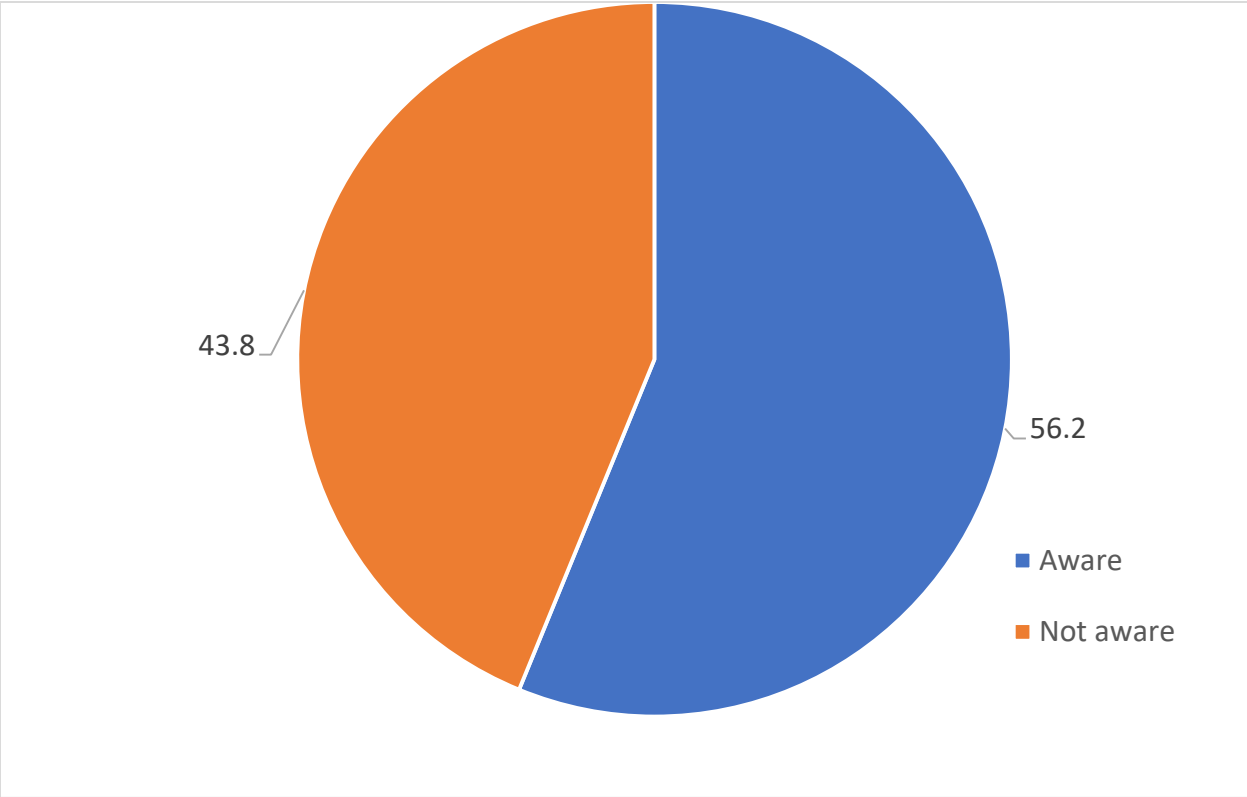

Figure 1: Awareness of platform cooperatives among the respondents

Challenges to participating in platform cooperatives

Table 2 shows that 84.7% of the respondents indicated that lack of trust to participate in online business due to fraud within the platform and low level of internet access which is poor in some localities respectively. The majority (83.9%) also indicated fraud by hackers and poor electricity supply (80.3%), poor internet infrastructure (78.8%), illiteracy rate (74.5%) and low level of digital literacy (72.3%). Other constraints identified were regulatory inefficiency (67.2%), low income (59.9%) and high cost of logistics for delivery of goods (59.1%).

This implies that to use internet service for business transactions in Nigeria, one needs to buy internet-enabled mobile phone or computer, data, and electricity to charge and power the gadget which are all costly items. This result is in support of the findings of Oluwagbemi (2016), Agwu (2014), and Al-Alawi and Kuzic (2008) that reported a lack of trust, internet fraud, poor electricity infrastructure and poor internet access.

Table 2: Respondents' challenges to participating in platform cooperatives (n-137)

Challenges	Yes (%)	No (%)
Lack of trust to participate in online business	84.7	15.3
Low and poor internet access	84.7	15.3
Online fraud by hackers	83.9	16.1
Poor electricity infrastructural supply	80.3	19.7
Poor internet infrastructure	78.8	21.2
Adult illiteracy rate	74.5	25.6
Low level of digital literacy	72.3	27.7
Regulatory inefficiency	67.2	32.9
Low income of an average Nigerian	59.9	40.2
High cost of logistics for delivery of goods	59.1	40.9
Competition with conventional cooperatives	59.1	40.9

CONCLUSION AND RECOMMENDATIONS

The study deduced that the majority of the respondents are aware of the Platform cooperative while constraints identified to participation in Platform cooperative include lack of trust, poor internet access, internet fraud, poor electricity and internet infrastructure, illiteracy level, low digital literacy among adults and inefficient regulators supporting the model. Notwithstanding these challenges, non-governmental organisations, cooperative participants and regulators should embrace PC for Nigeria to take advantage of the rising digital economy. Therefore, government internet business operational regulators should ensure that standards are upheld in the deployment of internet infrastructure for online business. Also, the government should promote cyber security and regulatory frameworks to reduce internet business fraud and boost the trust of people in using the internet for business transactions. Digital literacy should also be promoted for the operation of PC.

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EROSION CONTROL MEASURES ADOPTED BY RURAL FARMERS IN IKEDURU LOCAL GOVERNMENT AREA OF IMO STATE, NIGERIA

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ABSTRACT
The study assessed erosion control measures adopted by rural farmers in Ikeduru local government area (LGA) of Imo State, Nigeria. Two-stage sampling procedure was used to select 120 rural farmers. Data were gathered on erosion prevalence and control measures in the study area. Data collection was through a structured questionnaire and analyzed using mean and percentage. Findings revealed that water erosion ($\bar{x}$= 4.09), wind erosion ($\bar{x}$=3.25) and gully erosion ($\bar{x}$ =3.08) were the most prevalent forms of soil erosion. Furthermore, planting trees on the farm to serve as windbreaks ($\bar{x}$=3.61), planting trees on the farm to serve as shade against harsh temperatures ($\bar{x}$=3.53), planting of cover crops ($\bar{x}$=3.45), mulching ($\bar{x}$=3.27) and using improved crop varieties ($\bar{x}$=3.22) were the erosion control measures adopted by rural farmers. The study recommended that extension agents should continuously educate rural farmers on the need for the consistent adoption of appropriate erosion control measures that would assist farmers in coping with the high prevalence of soil erosion in the study area.
Keywords: Rural farmers, Soil erosion, Control measures

INTRODUCTION

Soil erosion is a global environmental problem that reduces the productivity of all natural ecosystems and agriculture Ewetola *et al*. (2021). The most pressing challenge of Nigerian agriculture in the new millennium is how it can meet the food needs of an ever-increasing population in the face of the myriads of social, cultural, economic and environmental problems that negate sustainable land management (Saheed and Isa, 2017). Soil erosion is a well-known environmental problem with a multiplicity of social and economic consequences in various parts of Southeast Nigeria, Ikeduru local government area inclusive. It has also been identified as a disastrous form of environmental degradation whose effect is multi-dimensional (Nwobodo, Otunwa, Ohagwu and Enibe, 2018). Akinbile, Aminu and Kolade (2018) asserted that disasters caused by erosion affect the livelihoods of rural people through its effects on their farming activities and sustenance. These effects on the livelihood of rural farmers include loss of arable lands, poor crop yields, loss of residential homes, and loss of income (Okorafor, Akinbile and Adeyemo, 2017). The threat to sustainable environmental and agricultural productivity has led to considerable interest in soil conservation measures that aid in the control of soil erosion. Such erosion measures include tillage, mulching, alley farming, ridge-furrow systems, contour farming, contour bunds, terraces and vegetative barriers (Ewetola *et al.,* 2021). Farmers are thus expected to adopt these erosion control measures to reduce the effects of erosion on their livelihoods. However, Ewetola *et al.* (2021) and Prosdocimi *et al.* (2016) noted that some erosion control measures are associated with one or more problems that makes it difficult for rural farmers to adopt. An example is the use of terracing which requires high labour and investment costs for smallholder farmers (Chapagain and Manish, 2017). Ewetola, Babarinde, Omirin and Ojewole (2017) also noted that certain erosion control measures adopted by farmers were not well suited to their environmental conditions. It is in this regard that the study sought to assess the adoption of erosion control measures by rural farmers in Ikeduru LGA Imo State using the following objectives to guide the study.

i. To examine the prevalence of soil erosion in the study area,
ii. To determine the erosion control measures adopted by rural farmers

METHODOLOGY

The study was carried out in Ikeduru LGA of Imo State, Nigeria. The Local Government area is one of the twenty-seven local government areas and is located in the western part of Imo State. It covers a total area of 179 square kilometres with an estimated population of 199,316 persons (National Population Commission, 2006).

A two-stage sampling procedure was adopted for the study. In the first stage, (12) communities were randomly selected from the LGA using a simple random sampling technique. The second stage involved the random selection of (10) respondents from each of the selected communities using a simple random sampling technique. This gave a total of (120) respondents for the study. Data collection was through a structured questionnaire and analysed using descriptive statistics such as mean and percentage.

The prevalence of soil erosion in the study area was measured using a 5-point Likert-type scale. A mean of 3.00 and above was regarded as a high prevalence of soil erosion, while a mean less than 3.00 was regarded otherwise. Soil erosion control measures adopted by farmers were also measured using a 5-point Likert-type rating scale. A mean of 3.00 and above was regarded as a soil erosion control measure adopted by the rural farmers, while a mean less than 3.00 was regarded otherwise.

RESULTS AND DISCUSSION

Prevalence of soil erosion in the study area

Results in Table 1 show that water erosion ($\bar{x}$= 4.09), wind erosion ($\bar{x}$= 3.25) and gully erosion (($\overline{x}$ = 3.08) were the prevalent types of soil erosion in the study area. This finding conforms with that of Nnamdi (2022) who reported that gully erosion was one of the most prevalent forms of soil erosion in various parts of Imo State. This finding is also in agreement with those of Igbokwe, Nwankwoala and Orluchukwu (2022) who reported a high prevalence of gully erosion in various parts of Anambra and Imo States.

Table 1: Distribution of farmers based on the prevalence of soil erosion in the study area

Prevalence of soil erosion	Mean
Water erosion	4.09*
Wind erosion	3.25*
Tillage erosion	2.80
Gully erosion	3.08*
Rill erosion	2.40
Sheet erosion	2.65
Grand mean score	**3.05***

Source: Field survey data, 2017

Erosion control measures adopted by rural farmers in the study area

Results in Table 2 reveal that planting of trees on the farm to serve as windbreaks ($\bar{x}$=3.61), planting of trees on the farm to serve as shade against harsh temperatures ($\bar{x}$=3.53), planting of cover crops ($\bar{x}$=3.45), mulching ($\bar{x}$=3.27), using improved crop varieties ($\bar{x}$=3.22), using minimum tillage operations ($\bar{x}$=3.16), intercropping ($\bar{x}$=3.14), early planting ($\bar{x}$=3.11), applying organic manure ($\bar{x}$=3.08), late planting ($\bar{x}$=3.07), and digging ridges across slopes in the farm against erosion ($\bar{x}$=3.02) were the main erosion control measures adopted in the study area. The grand mean score of the mean responses of farmers on the erosion control measures adopted in the study area is 3.23 which is greater than the benchmark mean score of 3.00, implying that the rural farmers in the study area were actively involved in adopting erosion control measures. This finding is in agreement with that of Umeh and Igwe (2019) who reported that crop rotation, reduced tillage, application of compost manure, cover cropping, planting of tolerant varieties and agroforestry were the sustainable agricultural practices adopted by rural farmers in Ebonyi State.

Table 2: Erosion control measures adopted by rural farmers

Erosion control measures	Mean
Using improved crop varieties	3.22*
Intercropping	3.14*
Mulching	3.27*
Planting of cover crops	3.45*
Applying organic manure	3.08*
Early planting	3.11*
Late planting	3.07*
Using minimum tillage operations	3.16*
Full tillage operation	2.75
Digging ridges across slopes in the farm against erosion	3.02*
Planting trees on the farm to serve as shade against harsh temperature	3.53*
Planting trees on the farm to serve as windbreaks	3.61*
Grand mean score	**3.23***

Source: Field survey data, 2017. Key: * indicates ≥3.0.

CONCLUSION

The study concluded that water, wind and gully erosion were the most prevalent forms of soil erosion in the study area. The study further concluded that planting trees on the farm to serve as windbreaks, planting trees on the farm to serve as shade against harsh temperatures, planting of cover crops, mulching, using improved crop varieties, using minimum tillage operations, intercropping, early planting, applying organic manure, late planting and digging ridges across slopes in the farm against erosion were the major erosion control measures adopted by rural farmers in the study area.

RECOMMENDATIONS

Farmers are encouraged to continuously adopt the practice of proper soil and water conservation methods in controlling water erosion occurrences. The use of terraces on steeply sloped farmlands and the creation of proper drainage channels to conduct large runoffs to safe outlets will also help in the control of the high prevalence of water erosion in the study area.

Extension agents should continuously educate rural farmers on the need for the consistent adoption of appropriate erosion control measures through the dissemination of proven soil management techniques that would assist farmers in coping with the high prevalence of soil erosion occurrences in the study area.

Cropping techniques such as bush burning, clean weeding, over-grazing and deforestation that contribute to soil erosion should be reduced.

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KNOWLEDGE GAP OF PRIMARY HEALTH CARE SYSTEM IN NIGERIA: A CONCEPTUAL DIFFERENCE IN AUTHOR'S AFFILIATION

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ABSTRACT
Globally, the assessment of health research to understand different content and gaps will support the effectiveness and attainment of sustainable development goals in 2023. This study investigated the knowledge gap of the Primary Health Care (PHC) system in Nigeria by the conceptual difference in the author's affiliation. The study used publication data from the PubMed database from 2015 to 2022 on Nigeria Primary Health Care (NPHC) OR Nigeria PHC. Two hundred and ninety-six (296) articles were reviewed for this study. At the multivariate level, a structural topic model was used to build and estimate the significant effect of topics, topic correlation and variability of topic relationship by author's affiliation (foreign or national authors). The results reveal that 59.2% of authors were Nigerian-based, highest journal publishers were PloS One and BMC Health Services Research. From the topic variability, research on disease prevention, quality health care, immunization and implementation of health care practices were mostly pioneered by foreign authors. In contrast, research on service/programmes, consequences, workers' knowledge and locality were from national-based authors. This study recommended targeted interventions to enhance healthcare workers' knowledge, emphasizing collaborative efforts among various healthcare professionals. Initiatives should focus on building the capacity of healthcare facilities, especially in rural areas, and promoting preventive measures such as immunization.

Keywords: Primary Health Care, Sustainable Development, PubMed, Author's Affiliation

INTRODUCTION

In a world where disease burdens are increasing and changing while health budgets are being cut at the same time, it is crucial to find practical approaches to developing and implementing evidence-based health services. This is the foundation for the target of Universal Health Coverage, which is part of the Sustainable Health Goals (Walley *et al*., 2018). The Alma Ata Declaration of 1978, which was drafted in the city of Alma Ata, the capital of the Soviet Republic of Kazakhstan, which was located in the Asian region of the Soviet Union, expressed the need for immediate action to be taken by all governments, all health and development workers, and the international community to protect and promote the health of all of the people of the world (Ata, 1978). The National Primary Health Care Development Agency (NPHCDA) was founded in 1992 to ensure the continuing and sustained implementation of the primary health care (PHC) agenda (Aregbeshola and Khan, 2017). The PHC under one roof (PHCUOR) strategy was established in 2011 to tackle the issue of fragmentation in primary healthcare (PHC) and guarantee the consolidation of PHC services under a single governing body. The influence of PHC under one roof on health status and utilization of PHC in Nigeria has yet to be experienced, as it was implemented as a national policy only a few years ago. The PHC centres' failure to deliver fundamental medical services to the Nigerian people has resulted in a surge of patients seeking care at secondary and tertiary healthcare facilities. This has had a detrimental impact on the secondary and tertiary levels of healthcare (Ugwu *et al*., 2020).

The availability of sufficient infrastructure, diagnostic medical equipment, pharmaceuticals, and adequately trained medical professionals is necessary for efficient delivery of healthcare services. In Nigeria, the delivery of healthcare services is frequently characterized by low funding and mismanagement, which harms both the coverage and quality of healthcare services (Oyekale, 2017). There has been numerous research on Nigeria's primary health care system (Abdulraheem *et al*., 2012; Aregbeshola, 2016; Ephraim-Emmanuel *et al*., 2018; Gyuse, Ayuk, and Okeke, 2018) but only a few investigate the performance of Nigeria health care system. Oyekale (2017) examines the assessment of primary health care (PHC) facilities' service readiness in Nigeria with a focus on the availability of some essential drugs and medical equipment. The predominance of Bibliometric subjects could be attributed to a marked interest in conducting studies related to educational and bibliometric aspects to assess the current state of research to draw relevant policies from it (Corrales *et al*., 2016). This study investigates the primary healthcare knowledge gap and a conceptual review of the authors' affiliations. This study addressed the following specific objectives:

i) Examine the top journal of affiliation on Nigeria's primary health care system between the year 2015-2022

ii) Ascertain the top 10 topics on Nigeria's primary health care system between 2015-2022.
iii) determine the topic differential between foreign and Nigerian/Home-base author's publications on the primary health care system.

METHODOLOGY

The study reviews literature from PubMed database https://www.ncbi.nlm.nih.gov/pubmed/ (National Network of Libraries of Medicine, 2004). A search was carried out in the R programming application (version 4.2.0). using easyPubMed package to fetch first-author journals from the PubMed database with search queries as follows such as (Nigeria PHC*[TIAB]) OR Nigeria primary health care [TIAB])) AND (("2015"[PDAT]: "2022"[PDAT])). Using the above search strategy, a total of 309 primary healthcare literature on Nigeria published between 2015 and 2022 were retrieved and 13 articles were not accessible. A total of 296 articles were eventually used for the citation analysis that, includes “pmid”, “doi”, “title”, “abstract”, “year”, “month”, “day”, “jabbrv”, “journal”, “keywords”, “lastname”, “firstname”, “address” and “email”. Data was transformed into PubMed data-frame and irrelevant stop words (such as “the”, “and”, “bot”, “for”, “is”, etc.) and alphanumeric characters ([^0-9A-Za-z///']) were removed from the title and address. Furthermore, other variable needed includes countries extracted from the addresses, concatenating the first and last name columns to generate the author's name.

The descriptive analysis investigated the most frequent word from the title, authors' country of affiliation, top journals of publication, top author's name and top authors by country of affiliation. A structural topic model (STM) was adopted at the multivariate level on the metadata to improve the assignment of words by author's affiliation to latent topics in the corpus data (Roberts *et al*., 2019).

RESULTS AND DISCUSSION

Figure 1 shows the most prevalent keywords from the 309 articles searched on PubMed. It shows that Nigeria's primary health care is the central theme of interest, having the largest width, followed by workers, rural areas, facilities and services. Other essential contents related to primary health care include prevention, utilization, management, control and others. This indicates a holistic approach to understanding, addressing challenges, and improving Nigeria's delivery and effectiveness of primary health care services. The prevalence of keywords related to Nigeria's PHC in Figure 1 indicates a comprehensive approach to understanding and addressing challenges in the delivery of healthcare services.

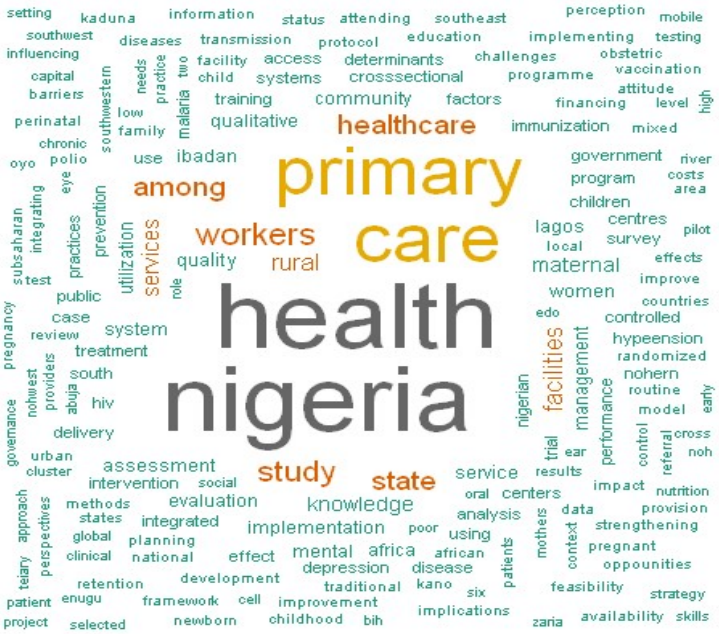


Figure 1: Description of publication by title

The result in Figure 2 reveals the top ten journal publishers on Nigeria's primary health care. PLoS One journal and BMC Health Service Research published the highest articles of 23 journals each. At the same time, Pan African Medical Journal and Health Policy Plan had 22 and 12, respectively. The least were the Annals of African Medicine and the African Journal of Primary Health and Family Medicine, with 4 journals each. The visualization of top journals in Figure 2 highlights the key players in disseminating research; this does not only showcase the vibrancy of research activities in the field of Nigeria's PHC but also serves as a valuable tool for decision-makers, researchers, and stakeholders to navigate the research landscape, ensuring that efforts are aligned with the most influential and reputable sources.

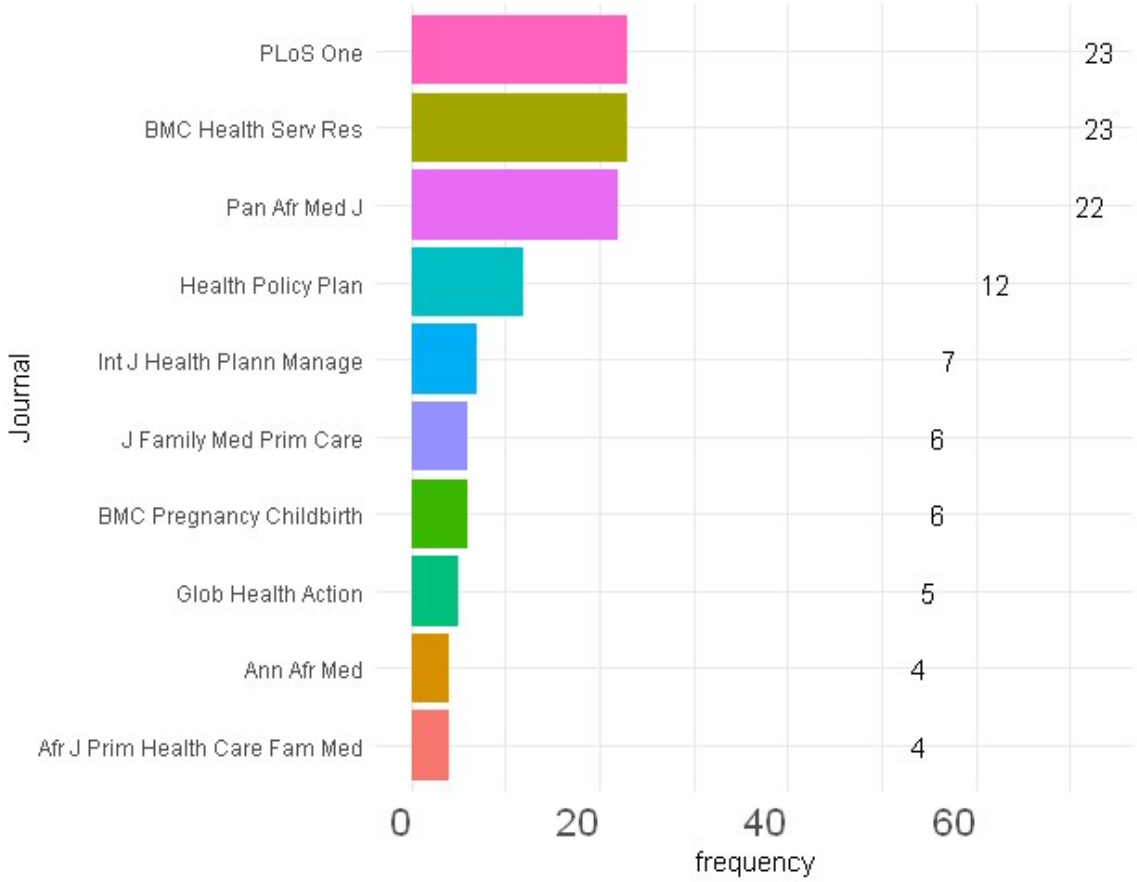


Figure 2: Top Journals of Publication

Figure 3 shows the distribution by meta-topic visualization from the title of journals. Notably, topic 7's prevalence of worker's knowledge of primary health care suggests a substantial interest in understanding and enhancing the skills and awareness of healthcare workers. This is crucial for improving the overall delivery of primary health care services. Du *et al*. (2019) stated that primary healthcare practitioners have a vital role in promoting, preventing, treating, and rehabilitating individuals. Effective primary healthcare (PHC) implementation depends on a collaborative effort from various healthcare professionals, including physicians, nurses, midwives, community and ancillary workers, and traditional practitioners. These individuals should be adequately trained to work together as a team and address the specific health concerns of the community. The concentration of articles on maternal health in topic 6 underscores the significance of maternal healthcare in the Nigerian primary health care discourse. It reflects a targeted focus on addressing maternal health challenges and improving outcomes. Topic 10's emphasis on the quality of health care highlights the ongoing efforts to assess and enhance the overall quality of primary health care services in Nigeria. The study by Eboreime *et al*. (2018) affirmed

that the absence of external support from development partners makes the planning and execution of PHC is nearly non-existent. As a result, while higher levels of government may establish ambitious objectives for primary healthcare (PHC), the actual execution of initiatives may be biased towards donors' interests.

Furthermore, the current configuration of the Local Government Area (LGA) system hinders the efficiency of Primary Health Care (PHC) interventions due to insufficient management capability and lack of political accountability at that level. Other topics, such as immunization (topic 8), disease prevention (topic 1), and primary health care in rural areas (topic 4), indicate a comprehensive exploration of critical areas in the primary health care system. This suggests a holistic approach to healthcare delivery, considering preventive measures, rural healthcare challenges, and specific programs like immunization. Figure 3's on metatopic distribution underscores the importance of healthcare worker knowledge, maternal health, and quality of healthcare in the discourse. This distribution is essential as it visually represents the thematic priorities within the discourse on Nigeria's PHC. This information guides research, policy, and interventions, ensuring that efforts are directed towards the most critical and impactful areas of improvement in the healthcare system.

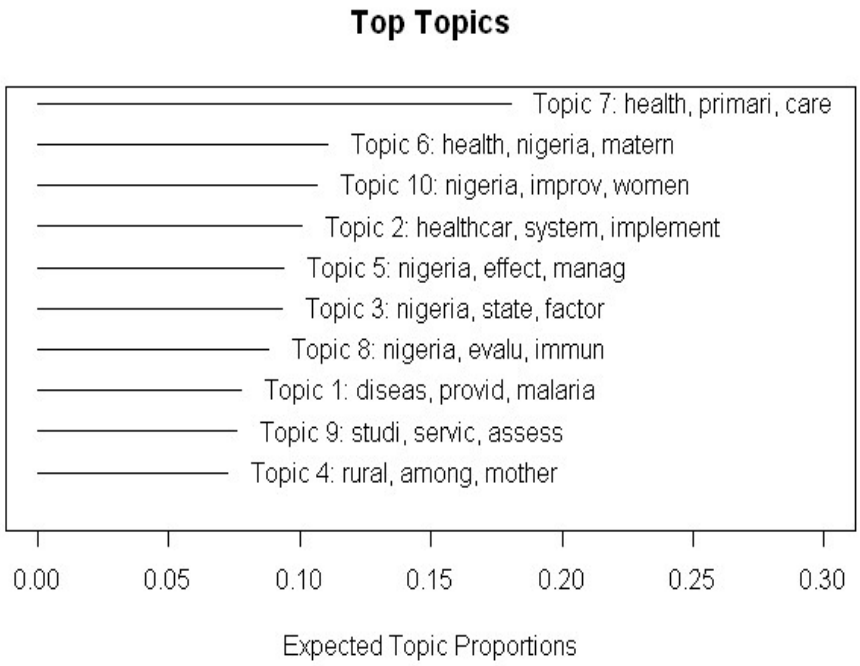


Figure 3: Metadata topic visualization

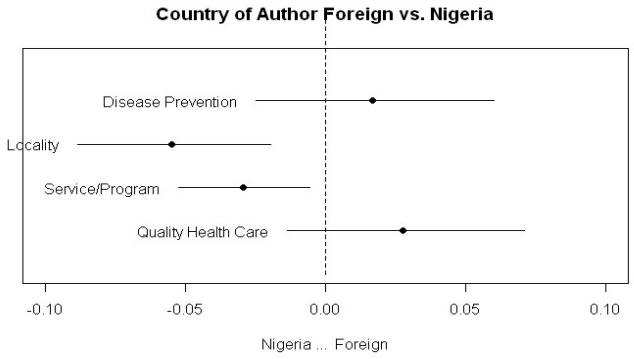
The result in figure 4 on the structural topic model (STM) reveals that the highest proportion of the topic model centred on worker's knowledge of primary health care, followed by maternal health, quality of health care, implementation of the health care system, effect of primary health care, a locality where the primary health care was located, immunization, disease prevention, primary health care service/program and primary health care in rural areas.

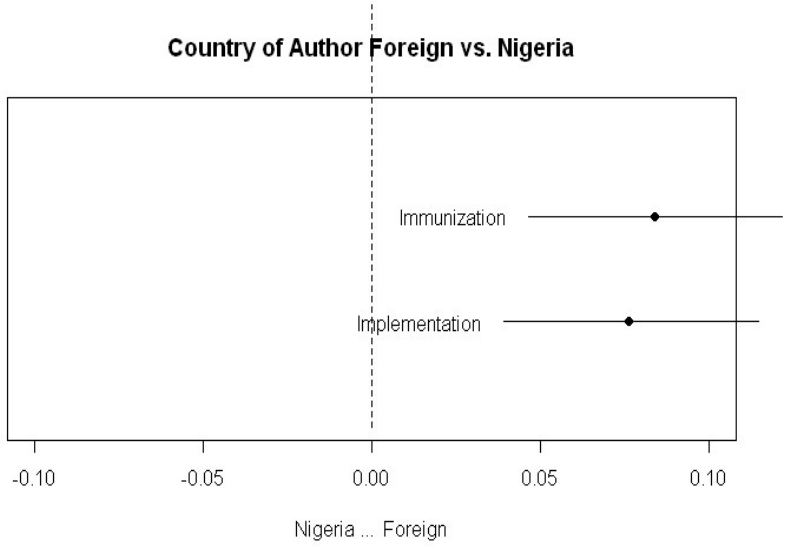
Most journals centred on disease prevention and quality of health care were foreign-based authors. This can be attributed to the pace of development of quality healthcare services in Nigeria which needs improvement. Ephraim-Emmanuel, Adigwe, Oyeghe, and Ogaji (2018) asserted that Nigeria, a country with a large population that has a ranking of 187 out of 200 on the list of countries with the best healthcare systems in the world, still has inadequate or non-existent health care standards and accreditation systems, low-quality health care services, inequitable distribution, and insufficient health care service delivery.

Scientific research by authors on the locality of primary health care and service/program provided was Home based authors. Similarly, research on the effect of primary health care and worker's knowledge showed that most authors were from Nigeria. This was reinforced by Akwaowo *et al*. (2020), who emphasize the role of primary health care as the first point of

contact with the healthcare delivery system. At that level, short-term, uncomplicated health issues should be addressed. At this stage, patients who require more specialized remedies are referred to secondary care, and efforts are made to promote and educate them about their health. Despite the high demand for these services, their quality could be better because these facilities need more infrastructure and personnel.

Lastly, research findings on immunization and implementation were from foreign-based researchers. Pantoja *et al*. (2017) stated that healthcare systems are tasked with the daunting task of enhancing the quality and safety of the services they provide to boost patient outcomes. However, they often need to employ the best evidence to support decisions on the implementation of specific healthcare initiatives, leading to inferior outcomes and inefficiency. Health and health behaviour results for patients, healthcare professional outcomes (such as sick leave), healthcare system outcomes (such as resource utilization), and societal outcomes are all influenced by implementation tactics. The structural topic model in Figure 4 further reinforces the prominence of workers' knowledge, maternal health, and healthcare quality in research. The identification of foreign-based authors dominating disease prevention and quality of healthcare topics suggests a possible disparity in healthcare development, with Nigeria needing help to meet international standards. Conversely, research on the locality of primary health care and worker's knowledge is largely driven by local authors, emphasizing the importance of indigenous perspectives in addressing healthcare challenge.





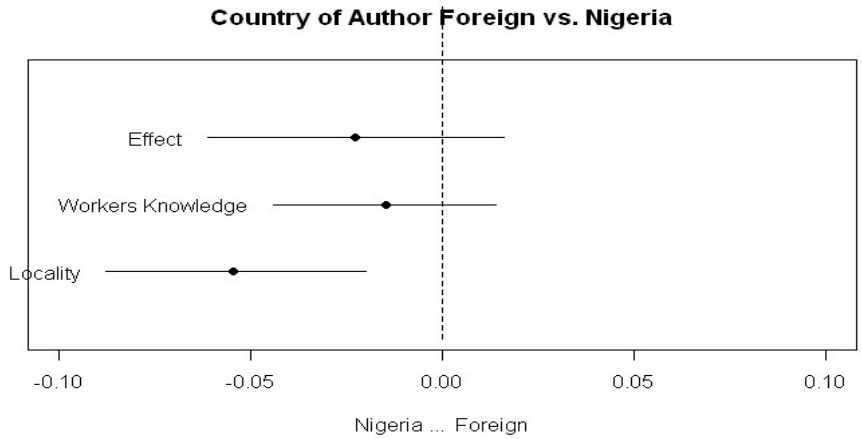


Figure 4: Estimate of Structural Topic Model on Primary Health Care Research in Nigeria

CONCLUSION AND RECOMMENDATION

The study examined the multifaceted nature of Nigeria's PHC system. Concentrating on worker's knowledge, maternal health, and health care quality indicates targeted efforts to improve healthcare delivery, especially in addressing maternal health challenges and enhancing overall service quality. The research findings also reveal challenges such as the influence of external donors, inefficient local government structures, and inadequate infrastructure contributing to the low quality of healthcare services. Based on the study's findings, several recommendations emerge. Firstly, there is a need for targeted interventions to enhance healthcare workers' knowledge, emphasizing collaborative efforts among various healthcare professionals.

Additionally, efforts should be directed towards improving maternal health, addressing healthcare quality, and strengthening the overall PHC system. Local government reforms and increased funding are imperative to overcome existing inefficiencies. Furthermore, initiatives should focus on building the capacity of healthcare facilities, especially in rural areas, and promoting preventive measures such as immunization. Lastly, fostering collaboration between local and foreign researchers can contribute to a more comprehensive understanding of Nigeria's PHC challenges and facilitate evidence-based decision-making for effective implementation of healthcare initiatives.

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CONSTRAINTS TO THE USE OF NARICT NEEM ORGANIC FERTILIZER AMONG SMALLHOLDER TOMATO FARMERS IN KADUNA STATE, NIGERIA

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ABSTRACT
Recognizing the myriad of deficiencies inherent in the use of inorganic fertilisers in developing countries, many agricultural-based agencies have advocated the use of organic fertilizers as an alternative to inorganic fertilizers. Therefore, this study described the constraints to the use of NARICT neem organic fertilizer among smallholder tomato farmers in Kaduna state. Four Local Government Areas (LGAs) were randomly selected from the four ADP zones of the state. One village was randomly selected from each of the four selected LGAs and then 11% of the tomato farmers from each of the four villages were randomly selected to arrive at the sample size. Data was collected using a structured questionnaire and both inferential and descriptive statistics were used in the analysis of the assembled data. The major constraint to the use of NARICT neem fertilizer was availability with 52.3% of the farmers, acknowledging it as a constraint and was ranked 1st, with slow action being ranked 2nd with about 45.6% while the high cost of transportation was ranked 4th with 41.7%. The average productivity of tomatoes in the study area was 1,820.3kg per hectare for non-NARICT organic fertilizer users, while for NARICT fertilizer users, their average tomato productivity was 2,226.11kg per hectare. Based on the research findings, it was concluded that even though NARICT neem organic fertilizer had some major use constraints, in the study area, its use results in some significant level of influence on the farmer's productivity and income.
Keywords: Constraints, NARICT neem organic fertilizer, smallholder tomato farmers

INTRODUCTION

Soil productivity maintenance is a major constraint on tropical agriculture. In the past, crop cultivation was usually moved between fields to enable the utilization of only fertile soils, without the use of fertilizers, for some years. However, this cannot be sustained to meet the demands of an increasing population. Tropical soils are adversely affected by sub-optimal soil fertility and erosion, causing the deterioration of the nutrient status and changes in soil organism populations (Economic Commission for Africa, 2011). The use of inorganic fertilizers can improve crop yields and soil pH, total nutrient content and nutrient availability. , but its use is limited due to scarcity, high cost and soil acidity (Agbede, Ojeniyi and Adeyemo, 2010).

Inorganic fertilizers while beneficial in the short term; have serious longer-term side effects, such as soil compaction, erosion and declines in the overall soil fertility along with health concerns as a result of the toxic chemicals entering the food supply; inorganic fertilisers are poisonous chemicals, pesticides and weedicides in which large number of the population that feed on this toxic substance used in conventional agriculture have fallen prey to diseases like cancer and other unknown diseases (Nnodim and Sunday, 2017).

Recognizing the myriad of deficiencies inherent in the use of inorganic fertilizers in developing countries, many agriculturally based agencies have advocated the use of organic fertilizer as an alternative to inorganic fertilizers (Emuh and Ofuoku, 2011). Also, Smile (2010) advocated that; organic fertilizer should be used as a means of maintaining and increasing soil fertility. It is in response to some of the challenges faced by the smallholder farmers; in Nigeria and improving food supply towards ensuring food security that the National Research Institute for Chemical Technology (NARICT) Zaria, in pursuance of its mandate, began studies aimed at producing minero-organic neem fertilizer that would be affordable, accessible, and eco-friendly.

Neem-base organic fertilizer also known as NARICT neem organic fertilizer is formulated from the neem tree which is a species of the mahogany family (*meliancea*) commonly known locally in the Hausa language as Dogonyaro, Bedi, Darbejiya or Maina. With the advancement in biotechnology, NARICT has explored commercial uses of the neem tree in organic fertilizer and related areas. NARICT fertilizer can be used on different crops, among which is tomato (NARICT, 2015). Tomato (Lycopersicon esculentum) is an important vegetable crop in many parts of the world. It is one of the most important vegetables grown for its edible fruits in virtually every part of Nigeria. It is also one of the most widely cultivated crops in the world. It is an important source of vitamins and an important cash crop for smallholder commercial farmers (Shankara, Joep, Marja, Martin and Barbara, 2005).

The adoption of NARICT neem organic fertilizer by tomato farmers is expected to have a positive effect on farmers' yield, and income and can also help in protecting the soil and its eco-friendliness

over the inorganic fertiliser (Ibeawuchi, Alagba, Ofor, Emma-Okafor, Peter-Onob and Obiefuna, 2015). Even though NARICT neem organic fertilizer has long been disseminated to farmers, particularly smallholder tomato farmers in Kaduna State, there have been limited or no studies on the described constraints in its use or determine the productivity and income of farmers who have adopted the technology.

The specific objectives are:

1. To identify and described the constraints associated with the use of NARIC neem organic fertilizer among the smallholder tomato
2. To determine the productivity and income of the tomato farmers in the study area.

METHODOLOGY

Kaduna State lies between Latitude 10°30' 37.6704" N and Longitude 7° 24' 59.418" E, with an area in approximately 48,473.2 square kilometres (Country coordinate, 2021). The population in the State is about 15,044,643 in 2021 Kaduna State Bureau of Statistics; (2020). The typical weather is mostly characterized by the constant dry and wet seasons. The state is within the tropical grassland of Sudan savannah in the north and Guinea savannah in the north, with prevailing vegetation of tall grasses and big trees of economic importance. The crops produced in the state include cotton, groundnut, tobacco, maize, beans, guinea corn, millet, rice, ginger, cassava, yam, and sweet potatoes. Another important aspect of agriculture engaged by the people is the rearing of cattle, sheep, goats, pigs, and poultry farming.

Four Local Government Areas (LGAs) were randomly selected from the four ADP zones of the state. One village was randomly selected from each of the four selected LGAs. This was followed by a random selection of 11% of the tomato farmers from each of the four villages, which constitute the sample size of tomato farmers. This is in line with the recommendation of Glen (2013), who asserted that 11% of a population can be taken as sample size once the total sample taken exceed one thousand (1000). A total sample size of one hundred and ninety-one (191) tomato farmers using NARICT Neem organic fertiliser were selected Furthermore, a corresponding sample of 191 farmers was drawn randomly from the population of the farmers not using NARICT Neem organic fertilizer. The total sample size for the study was three hundred and eighty-two (382) tomato farmers. However, only 160 and 190 questionnaires were retrieved from farmers using NARICT Neem organic fertilizer and those not using the NARICT.

Neem organic fertilizer respectively. Therefore, the total sample used for analysis was three hundred and fifty (350).

Table 1: Summary of sample distribution

KADA Zone	LGAs	Rural villages	No of famers in the selected villages	No of farmers using NARICT organic fertilizer	Sample size of farmers using NARICT organic fertilizer (11%)	No of farmers not using NARICT organic fertilizer	Corresponding Sample size of farmers not using NARICT organic fertilizer
Lere	Igabi	Birnin Yero	11,500	575	63	10,925	63
Maigana	Soban-gari	Sakadadi	10,000	500	55	9,500	55
Birnin Gwari	B/Gwari	Kuyallo	10,000	500	55	9,500	55
Samarun Kataf	Kachia	Awon	3250	163	18	3,087	18
Total			34,750	1,738	191	33,012	191

Source: Reconnaissance survey 2019

Data for the study was collected using a structured questionnaire, and both descriptive and-inferential statistics were used in the analysis of assembled data. Descriptive statistics was used to describe the constraints associated with the use of NARICT neem organic fertilizer as identified in the study, while inferential statistics, specifically the Z-test was used to determine the productivity and income of the farmers who adopted the technology. The Z-test model was used to compare the mean values of the income of the adopters and non-adopters. The comparison provided statistics for evaluating whether the difference between the two means is statistically significant or not and at the same time to determine if

the adoption of NARICT Neem organic fertilizer has any significant effect on the productivity of tomato farmers in the study area. The formula is presented below:

$$Z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s_{z_1} + s_{z_2}}{n_1 + n_2}}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 1$$

Where Z = z value

$\bar{x}_1$ = the sample mean of the productivity of the adopting farmers

$\bar{x}_2$ = the sample mean of the productivity of the non – adopting farmers in the study area.

S_1^2 = sample standard deviation for the adopting farmers in the study area

S_2^2 = sample standard deviation for the non-adopting farmers in the study area.

n_1 = sample size of adapters in the study area.

n_2 = sample size of non-adopters in the study area.

RESULTS AND DISCUSSIONS

Table 1 reveals that 52.3% of the farmers indicated the unavailability of the NARICT Neem organic fertilizer in the market and ranked 1st. This contradicts the findings of Adeyemo (2009) who found that the market/availability of organic fertilizer had a significant influence on the adoption of agricultural technologies among cooperative farmers in Kano State, This is also contrary to the findings of Odhiambo and Madangini (2008) who reported open market organic fertilizer for vegetable farmers in Kwara State in the study are which could easily be purchased and as a result increase the likelihood to adopt the use of the organic fertilizer. Another study done by Makokha *et al* (2011) in consonant with the study on determinants of fertilizer and organic fertilizer use on tomato production in Kenya, reported high cost of labour and unavailability of organic fertilizer in the market and untimely delivery as the main constraint to fertilizer adoption The result further showed that slow acting (45.6%) was also a constraint to the use of NARICT Neem organic fertilizer. This agrees with the findings of Alimi *et al*. (2006) that slow-acting inorganic fertilizer use can be an advantage and disadvantage at the same time. The slowness may decrease current output but gradually release minerals that help decrease future cost of production and increase future output. Livestock feeding on the fertilizer was ranked 3rd (42.8%) as another constraint identified by the farmers, sheep's feed on the fertilizer making the availability of the fertilizer to not be sufficient for the crop. Consequently, it constitutes a constraint to the use of NARICT Neem organic fertilizer. High cost of transportation was ranked 4th with 41.7% among constraints identified. This confirms the finding of Omotosho *et al*. (2012) who posited that major constraints in the use of organic materials by farmers include poor transport facilities and worm infestation of the organic fertilizer. It is also in consonance with the findings of Amadi *et al* (2006); who reported that the adoption of organic fertilizer could be inhibited by some factors which include difficulty in transporting. Bulkiness, offensive odour and slow acting. This also conforms with Ajewole's view (2010) who reported difficulty in transporting organic fertilizer. Furthermore, insufficient capital ranked 5th (38% of the farmers) as a constraint to using organic fertilizer among the farmers. This confirms the finding of Idris and Ogunbameru (2008), who reported that farmers in Northern Nigeria are generally constrained by problems of insufficient capital which usually limits their production activities. Uaiene *et al* (2009) that difficulty in accessing credit appeared to be one of the major constraints to adoption in the developing countries of Africa, Asia and Latin America. Also, Zavale *et al* (2006) reported that capital constraints and limited access to credit hinder the adoption of most agricultural technologies and inputs that require a high initial capital investment and high operational cost. Some of the farmers considered the organic fertilizer as being expensive which ranks 6th (25.1%). This is contrary to the findings of Alimi *et al*. (2006) who found that organic fertilizer is the main source adopted by vegetable farmers to supply nutrients to their crops probably because it is a cheap source of nutrients to their crops thus reducing the cost of production

Farmers experienced low yield when they used the NARICT neem organic fertilizer which ranked 7th (17.1%). This is contrary to the findings of Oladapo *et al.* (2009) who reported high yield when poultry manure as an organic fertilizer was applied. Also, according to the findings of Adedokum *et al* (2009), in the area of agricultural production, 45.3% of respondents indicate the greater benefit of using organic fertiliser by the increase in their crop yield.

Table 2: Major constraints associated with the use of NARICT neem organic fertilizer

Constraints	Frequency	Percent	Rank
Not available in the market	160	52.3	1st
Slow action	155	45.6	2nd
Other livestock feed on the fertilizer	151	42.8	3rd
High transportation cost	146	41.7	4th
Insufficient capital	133	8.0	5th
Expensive compared to NPK and other fertilizers	88	25.1	6th
Low yield	60	17.1	7th

The result in Table 3 above shows that the average productivity of tomatoes in the study was 1,820.3kg per hectare for non-NARICT fertilizer users, while for NARICT fertilizer users, their average tomato productivity was 2,226.11kg per hectare. The average total income of Non-NARICT fertilizer users was ₦747, 173.7 whereas, the NARICT fertilizer users had an average total income of ₦1, 001,257.1, the pooled for both Non-NARICT neem organic fertilizer and NARICT neem organic fertilizer users was 2015.2 and 813, 051.4 respectively. By improving input/output relationships, new technologies tend to raise output and reduce the average cost of production, which in turn results in substantial gains in farm income.

The substantial gains in farm income as a result of the productivity due to the use of organic fertilizer which serves as both fertilizer and soil conditioner as they feed both soil and plants and they are carbon-based compounds that increase the productivity and growth quality of plants. This is one of the most important differences between chemical fertilizer use and the use of organic fertilizer in soil care and fertilizing. However, it is known that in fields under intensive monoculture which obtain only heavy applications of inorganic fertilizer, there will be a gradual decline in farm outputs. The application of organic fertilizer has proven to bring about a gradual improvement in soil productivity and crop performance (Morteza *et al.,* 2015).

Table 3: Average Productivity and Income of Tomato Farmers in the Study Area

Type of fertilizer used	Productivity of tomatoes (kg/ha)	Annual total Income (₦)
Non-NARICT	1820.3	747,173.7
NARICT Users	2226.1	1,001,257.1
Pooled	2015.2	813,051.4

Source: Field survey, 2020

Effect of adoption of NARICT Neem organic fertilizer on productivity of tomato farmers in Kaduna State

The results in Table 4 showed the effect of the adoption of NARICT organic fertilizer on productivity. The result depicts the average productivity of farmers that cultivated the same crop with NARICT neem organic fertilizer with those that did not produce the crop with NARICT fertilizer. The productivity for adopters was 2412.1kg/Ha while, for the non-adopters it was 1663.7kg/Ha. A difference between the two groups was found to be 748.42 kg/ha, and a significant difference at a 1% level. The standard errors are relatively low, likewise is the standard deviation between the two groups of farmers. The result showed a statistically significant test on equality for both adopters (2412.1) and non-adopters (1663.7) respectively. Organic fertilizer improves soil fertility by increasing organic matter, microbial activity of the soil and chemical properties of the soil with a subsequent increase in productivity. This is in line with the findings of Adedokun (2009), who posited that 45.3% of his respondents indicated the greater benefit of organic fertilizer on increase in crop productivity.

Table 4. Effect of Adoption of NARICT Neem Organic Fertilizer on Productivity of Tomatoes farmers in Kaduna State

Productivity Variation	Group		Diff	Pr(|Z| > |z|)
	Non-NARICT Adopters	NARICT Adopters		
Observations	190	160		
Mean	1663.7	2412.1	748.42	0.0000***
Std.Err.	0.0725	0.0791	0.1073	
Std.Dev.	1.0000	1.0000	748.63	

Source: Field survey, 2020

CONCLUSION

Based on the findings from this study, the study concluded that the socio-economic and institutional characteristics of the farmers have a significant influence on the adoption of NARICT neem organic fertilizer. Similarly, a significant effect was found when farmers adopted the use of NARICT neem organic fertilizer on the productivity and income of farmers.

RECOMMENDATIONS

The study presents the following recommendations:

NARICT should come up with ways to make organic fertilizer available to farmers in the market at affordable prices.

Slow-acting fertilizer is another constraint raised by farmers, so the NARICT research institute should make efforts to educate farmers on the need to accommodate the slow-acting fertilizer with the help of extension agents. Organized symposium/ workshop to make farmers aware that the slow acting of organic fertilizer is advantageous (decreasing future cost of production and increasing future output due to the slow release of minerals into the soil).

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CAUSES AND EFFECTS OF LAND DEGRADATION ON CROP PRODUCTION IN ILLELA LOCAL GOVERNMENT AREA OF SOKOTO STATE, NIGERIA

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ABSTRACT
Land degradation has remained one of the most serious problems currently affecting crop production in Illela Local Government Area (LGA) of Sokoto State, Nigeria. This study analysed the causes and effects of land degradation on crop production and techniques for the restoration of degraded land in the area. Data for the study were obtained using a structured questionnaire from 113 randomly selected farmers using a two-stage sampling procedure. Data were analysed using mean, frequency counts and percentages. The results showed that desertification (39.7%), deforestation (28.4%) and erosion (14.3%) were the major causes of land degradation in the study area. An increase in cost of production (15.0%), a decrease in market turnover (15.0%) and decrease in farm income decrease in farm income (14.1%) were the major effects of land degradation on the farmers in the area. The farmers used a variety of strategies such as the use of cover crops (95.6%), ridging of farms (93.85) and use of organic manure (85.0%) for the reclamation of their degraded farmlands. It was concluded that desertification, deforestation and erosion were the major causes of land degradation in the study area, which had several devastating effects on the farmers particularly an increase in the cost of production, a decrease in farm income and food shortage. It is therefore recommended that farmers should sustain the temperature by using cover crops, ridging and organic manure to reclaim their degraded farmlands. All stakeholders in agricultural and rural development should complement the efforts of the farmers in reclaiming their degraded farmlands through interventions and empowerment.
Keywords: Land degradation, Land reclamation, Organic manure

INTRODUCTION

The land is a vital resource to humankind, like air and water. Land degradation-the deterioration or loss of the productive capacity of the soils for present and future-is a global challenge that affects everyone through food insecurity, higher food prices, climate change, environmental hazards, and the loss of biodiversity and ecosystem services [Global Environment Facility (GEF), 2023]. It is the result of complex interaction among, physical, chemical, biological, socio-economic and political issues of local, national or global nature. It affects the economy and also has many negative impacts on agricultural productivity by reducing the fertility of agricultural land (Tilauhun and Zewide, 2021).

Land degradation is one of the world's most pressing environmental problems and it will worsen without rapid remedial action. Globally, about 25 percent of the total land area has been degraded. When land is degraded, soil carbon and nitrous oxide are released into the atmosphere, making land degradation one of the most important contributors to climate change. It is happening at an alarming pace, contributing to a dramatic decline in the productivity of croplands and rangelands worldwide. Scientists recently warned that 24 billion tons of fertile soil was being lost per year, largely due to unsustainable agriculture practices. If this trend continues, 95 percent of the Earth's land areas could become degraded by 2050 (GEF, 2023).

According to Tilauhun and Zewide (2021), Land degradation has two causes direct causes of land degradation and indirect causes of land degradation. The direct cause of land degradation is the mismanagement of the land by man. The indirect causes of this mismanagement may be land tenure regulations, policies related to export-import, land politics, drought, poverty, poor advisory and extension services, and population pressures.

Agricultural production provides more than 40% of Nigeria's annual GDP, absorbs about 68% of the labour force, and provides over 80% of the food needs of the country. However, the small-scale farmers who drive agricultural production are facing challenges in getting suitable land as a result of incessant growth in population, land degradation, and one-sided planning in the use of available land (Titilola and Jeje, 2008).

One of the challenges facing Nigeria is the production of sufficient food and fibre to meet the needs of her increasing population (Alao and Shuaibu, 2011). The rapidly expanding population and consequent pressure on land for socioeconomic, agricultural and industrial development as well as

increasing human interference on the forests and the environment have put the future of Nigeria's forest and agricultural land in great danger (Bifarin *et al.,* 2013). Despite the vast arable land, conducive climate and different agricultural programmes, the hope of Nigeria to attain self-sufficiency in food production has not been realized (Idachaba, 2006). The increase in world population and other non-agricultural land uses are putting additional pressure on land, hence there is progressively less land for food production while demand for food and other agricultural products is increasing, requiring more land which is not available since the earth's land is finite (El-Swaify, 2002). Increasing food production to keep pace with the demand, while retaining the quality of land and the ecological balance of the production system is a current challenge to agricultural research and policy in Nigeria (Onu, 2011).

Most countries of the world are currently uniting against selected developmental problems such as poverty, hunger, malnutrition, disease, food insecurity, gender inequality and environmental degradation. Land degradation has impacted much on rural people's livelihoods, especially in agricultural production. There is currently scanty information on the causes and effects of land degradation especially in Illella LGA, located at the end of northern Sokoto State.

It is in this regard that this study was designed to determine the causes and effects of land degradation on farmers in Illela LGA of Sokoto State, Nigeria. It also determined the strategies for the reclamation of degraded farmlands.

METHODOLOGY

The study was carried out in Illela LGA, Sokoto State, Nigeria. Illela LGA shares a border with the Republic of Niger to the North. It is among the LGAs that make up the Northern Agricultural Zone of Sokoto State. It lies within latitude 13º 43¹N and 13º 57¹N and longitude 5º18¹E and has a total area of 1,246 square kilometres, while the total population is projected at 259,100 people (NPC, 2022). Illela LGA is characterized by 3-4 months of rainfall, from June to September or October and 7-8 months of dry season from October to May. The climate of the State is largely controlled by two opposing air masses, the moist tropical maritime from the North, across the Sahara, which is dry and dusty and brings harmattan (Onu, 2011).

A two-stage sampling procedure was used to obtain the sample for this study. In the first stage, four out of 11 villages in Illela LGA were purposively selected due to the high level of land degradation occurrence using a purposive sampling technique. They are Gidan-Hamma, Kalmalo, Gidan-Katta and Araba. In the second stage, 113 out of 1129 registered farmers were randomly selected to give the study sample. The selection was done using a simple random sampling technique. Data for this study were obtained with the use of a structured questionnaire administered to the respondents. The data were analysed using both descriptive and inferential statistical tools such as mean, frequencies and percentages.

RESULTS AND DISCUSSION

Causes and effects of land degradation

The result shows that 39.7% of the respondents reported desertification as the main cause of land degradation in the area, 28.4% reported deforestation and 14.3% reported erosion (Table 1). This implies that desertification, deforestation and erosion were identified by the respondents as the major causes of land degradation in Illela LGA. It is important to make the farmers understand that improper cultivation of land, urbanization and overgrazing (especially by the Fulani herdsmen who have now moved down southeast massively) can cause land degradation. It implies that there is a wide variation in the causes of land degradation in the area. This result is in line with the findings of Umahi (2011) and Mbagwu (2003) who reported that land degradation was caused by erosion, deforestation and overgrazing of land and others.

The result also showed that 15.0% of the respondents believed that land degradation increased the cost of crop production and decreased in market turnover of the crop produce. Also, 14.0% of the respondents reported a decrease in farm income due to land degradation, 12.6% reported food shortage, 10.9% indicated land shortage and 10.4% reported a reduction in land productivity. The result implies that land degradation has several devastating effects on agricultural production as well as the socioeconomic life of the farmers. The effects may combine to make life difficult in the area. The result is in line with the findings of Sara and Satya (2009) and the European Commission for Agriculture (ECA) (2006), who reported that shortage of food, increase in the cost of production, decrease in farmer income, decrease in market turnover and others are the effects caused by land degradation.

Relationship between causes and effects of land degradation

Linear regression estimates for the relationship between causes and effects of land degradation is presented in Table 2. There is a positive and significant ($p < 0.00$) relationship between causes

and effects of land degradation on farmers. Concerning the overall fit of the regression model, the obtained R^2 adjusted (0.832) suggests that the predictor variable (causes of land degradation) was significant in explaining the dependent variable (effect of land degradation on farmers). This implies that the causes of land degradation (mainly desertification, deforestation and erosion) had strong and positive effects on the farmers (mainly increase in cost of production, decrease in farm income and food shortage).

Table 1: Distribution of the respondents according to causes and effects of land Degradation (n=113)

Causes of land degradation	Frequency	Percentage
Overgrazing	13	9.2
Erosion	20	14.3
Deforestation	40	28.4
Flooding	1	0.7
Bush-burning	1	0.7
Desertification	56	39.71
Urbanization	10	7.1
Effects of land degradation		
Food shortage	75	12.6
Reduction in land productivity	62	10.4
Soil nutrients loss	45	7.6
Shortage of land	65	10.9
Increase in cost of production	89	15.0
Decrease in farm income	84	14.1
Loss of off-side cost sedimentation	24	4.0
Increase in cost of reclamation	61	10.3
Decrease in market turn over	89	15.0

Source: Field survey, 2019
*Multiple responses

Table 2: Relationship between causes and effects of land degradation on farmers

Variable	Coefficient	Standard error	t-ratio	P[|T|>t]
Constant	-0.609	0.194	-3.144	0.002
Causes of land degradation	0.853	0.036	23.580	0.000***
Adjusted R-squared = 0.832				

***Significant at 1% level

Strategies for reclamation of degraded land

Table 3 reveals that the respondents reported afforestation (76.1%), zero-tillage (80.5%) and controlled grazing (83.2%) as very effective methods of reclamation of degraded land. Other very effective methods include avoiding bush burning (95.6%), ridging of farms (93.85) and use of organic manure (85.0%). The use of cover crops (95.6%) was also considered effective by the respondents. It implies that the farmers used a variety of methods in the reclamation of degraded farmland. However, an increased campaign for sustained use of measures is necessary. This result agrees with the findings of Oyakale (2008), who reported that farmers in his study area use Afforestation, zero tillage, controlled grazing, avoiding bush burning, use of cover crops, ridging of farmland and others in the reclamation of degraded land.

Table 3: Distribution of respondents according to their strategies for reclamation of degraded land

Strategies	Very effective	Effective	Ineffective
Afforestation	76.1	23.9	0.0
Zero tillage	80.5	16.8	2.7
Controlled grazing	83.2	15.9	0.9
Avoiding bush burning	95.6	4.4	0.0
Use of cover crops	4.4	95.6	0.0
Ridging of farmland	93.8	5.3	0.9
Use of organic manure	85.0	14.2	0.9
Agro forestry	38.9	47.8	13.1

Source: Field survey, 2019

CONCLUSION

The study concluded that desertification, deforestation and erosion were the major causes of land degradation in the study area. Land degradation has several devastating effects on the farmers particularly about increase in the cost of production, a decrease in farm income and food shortage. They, however, minimised the effects through various measures in the reclamation of the degraded farmlands, including controlled grazing, tillage control, and use of organic manure, among others.

RECOMMENDATIONS

Based on the findings of the study, it is recommended that farmers in the study area should sustain the tempo in the use of measures to reclaim their degraded farmlands. All stakeholders in agricultural and rural development such as the Ministry of Agriculture, Agricultural Development Programme and International Funds for Agricultural Development in the State should complement the efforts of the farmers in reclaiming their degraded farmlands through interventions and empowerments.

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UTILISATION OF MATERNAL HEALTH INFORMATION AMONG FEMALE FARMERS IN IBARAPA COMMUNITIES OF OYO STATE, NIGERIA

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ABSTRACT
Health information with its usage intensifies awareness, influences the attitude and knowledge for people's health improvement. It is against this backdrop that this study assessed maternal health information usage among female farmers in some Ibarapa communities of Oyo State. This study employed a multistage sampling procedure to select 116 female farmers of childbearing age. A well-structured interview guide was used to obtain primary data on respondents' socioeconomic characteristics, sources of information, availability and utilization of maternal health information, and challenges faced in seeking maternal health information in the study area. Data were analysed using frequency counts, percentages, and mean score. Results show that respondents' mean age and household size were 35 years and 5 persons respectively. Respondents' sources of information were friend/ family (86.2%) and health officers (83.6%), while couples' blood group match information ($\bar{x}$ =2.53), foetus' development and growth ($\bar{x}$ =2.59) and family planning /birth spacing ($\bar{x}$ =2.85) were the identified available maternal health information during pregnancy, childbirth and postpartum respectively. Similarly, respondents used maternal health information on couple's blood group match information ($\bar{x}$ =2.47), maternal health nutrition information ($\bar{x}$ =2.52) and neo-natal infections ($\bar{x}$ =2.63) during pregnancy, childbirth, and post-partum respectively. However, lack of knowledge regarding disseminated health information ($\bar{x}$ = 2.14) and health facility charges ($\bar{x}$ = 1.97) were the major constraints encountered in using maternal health information. This study therefore recommended that Public-Private Partnership (PPP) and Health Insurance Scheme (HIS) should be promoted to reduce cost of health services.
Keywords: Maternal health information, Female farmers, Postpartum information, Family planning.

INTRODUCTION

Good health is a means of achieving one's desired goals and objectives as an individual, groups, communities, or the nation at large, therefore, access to health services is a major issue in rural area around the world, (Coombs, Campbell, and Caringi, 2022). Worldwide, over half a million young women die every year because of complications associated with pregnancy and childbirth (WHO, 2019) despite their roles in rural community development and that agriculture. This could be due to social factor, cultural background, economic factors, gender inequality, work burdens, food insecurity and dietary restrictions or lack of access to quality medical services, (Griese, *et al* 2020). Patil and Babus (2018) itemize women's roles in agriculture to include carrying out different activities relating to food production, processing, and marketing. Also, the responsibility placed on women in rural areas to meet the daily food needs of most families cannot be overemphasized. This can be explained further to mean that coupled with their roles as farmers, wage earners or entrepreneurs, they are equally responsible for the well-being of the family members as they make their food, care for children and the elderly to mention a few (ILO, 2019). It is not surprising that with all these significances roles performed by women to the immediate physical environment, agriculture and personal household well-being, many rural women are battling with poor health status. This could probably be because of heavy farm work, childbearing and rearing coupled with poor nutrition (Ugwu, 2019). Rural people, particularly the rural women, are faced with various difficulties as regards access to proper healthcare services. The health needs of women in rural areas are often neglected, compared to the needs of those in urban areas, and their access to services is often too low. They encounter numerous constraints in accessing affordable, adequate health services in rural areas (Adefalu, Awoete, Aderinoye-Abdulwahab and Issa, 2017). This is evident as many rural households in Africa still lack access to the information needed to make evidence-based decisions to effective health care (Zadawa and Omran, 2020). One major explanation of these observations is poverty, as rural women do not have adequate resources to access information needed to improve their health status. To make informed choices and navigate the complex health care system, people must have easily available, accurate, and timely information, and they must use it (Griese, Berens, Nowak, Pelikan, Schaeffer, 2020).

Ekoko (2020) in a study in Delta State, Nigeria reported that majority of the women could not read or write and therefore lagged in functional literacy on health. Women tend to be given inadequate information, education, and communication during and after childbirth (Vogels-Broeke, Daemers, Budé, de Vries, and Nieuwenhuijze, 2022). They hardly

access the 'right' kind of information as in most cases, the information is inappropriate to meet their needs, either in content which does not reflect their reality or in the choice of language use for presentation. Seretse, Chukwuere, Lubbe, Klopper, (2018) observed in their study that ignorance resulting from illiteracy, poor infrastructure, unreliable information, inability to locate information and the information brokers who need commission are problems encountered by rural women in accessing and using information. Nigerian rural women in particular needs adequate information sources to guide their health choices (Ekoko, 2020). It is against this backdrop that this study assessed the utilization of maternal health information among female farmers in some Ibarapa communities of Oyo State.

The specific objectives are to:

1. Describe the socioeconomic characteristics of the respondents.
2. Determine to what extent maternal health information is available to the respondents.
3. Identify the sources of maternal health information available to the respondents
4. Assess respondents' use of available maternal health information
5. Identify the constraints encountered while using the available maternal health information.

METHODOLOGY

This study was carried out in Ibarapa area of Oyo State, under Ibadan/Ibarapa Zone of Oyo State Agricultural Development Programme OYSADEP structure. The area is made up of Ibarapa East, Ibarapa Central and Ibarapa North Local Government Areas of Oyo State. The vegetation of the area is largely savannah, thus allowing for the cultivation of a wide array of arable and perennial crops. The rainfall patterns in the study area follows a tropical pattern with an annual rainfall ranging from 1000mm-1430mm and fairly high temperature. The occupation of the people is largely farming, predominantly subsistent farming, with some pockets of commercial farming.

The population of the study was female farmers of childbearing age in the Ibarapa area of Oyo state, Nigeria. A multistage sampling procedure was used to select the respondents. In the Stage 1, twenty percent of blocks in the Ibadan/Ibarapa zone of Oyo State Agricultural Development Programme (OYSADEP) were randomly selected using a random sampling technique. The blocks selected were Ibarapa Central, Aiyete and Eruwa. In the second stage of sample selection, lists of female farmers that are members of the All-Farmers Association of Nigeria (AFAN) were collected from the three selected blocks. Total number of AFAN members in Ibarapa central block was 1,574, 1,252 members from Aiyete block and 1,335 from Eruwa block. The members were stratified using stratified random sampling technique. Therefore, 550 female farmers strata were selected from Ibarapa central block, 370 from Aiyete block and 240 female farmers were selected from Eruwa block., The final stage involved selection of ten percent of the female members population using simple random sampling technique, to have 55, 37 and 24 female farmers from Igboora, Aiyete and Eruwa, respectively. In all, a total sample size of 116 respondents were sampled.

The dependent variable which is utilization of maternal health information was measured by providing respondents with a list of twenty (20) maternal health information under three major thematic areas of maternal health information, information during pregnancy childbirth and postpartum period information needs. Respondents were asked to state how often they use each of the provided maternal health information items from response options of Always, Occasionally, Rarely and Never with scores of 3, 2, 1 and 0 assigned, respectively. Thereafter, individual mean score for utilization index were computed. The individual mean score was used to rank the information items in ascending order while the use index was used to categorize utilization into high and low categories using mean as the benchmark. Data collected were analyzed using frequency count, percentages and mean score.

RESULT AND DISCUSSION

Socioeconomic characteristics

Table 1 reveals that female farmers' mean age, household size, number of children, age interval between the children and household income were 35 years, 5 persons, 3 children, 2 years interval and ₦49,997 monthly, respectively. This implies that female farmers were young within childbearing age, have a relatively large family size with at least three children, observe the standard age interval in between the children or spacing but earn small income per month. Also, majority (84.5%) of the women sampled were married and secondary school leavers (51.7%) while 75.7% had 1- 4 delivery cases. These results are in line with the study of Rao and Shokeen (2022) who discovered that majority of women sampled were school leavers and had between one to four delivery cases.

Table 1: Distribution of female farmers according to their personal characteristics (n = 116)

Characteristics	Frequency	Percentage	Mean/SD
Age (years)			35 years
20 -30	46	39.7	
31 – 40	47	40.5	
41 – 50	19	16.4	
51 – 60	4	3.4	
Marital status			
Single	13	11.2	
Married	98	84.5	
Divorced	3	2.6	
Widowed	2	1.7	
Religion			
Christianity	60	51.7	
Islam	51	44.0	
Traditional	4	3.4	
Worshiper	1	0.9	
Education level			
Primary education	13	11.2	
Secondary education	60	51.7	
Tertiary education	39	33.6	
Adult education	1	0.9	
No formal education	3	2.6	
Livelihood activities			
Farming	24	20.7	
Civil servant	21	18.1	
Artisan	17	14.7	
Trading	48	41.4	
Dependent	6	5.2	
Alternative livelihood			
Artisan	3	2.6	
Trading	13	11.2	
Household income			₦49,919
0 (Dependent)	5	4.3	
5000 – 20000	60	51.7	
21000 – 40000	42	36.2	
41000 – 60000	9	7.6	
61000 – 80000	3	2.6	
81000 and above	2	1.7	
Household size			5 persons
1-4	36	31.0	
5-8	80	69.0	
Cases of delivery			
1 – 4	87	75.0	
5 – 8	27	25.0	
Number of children			3 children
1 – 3	71	61.2	
4 – 6	43	38.8	
Age interval of children			2 years
1-2	72	62.1	
3 years and above	54	37.9	

Field survey, 2019

Source of information of the female farmers on health needs

Table 2 shows that 86.2% of the respondents claimed to have received maternal health information through their friend/family, health officer (83.6%), faith centre (79.3%), paid health consultant (70.7%) and radio (62.1%), while 25.86% of the respondents sourced this information through the internet. The implication is that female farmers sourced for maternal health information mainly from friend/family, health officer, paid health consultant, faith centre and radio. This means that all these sources can be targeted in case of any health campaign by government or donor agencies because it is certain that women will subscribe to any health information from these sources (Ghiasi, 2021).

Table 2: Distribution of female farmers by sources of maternal health information (n = 116)

Information Sources*	Frequency	Percentage
Friend/family	100	86.2
Health officer	97	83.6
Extension agent	45	39.0
Paid health consultant	82	70.7
Women organization	61	52.6
Radio	72	62.1
Television	60	51.7
Newspapers, magazines and publication	38	32.8
Internet	30	25.9
Faith Centre	92	79.3

Field Survey: 2019
*Multiple Responses

Available maternal health information to female farmers

Table 3 reveals that to a larger extent maternal health information available to female farmers during pregnancy were couples' blood group match information ($\bar{x}$ =2.53), pre-natal screening and diagnosis ($\bar{x}$ =2.51), while foetus' development and growth ($\bar{x}$ =2.59), mothers' nutrition ($\bar{x}$ =2.56), labour pain and its relief's method ($\bar{x}$ =2.38) were to a larger extent available during childbirth. Finally, to a larger extent family planning /birth spacing ($\bar{x}$ =2.85), neo-natal infections ($\bar{x}$ =2.69) and dangers signs after birth /postpartum care ($\bar{x}$ =2.56) were available during postpartum. It can be inferred that some maternal health information are readily available in the study area for women to explore during pregnancy, childbirth and postpartum however, this does not connote usage of the information.

Table 3: Distribution of female farmers according to the available of maternal health information

Maternal health information during pregnancy	Larger extent	Lesser extent	Rarely	Not at all	Mean	Rank
Couples blood group match information	14.7	47.4	14.7	23.28	2.53	1st
Pre-natal screening and diagnosis	16.4	43.1	15.5	25	2.51	2nd
Mating information	4.3	51.7	18.1	25.86	2.34	3rd
Pre-natal nutrition	12.9	36.2	10.3	40.5	2.22	4th
Symptoms of pregnancy / marital physiological changes	9.5	37.1	14.7	38.7	2.17	5th
Maternal health information during childbirth						
Foetus' development and growth	19.8	44.8	6.9	28.4	2.59	1st
Mothers' nutrition	31.0	26.7	9.5	32.7	2.56	2nd
Labour pain and its relief's method	8.6	43.1	26.7	21.5	2.38	3rd
Vaccination/test during pregnancy	19.8	29.3	12.9	37.9	2.31	4th
Sexual activities in pregnancy	9.48	26.7	41.4	22.4	2.23	5th
Personal hygiene	27.6	18.1	3.4	50.8	2.22	6th
Method of delivery/ childbirth	11.2	35.3	6.9	46.5	2.11	7th
Pregnancy complication/miscarriage	12.1	27.6	15.5	44.8	2.07	8th

Maternal health information during pregnancy	Larger extent	Lesser extent	Rarely	Not at all	Mean	Rank
Maternal health information during postpartum						
Family planning /birth spacing	37.9	31.9	7.8	22.4	2.85	1st
Neo-natal infections	11.2	54.3	21.6	12.9	2.69	2nd
Dangers signs after birth /postpartum care	11.2	53.4	16.4	18.9	2.56	3rd
Infant feeding/ child nutrition	23.3	24.1	6.9	45.6	2.25	4th
Personal hygiene	26.7	13.8	4.3	55.1	2.12	5th
Child immunization	22.4	21.6	6.0	50	2.10	6th
When to resume sexual relation	5.2	25.0	41.4	28.4	2.07	7th

Field Survey: 2019

Female farmers' use of maternal health information

Table 4 shows that female farmers frequently use maternal health information like couples' blood group match information ($\bar{x}$ =2.47), mating information ($\bar{x}$ =2.40) and pre-natal nutrition ($\bar{x}$ =2.32) during pregnancy stage. Meanwhile, during childbirth they often use mothers' nutrition information ($\bar{x}$ =2.52), foetus' development ($\bar{x}$ =2.47) and labour pain with relief method ($\bar{x}$ =2.31). Lastly, neo-natal infections ($\bar{x}$ =2.63), dangers signs after birth /postpartum care ($\bar{x}$ =2.24) and personal hygiene ($\bar{x}$ =2.21) were the maternal health information used during post-partum.

This implies that female farmers used maternal health information as identified to be available in Table 3 during pregnancy, childbirth and postpartum. The health information used by the respondents are couples' blood-group-match information, mating information, foetus' development information, labour pain with relief method information, neo-natal infections information, and information on dangers signs after birth. The usage of maternal health information among the respondents is not surprising because according to Marabele *et al*, 2020, there is possibility that the clients will use them especially if such maternal health information to be readily available, accessible and affordable then.

Table 4: Distribution of female farmers according to their usage of maternal health information

Maternal health information during pregnancy	Always	Occasionally	Rarely	Never	Mean	Rank
Couples blood group match information	9.5	50.9	17.2	22.4	2.47	1st
Pre-natal screening and diagnosis	12.9	40.5	26.7	19.82	2.47	1st
Mating information	7.8	49.1	19.0	24.13	2.40	2nd
Pre-natal nutrition	19.0	31.9	12.1	37.06	2.32	3rd
Symptoms of pregnancy / marital physiological changes	9.5	33.6	12.9	45.68	2.10	4th
Maternal health information during childbirth						
Mothers' nutrition	26.7	30.2	12.1	31.03	2.52	1st
Foetus' development and growth	14.7	48.3	6.9	30.17	2.47	2nd
Labour pain and its relief's method	6.0	47.4	18.1	28.44	2.31	3rd
Personal hygiene	32.8	12.1	6.0	49.13	2.28	4th
Vaccination/test during pregnancy	15.5	31.9	8.6	43.96	2.18	5th
Method of delivery/ childbirth	9.5	33.6	9.5	47.41	2.05	6th
Sexual activities in pregnancy	13.8	18.1	24.1	43.96	2.01	7th
Pregnancy complication/miscarriage	6.89	34.5	10.3	48.27	2.00	8th
Maternal health information during postpartum						
Neo-natal infections	14.7	50.9	18.1	16.37	2.63	1st
Dangers signs after birth /postpartum care	19.8	50.9	14.7	14.7	2.24	2nd
Personal hygiene	31.0	11.2	6.0	51.72	2.21	3rd
Family planning /birth spacing	10.3	36.2	15.5	37.93	2.18	4th
Infant feeding/ child nutrition	22.4	21.6	6.0	50.0	2.16	5th
Child immunization	19.8	19.0	10.3	50.86	2.07	6th
When to resume sexual relation	4.3	25.0	43.1	27.58	2.06	7th

Constraints faced by female farmers in using maternal health information

Table 5 reveals that lack of knowledge regarding disseminated health information ($\overline{x} = 2.14$), health facility charges ($\overline{x} = 1.97$), lack of awareness/information on prevailing health issues ($\overline{x} = 1.95$) were the constraints identified by the female farmers in using maternal health information in the study area. This result is in agreement with the findings of Taiwo, Yekinni, and Thomas, (2017); Mulauzi, and Daka, (2018), they all agree that most rural women lack information, funds, or access to health services that might help them prevent and treat disease. The implication is that lack of knowledge regarding disseminated health information, health facility charges, lack of information on prevailing health issues as well as religion/cultural barrier were the challenges encountered that hindered respondents use of maternal health information in the study area. Therefore, all the identified constraints especially religious barrier and health facility charges should be taken into consideration in case of future health campaign.

Table 5: Distribution of respondents based on constraints encountered in the use of maternal health information

Constraints	SC	MC	NC	Mean	Rank
Lack of knowledge/ ignorance regarding disseminated health information	32.8	49.1	18.1	2.14	1st
Health facility charges	14.7	68.1	17.2	1.97	2nd
Lack of awareness/information on prevailing health issues.	19.0	56.9	24.1	1.95	3rd
Inadequate social/ information amenities	5.2	80.2	14.7	1.91	4th
Religion/cultural barrier	9.5	68.1	22.4	1.87	5th
Financial constraint	10.3	50.0	39.7	1.70	6th
Literacy/language barrier	4.3	49.1	46.6	1.58	7th
Location	9.5	27.6	62.9	1.46	8th

Field Survey: 2019

SC = Serious Constraint; MC = Mild Constraint; NC = Never a constraint

CONCLUSION AND RECOMMENDATIONS

The study concludes that female farmers frequently use couples' blood-group-match information, mating information, foetus' development information, labour pain with relief method information, neo-natal infections information as well as dangers signs after birth maternal health information during pregnancy, childbirth and postpartum. However, lack of knowledge regarding disseminated health information and prevailing health issues, health facility charges, and religion/cultural barrier were hindered usage of maternal health information. Therefore, health campaign by government or donor agencies should endeavor to make maternal health information during pregnancy, childbirth and postpartum readily available, accessible and affordable to female farmers for easy usage. Also identified sources from friend/family, health officer, paid health consultant, faith center and radio should be targeted in case of any health campaign since the respondents are certain of them, while health facility charges should be taken into consideration in case of future health campaign. This could be achieved by engaging in Public-Private Partnership (PPP) and Health Insurance Scheme (HIS).

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