IMPACT OF FOREST AS SUCCOR TO RURAL DWELLERS DURING THE COVID 19 PANDEMIC IN DELTA STATE NIGERIA

Ohwo, O.A.[1*], Abioye, R. O.[1], Oluwadare, A. O.[2] and Popoola, L.[3]
[1]Department of Forestry and Wildlife, Delta State University, Abraka
[2]Department of Forest Production and Products, University of Ibadan
[3]Department of Social and Environmental Forestry, University of Ibadan
*Corresponding Author's Email: Oghenekevweabigail@gmail.com/Ohwoao@delsu.edu.ng Mobile No.: +2348069693421

Abstract
Forests are endowed with natural resources for mans of survival. In periods of socioeconomic disruptions, forest serve as natural insurance to providing mans' need. This study examined the impact of forest in rescuing rural household from hardship during the covid-19 pandemic. Two villages were selected each from six towns in Ughelli North Local Government Area purposively on their proximity to forest. Twenty five household were randomly selected from each village and interviewed using structured questionnaire. Data on forest resources utilized and their exploitation rate were collected. Descriptive statistics was used to analyse forest resources utilized, a 3 point likert scale was used to rate the level of resources exploitation while Chi-square tested the association of residence and exploitation rate of forest resources. Most (77.3%) respondents were indigene of the community, married (69.3), have household size of 5-8 (58.0%), do not have personal land (63.3%) and migrated to the community (65.7%). Resources utilized from forest served as medicine (Garcinia kola, Senna alata), fuelwood, protein (Agaricus bisporus, Neotragus pygmaeus, Cirrhinus molitorella) and substrate for raising other crops (forest land). Exploitation rate of bush-meat (2.36±0.05) and Forest land (2.28±0.07) were high. The χ2 result displayed significant association between resident and rate of forest resources exploitation with values of 8.12 and 38.13 for bush-meat and forest land, respectively. The increased utilization of forest land heightened deforestation a major anthropogenic activity of climate change. Forest land restoration with increased community involvement is recommended for forest conservation and resource.

Keywords: Forest community livelihood, Natural Insurance, Forest Resources, Deforestation, Climate Change

Introduction

The Covid-19 pandemic caused untold disruption to socio-economic activities globally. The lockdown approach to managing the virus from spreading further instilled countless hardship to man (FAO, 2020). The ripple effect of this approach was public health challenge and brief economic recession (FAO, 2021). Developing countries were worse hit as facilities to cater for citizens' were not in place. Households were exposed to hunger, inaccessibility to medical help, zero to no income and depressions in some worst case scenario (Egger *et al.*, 2021). The pandemic also had multiple impacts on forest resources, the forest sector and forest dependent communities. However, the pandemic highlights the usefulness and worldwide necessity for forest and its products (Pebke *et al.*, 2020).

Forests an eminent resource to man's survival from creation till date and shall be for years to come in provisioning, protecting, regulating and various cultural and spiritual functions (Ohwo and Nzekwe-Ebonwu, 2021). Provisioning, forest house various fauna and flora species use by man for food, shelter, furniture, medicine and income (Ohwo *et al.*, 2021). The forest land and soils serves as fertile ground for cultivating various domesticated crops and minerals such as calcium, potassium, fine clay and precious stones are all obtained from forest soils. In Nigeria, 51.4 % of rural household obtain about 20 percent of family income forest provides (Ohwo and Nzekwe-Ebonwu, 2021) and serves as natural insurance to rural communities in times of disaster.

Rural dwellers have a noticeable tie with forest and retain traditions between human and nature on the basis of meeting basic need and saving the environment for posterity (Sajeva *et al.*, 2019). They obtain fuel-wood, vegetable, protein (snail, bushmeat, fish, mushroon), and crops cultivated via agro-forestry systems to survive (Ohwo *et al.*, 2021) in times of unavailability of market and products. With the announcement of a global lockdown during the Covid-19 pandemic, individuals perceiving the imminent hunger decided to secure a safety nest by moving from city to their respective villages as a result of accessibility to forest resources for survival especially with the heightened price and scarcity of food (Osahon, 2020). Delta State was no exception as citizens flocked in from various part of the country. Literature capturing the forest resources utilized by rural dwellers during the lock down period in Delta State is limited. This study examined the impact of forest in providing the basic need of rural dwellers during the global lockdown period in Delta State x-raying the forest resources utilised by the rural dwellers and prioritised the forest resources according to the rate of exploitation for immediate management.

Materials and Methods

Data were collected from rural household in Ughelli North Local Government Area of Delta State. Two villages were selected from six towns (Ododegho and Ujode from Ughelli; Ehwahwa and Ihwrejdu from Agbarha-Otor; Ejekuta and Ovwodokpokpo from Ogor; Unenurhie and Ivwrorode from Evwreni; Ogode and Ohoro from Owheru; Okan and Ophori from Agbarho) purposively

Proceedings of the 8th Biennial Conference of the Forests & Forest Products Society,
Held at the Forestry Research Institute of Nigeria, Ibadan, Nigeria. 14th - 20th August, 2022
197

based on their proximity to the forest. Twenty five household were randomly selected from each village and interviewed for the study. A total of 300 rural dwellers were interviewed for the study.

Data analysis
Descriptive statistics of table, frequency and percentage occurrence was used to identify the forest resources utilized by rural dwellers while a three point likert scale was used to rank the level of forest resources exploitation as high (3), medium (2) and low (1). A mean score of 1.5 was used to rank forest resources utilization as over exploited or under exploited. Chi square test was used to check for degree of association between residence (resident and non-resident) on intensity of the most exploited forest resources using the model below

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$ ....Equation (1)

Where,
χ^2 = Chi square
O= observed frequency
E= Expected frequency

Results and Discussion
The demographic characteristic of rural household present in Table 1 shows that majority 45.3% were within the age bracket of 41-50 years, 54.0% were male, 69.3% were married, 46.7% were involved in other religion, 75.3% were secondary school certificate holder, 58.0% have family size of 5-8, 56.0% were farmers, 37.3% receives ₦11000-30000 income monthly, 63.3% of the respondent do not have personal land with 77.3% members of the community. About 65.7% of the people do not reside in the community. The dominance of youths in rural communities and non residents during this period was due to reverse migration of families from cities to villages whose jobs were affected by the pandemic and depend mainly on forest products for survival (Osahon, 2020; Egger *et al*. 2021). This dependence was further stimulated by family size of respondents. The unnoticeable difference between the male and female plaintiff indicates the collective effort of parents to meet household need. Basically, the males were more involved in hunting, collection of fuel-wood and clearing of forest land for farming while the females focused on collection of NTFPs, fruits and medicinal herbs for their household (Ohwo *et al*. 2021). However, all members of household were involved in planting of arable crops on forest land. The utilization of forest land for food production was unavoidable as majority of the plaintiff do not have access to land. Hence, they rely solely on the forest land for crop/food production for their household, a major reason for migrating from city to community to combat the challenge of food insecurity and low income (Egger *et al*. 2021)

Table 1: Demographic characteristics of rural dwellers

Variable	Frequency	Percentage	Variable	Frequency	Percentage
Gender			**Monthly income**		
Male	162	54.0	less 10000	20	6.7
Female	138	46.0	11000-30000	112	37.3
Total	300	100.0	31000-50000	70	23.3
Marital status			above 50000	98	32.7
Single	24	8.0	Total	300	100.0
Married	208	69.3	**Occupation**		
Widow	46	15.3	Farming	168	56.0
Divorced	22	7.3	Trading	48	16.0
Total	300	100.0	civil servant	74	24.7
Age			Others	10	3.3
20-30	24	8.0	Total	300	100.0
31-40	106	35.3	**Personal land**		
41-50	136	45.3	Yes	110	36.7
above51	34	11.3	No	190	63.3
Total	300	100.0	Total	300	100.0
Religion			**household size**		
Christianity	108	36.0	1-4	84	28.0
Islam	52	17.3	5-8	174	58.0
Others	140	46.7	above 9	42	14.0
Total	300	100.0	Total	300	100
Education			**Community indigene**		
Primary	62	20.7	Yes	232	77.3
Secondary	226	75.3	No	68	22.7
Tertiary	12	4.0	**Total**	300	100

Proceedings of the 8th Biennial Conference of the Forests & Forest Products Society,
Held at the Forestry Research Institute of Nigeria, Ibadan, Nigeria. 14th - 20th August, 2022

198

			Reside in community		
Total	300	100.0	Yes	103	34.3
			No	197	65.7
			Total	300	100

Source: Data analysis (2021)

Forest resources utilized by rural dwellers during the covid-19 lockdown

The result of the forest resources utilized by rural dwellers during the Covid-19 lockdown presented in Table 2 shows that 94.7% of rural dwellers utilized forest resources during this period (Pebke *et al*., 2020). Table 3 show that leave, fruits, wood and stems of various forest trees were utilized. Proteins in form of bush-meats (*Cercopithecus mona, Phacochoeurus africanus*), fishes, mushrooms and edible worms were utilized as source of food and income. Wood of *Daniella ogea, Senna alata, Hevea brasileiensis* and *Terminalia superba* were used as source of energy (fuelwood and charcoal), leaves and roots of *Magnifera indica*, leaves of *Moringa oleifera, Cymbopogon citrates and Citrus aurantiifolia* were boiled and used as medicines as reported by Adeyemi *et al*., (2015) and Walter *et al*., (2021). The forest land was used to grow vegetables such as *Talinum triangulare, Amaranthus retroflexus, Ocimum gratissimum* and short span cereals such as *Zea mays* (Table 3) for immediate consumption by rural dwellers to boost immunity of the body against the virus. As instructed by health practitioners, individuals are to improve their immune level by consuming fruits and vegetables as well as being hydrated (Shakoor *et al*. 2021). Importantly, these products were scarce in the markets and when available, the prices are outrageous. The forest fertile land was the only alternative for rural dwellers to grow and access veggies during this period.

Table 2: Forest resources utilized by community during the Covid-19 lockdown

Variable	Frequency	Percentage
Utilized forest products		
Yes	284	94.7
No	16	5.3
Total	**300**	**100.0**
Forest resources utilized		
Did not use any forest product	16	5.3
Timber	33	22.0
Forest land	53	17.6
Bush-meat	10	3.3
Herb	16	5.4
Firewood	22	7.3
Fish	10	3.3
Forest fruit	24	8.0
Herbs and snail	38	12.7
Timber and bush-meat	2	0.7
Firewood and herbs	4	1.3
Bush-meat, herbs, mushroom and forest fruit	24	8.0
Herbs, snail and firewood	20	6.6
Timber and herbs	28	9.3
Total	**300**	**100.0**

Source: Data analysis (2021)

Table 3: Forest resources, part harvested and uses

S/N	Scientific name	Common name	Part harvested	Uses
	Forest resources			
1	*Lophira alata*	Ironwood	Stem	Sold and fuelwood
2	*Nauclea diderrichii*	Opepe	Stem	Sold
3	*Entandrophragma cylindricum*	Mahogany	Stem	Sold
4	*Daniella ogea*	Rice leaf	Leaf	Sold
5	*Juglans regia*	Walnut	Fruits	Sold/medicine
6	*Piper guinensis*	Uziza	Leaf	Sold
7	*Garcinia kola*	Bitter cola	Fruits	Fruits and herbs
8	*Terminalis ivorensis*	Black afara	Stem	Sold
9	*Terminalis superb*	White afara	Stem	Roofing
10	*Senna alata*	Candle bush	Leaf and root	Medicine (pile)
11	*Milicia excelsa*	Iroko	Stem	Sold

Proceedings of the 8th Biennial Conference of the Forests & Forest Products Society,
Held at the Forestry Research Institute of Nigeria, Ibadan, Nigeria. 14th - 20th August, 2022

199

12	*Magnifera indica*	Mango tree	Root and leaf(herbs)	Medicine (malaria)
13	*Ceiba petandra*	silk cotton tree	Stem	Sold
14	*Agaricus bisporus*	Mushroom	Full	Protein
15	*Irvingia wombolu*	Ogbono	Fruits	Soup
17	*Monodora myristica*	Local nutmeg	Fruits	Spices/sold
18	*Spondia mumbi*	Hug plum	Fruits	Fruits
19	*Pseudotsuga menziesii*	Cone wood	Stem	Sold
20	*Moringa oleifera*	Moringa	Leaves and fruits	Medicine
	Wildlife resources			
21	*Achatina marginata*	Snail	Full	Protein
22	*Neotragus pygmaeus*	Antelope	Full	Protein
23	*Cercopithecus mona*	Monkey	Full	Protein
24	*Cirrhinus molitorella*	Mud carp (fish)	Full	Protein
25	*Clarias gariepinus*	Tilapia	Full	Protein
26	*Synodontis sorex*	Catfish	Full	Protein
27	*Pleurotus tuberregium*	Mushroom	Cap and gills	Medicine (headache)
28	*Termitomyces microcarpus*	Mushroom	Cap and gills	Medicine (Malaria)
29	*Sylvicapra grimmia*	Duiker	Full	Protein
30	*Phacochoerus africanus*	Warthog	Full	Sold
31	*Artherurus Africana*	Porcupine	Full	Sold
32	*Oryctolagus cuniculus*	Rabbit	Whole	Eaten/sold
33	*Thryonomys swinderianus*	Grass-cutter	Whole	Eaten/sold
	Resources from forest land			
34	*Cymbopogon citrates*	Lemon grass	Leaves	Medicine
35	*Citrus aurantiifolia*	Lime	Fruits and leaves	Medicine
36	*Amaranthus retroflexus*	Green vegetable	Leaves	Vitamins
37	*Telfairia occidentalis*	Pumpkin	Leaves	Vitamins
38	*Ocimum gratissimum*	Scent leaves	Leaves	Medicine, spices
39	*Talinum triangulare*	Water leaves	Leaves	Vitamins/food
40	*Vernonia amygdalina*	Bitter leaves	Leaves	Food/medicine
41	*Zea mays*	Maize	Fruit/silk	Food/medicine
42	*Abelmoschus esculentus*	Okra	Fruits	Food/sold

Source: Data analysis (2021)

Prioritized forest resources according to exploitation rate

The result of exploitation rate of forest resources by rural dwellers during the lockdown as shown by their mean values is presented in Table 4. The exploitation rate of bush-meat (2.36 ± 0.05), Forest land (2.28 ± 0.07), Iroko (2.24 ± 0.06) were high while snail (1.42 ± 0.05), fuelwood (1.39 ± 0.05) and fish (1.28 ± 0.04) were low. Saidur *et al.*, (2021) and Brancalion *et al.*, (2020) reported that the rate of wildlife killing during this period was high in Bangladesh and deforestation rate increased globally, respectively. An overall mean of 1.66 ± 0.01 shows a medium rate of resources exploitation in rural communities. The percentage response of the community dwellers on exploitation rate of forest resources shows that Forest land (43.3%) and Iroko (43.3%) were highly exploited, followed by bush-meat (46.7%) and Moringa (46.7%) with medium exploitation rate (Table 5). The above observation validates reports of Escobar (2020) and Walter *et al.*, (2021) who reported that rural household in nations with rich ecosystems results in land clearing, illegal logging, hunting and exploitation of medicinal herbs from the forest. The conversion of forest land to farmlands is a major cause of deforestation. Saidur *et al.*, (2021) reported that 2500 hectares of forest land was cleared in Taknaf and Ukhiya sub-districts of Bangladesh.

The heightened rate of deforestation is a major cause of climate change. Deforestation increased by 63.0% in America, 136.0% in Africa and 63.0% in Asia-Pacific (Brancalion *et al.* 2020). For continuous supply of the benefit of forest estate, there is need for forest land restoration. Forests function to regulate air and sinks carbon via wood production (Arshas *et al.* 2014). Globally, deforestation affects the absorption of CO_2 by forest trees and soils. Forests regulate worldwide climatic pattern via biological, chemical and physical, chemical, and biological course which controls atmospheric structure, hydrological cycle and temperature permanence (Bennett, 2017). Measures such as intensive agro-forestry and afforestation activities should be carried out to restore forest land to its original use.

Proceedings of the 8th Biennial Conference of the Forests & Forest Products Society,
Held at the Forestry Research Institute of Nigeria, Ibadan, Nigeria. 14th - 20th August, 2022

200

Table 4: Prioritized natural resources according to exploitation rate

Forest resources	Mean	Standard error
Bush-meat	2.36	0.05
Iroko	2.25	0.06
Mahogany	1.77	0.07
Forest land	2.28	0.07
Silk cotton tree	1.70	0.05
Rice leaf	1.69	0.06
Opepe	1.67	0.06
Conewood	1.67	0.05
Uziza	1.62	0.06
Moringa	1.54	0.05
Hug plum	1.57	0.06
Mushroom	1.57	0.04
Ironwood	1.54	0.07
Candle bush	1.51	0.05
Walnut	1.48	0.05
Herb	1.46	0.05
Bitter cola	1.42	0.05
Snail	1.42	0.05
Fuelwood	1.39	0.05
Fish	1.28	0.04
Total mean	1.66	0.01

N.B: 3 (high), 2 (medium) and 1 (low)
Source: Data analysis (2021)

Table 5: Percentage response of respondent on rate of exploitation of resources during covid-19 lockdown

S/N	Variables	High	Medium	Low
1	Ironwood	64(21.3)	34(11.3)	202(67.3)
2	Opepe	48(19.3)	86(28.7)	156(52.0)
3	Mahogany	80(26.7)	72(24.0)	148(49.3)
4	Rice leaf	54(18.0)	100(33.3)	146(48.7)
5	Walnut	18(6.0)	108(36.0)	174(58.0)
6	Forest land	130 (43.3)	126 (42.0)	44 (14.7)
7	Uziza	42(14.0)	102(24.0)	156(52.0)
8	Moringa	116 (38.7)	134 (46.7)	50 (16.7)
9	Bitter cola	28(9.3)	70(23.3)	201(67.3)
10	Snail	28(9.3)	70(23.3)	202(67.3)
11	Bush-meat	134(44.7)	140(46.7)	26(8.7)
12	Fuelwood	12(4.0)	94(31.3)	194(64.0)
13	Candle bush	26(8.7)	102(34.0)	172(57.3)
14	Iroko	130(43.3)	114(38.0)	56(18.7)
15	Fish	6(2.0)	72(24.0)	222(74.0)

Source: Data analysis (2021)

The Chi-square result of the association between resident in the community and the most exploited forest resources presented in Table 6 displayed significant association between resident and rate of forest resources exploitation with ($\chi 2$) values of 8.12 and 38.13 for bush-meat and forest land but no significant relationship was evident for Iroko (3.44). A weak strength of association was observed with Phi values of 0.36 (forest land) and very weak association of 0.17 (bush-meat) and 0.11(Iroko) between residence in the community and exploitation of the listed forest resources. The above finding relates the finding of Ohwo *et al*., (2021) who observed a weak and very weak association in profit and educational level of traders of non wood forest products in Asaba, Delta State.

Proceedings of the 8th Biennial Conference of the Forests & Forest Products Society,
Held at the Forestry Research Institute of Nigeria, Ibadan, Nigeria. 14th - 20th August, 2022
201

Table 6: Association of Resident and Exploitation Rate of Forest Resources

Variables	Values	Degree of Freedom	Asymp. Sig.
Bushmeat	*8.12	2	0.02
	^0.17	2	0.02
Forest land	*38.13	2	0.00
	^0.36	2	0.00
Iroko	*3.44	2	0.18
	^0.11	2	0.18

Source: Data analysis (2021)
* = Pearson (χ2) value (significant association)
^ = phi value (strength of association)

Conclusion
Forests and its resources are phenomenal in the survival of man in times of emergencies. The covid-19 pandemic has further proved the importance of forest in providing meat, herbs and fruits for man. The forest land served as fertile ground for the growth of arable crops in Ughelli North Local Government Area of Delta State. However, these benefits were without destruction of the forest. Deforestation was prominent in the use of the forest by rural dwellers (migrant and residents) during this period thus contributing to climate change. For the continuous supply of the benefit of the forest, forest land restoration needs urgent attention.

Recommendations
Integrated forest management technique can be an effective strategy to mitigate the increasing effect of deforestation on climate change as a post Covid-19 recovery method for the forestry sector. Forest land use and forest fortification instructions should be applied earnestness and with approval from the community. The need to communicate the importance of protecting the forest and administer training to volunteers of the community is important to attain successful forest restoration and conservation.

References

Adeyemi, A.A., Ohwo, O.A. and Lekeada, I.S. 2015. Status and distribution patterns of selected medicinal and food tree species in Owerri West Local Government Area of Imo State, Nigeria. *Journal of Agriculture, Forestry and the Social Sciences* Vol. 13(1):44-62

Arshad, A., Somana, R. and Shahid I. 2014. Deforestation and its impacts on climate change an overview of Pakistan, *Global Change* Vol 21: 51–60

Bennett, L. 2017. Deforestation and Climate Change. A publication of the climate institute 1400, 16th St NW, Suite 430, Washington DC, 20036, Pp 1-16

Egger, D., Miguel, E., Warren, S.S., Shenoy, A., Collins, E., Karlan, D., Parkerson, D., Mobarak, A.M., Fink, G., Udry, C., Walker, M., Haushofer, J., Larreboure, M., Athey, S., Lopez-Pena, P., Benhachmi, S., Humphreys, M., Lowe1, L., Meriggi, N.F., Wabwire, A. Davis, A., Pape, U.J., Graff, T., Voors, M., Nekesa, C. and Vernot, C. 2021. Falling living standards during the COVID-19 crisis: Quantitative evidence from nine developing countries, *Science Advancement* 7: 1-12

FAO 2021. Information paper: covid-19 impacts on the forest sector and communities in Latin American and Caribbean and recovery opportunities. Latin American and Caribbean Forestry Commission, FO:LACFC/2021/3 32 session executive summary Pp 1-6

FAO. (2020). The impacts of COVID-19 on the forest sector: How to respond?. Food and Agriculture Organizations of the United Nations (FAO). FAO, Italy, Rome. https://doi.org/10.4060/ca8844en

Ohwo, O. A. and Nzekwe-Ebonwu N. F. 2021. Impacts of rural community on the forest estate in Ugbolu, Oshimili North Local Government Area, Delta State, Nigeria. *Journal of Forest*, Vol. 8 (1): 45-60

Ohwo, O. A., Gbigbi, T. M., and Daje, O. G. 2021. Marketing of selected non wood forest products in Asaba, Delta State. *Kastamonu University Journal of Forestry Faculty*, Vol. 21 (1): 74-89

Osahon, N. (2020). Reactions to COVID-19. *The Vanguard*, p.23.

Pepke,E., Fernholz, K., Bowyer, J., Erickson, G., Groot, H., Jacobs, M. and McFarland, A. 2020 COVID-19 Impacts on the Forest Sector: 2020 and Beyond, executive summary *Published by Dovetail Partners December2020. Page 1-10*

Saidur, R., Azharul, A., Serajis, S., Ariful H. B. and Saifur, R. 2021. The COVID-19 pandemic: A threat to forest and wildlife conservation
    in Bangladesh? *Trees, Forests and People* Vol. 5: 1-14

Shakoor, H., Feehan, J., Dhaheri, A. S. A., Ali, H. I., Platat, C., Ismail, L.C., Apostolopoulos, V. and Stojanovska, L. 2021. Immune-boosting role of vitamins D, C, E, zinc, selenium and omega-3 fatty acids: Could they help against COVID-19? *Maturitas*. Vol. 143: 1–9.

Walters, G., Broome, N. P., Cracco, M., Dash, T., Dudley, D., Elías, S., Hymas, O., Mangubhai, S., Mohan, V., Niederberger, T., Achtone, C., Kema, N., Lio, A.O., Raveloson, N., Rubis, J., Toviehou, S.A.R.M. and Vliet, N.V. 2021. Covid-19, Indigenous Peoples, Local Communities and Natural Resource Governance, *Parks* Vol. 27 (Special Issue): 57-72

Proceedings of the 8th Biennial Conference of the Forests & Forest Products Society,
Held at the Forestry Research Institute of Nigeria, Ibadan, Nigeria. 14th - 20th August, 2022

202