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ASSESSMENT OF PERCEIVED EFFECTS OF CORONA VIRUS DISEASE PANDEMIC ON RICE PRODUCTION AMONG RURAL RICE FARMERS IN EBONYI STATE, NIGERIA

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Abstract

This study was conducted to assess perceived Effects of COVID-19 pandemic on rice production among rice farmers in Ebonyi State, Nigeria. A total Sample size of 144 respondents was purposively selected from 8 rural communities of 2 Local Government Areas of the State. The Local Government Areas were Ohaukwu and Ezza North. The data collected were analysed using descriptive statistics such as frequency, percentages, mean and standard deviation. The result of the analysis revealed that reduction in rice production ($\bar{x}$=3.76), shortage of labour ($\bar{x}$=3.49), reduction in the supply of rice produce ($\bar{x}$=3.40), among others were the major effects of COVID-19 on rice production. Moreso, the result showed that reliance on family and friends for labour ($\bar{x}$=2.54), reliance on self labour ($\bar{x}$=2.53), selling of agricultural produce in village markets and roadside ($\bar{x}$=2.52), and diversification to off-farm activities in order to get income ($\bar{x}$=2.51) were the adaptation strategies of rice farmers to the effects of COVID-19 pandemic. Also, inadequate fund to procure inputs ($\bar{x}$=2.55), poor supply of input for rice production ($\bar{x}$=2.54), scarcity of labour for rice production ($\bar{x}$=2.53), among others were the major constraints of rice farmers during COVID-19 pandemic. The study recommends that rural rice farmers should learn to adopt to outbreak of future pandemic.

Keywords: Assessment, Effects, Covid-19, Pandemic, Rice Production

1.0 Introduction

Rice (*Oryza sativa*) is a cereal belonging to the Gramineae, a large monocotyledonous family of about 600 genera and around 10,000 species (Fahad et al., 2019). It is valued as the most important staple food for over half of the world population (Dogara & Jumare, 2019) and ranks third after wheat and maize in production on a worldwide. More than half of the world's population depends on rice as the major source of calories (Food and Agriculture Organization, (FAO, 2018), consuming about 520 million metric tons of rice in 2021/2022 cropping year (FAO, 2022).

Rice is produced in considerable quantity in sub-Saharan Africa (SSA). Rice consumption is increasing faster than that of any other staple food in SSA (Seck et al., 2018). This increase is driven by urbanization and related changes in dietary habits and population growth. Although its production has been increasing in West Africa, it has not been able to catch up with the demand as around 40–50% of its consumption in this region is still from imported rice (Seck et al., 2018). Rice yield remains relatively low (around 2 t/ha), and its yield gaps are generally large, suggesting that there is large scope for improving local rice production (van Oort et al., 2018).

In Nigeria, rice is grown on approximately 3.7 million hectares of land, covering 10.6 percent of the 35 million hectares of land in Nigeria (Asiru *et al.*, 2018; Philip, Jayeoba, Ndripaya and Fatunbi, 2018; Zalkuwi, 2019). The production is dominated by smallholder farmers who use rudimentary technology and traditional methods to produce over 80% of national production (Omoare and Oyeleke, 2018). They cultivate between 0.5 to 1.5 hectares (ha) on the average (Mohammed *et al*., 2018). However, over the years, the quantity of unprocessed rice produced in Nigeria outnumbered that of milled rice. For instance, paddy rice production reached approximately 8.3 million metric tonns in 2021. Although this was a slight decrease in output compared to the preceding year, it represented an overall increase in whole rice production in the country. However, in 2023, the quantity of milled rice produced in Nigeria was estimated at 5.2 million metric tonns. Between 2010 and 2023, milled rice production in the country generally increased. The largest growth in output was registered in 2010, when the crop volume experienced a 26 percent increase compared to the previous year (Sasu &Doris, 2023). In the year 2020, while rice farmers were still battling with the negative impact of

climate change, low rainfall, price volatility, pests and diseases, lack of funds to procure inputs, soil salinity, poor government policies on agriculture and greenhouse gases emissions (GHGs), the COVID-19 pandemic emerged (FAO, 2020).

The first human cases of COVID-19, the disease caused by the Corona Virus, subsequently named SARS-CoV-2 were reported in Wuhan city, China, in December 2019 (World Health Organization (WHO, 2020). Retrospective investigations by Chinese authorities have identified human cases with onset of symptoms in early December 2019 (Wang et al, 2020). Some of the earliest known cases had a link to a wholesale food market in Wuhan, while some did not. Many of the initial patients were store owners, market employees or regular visitors to this market (Yang et.al, 2020). Environmental samples taken from this market on December 2019 tested positive for COVID-19 which further suggest that the market in Wuhan City was the source of this outbreak or played a role in the initial amplification of the outbreak (Yang et.al, 2020).

The World Health Organization declared COVID-19 a global pandemic on 11th March, 2020 (WHOa, 2020). Specifically, across sub-Saharan African (SSA) and as at 8th August, 2020, the five countries that reported most cases were South Africa (553,188), Egypt (95,314), Nigeria (46,140), Ghana (41,003) and Algeria (34,693) (African Centre for Disease Control (ACDC), 2020). In Nigeria, the numbers of those infected were 253,405 of which 229,676 had recovered with 3,136 deaths (NCDC, 2022a). Ebonyi State has 2,064 confirmed cases, 25 deaths, 2,015 discharged cases and 28 people on admission (NCDC, 2022). Nigeria is one of the thirteen top countries identified as high risk for COVID-19 based on either direct link or high travel volume to and from China where the Pandemic originated (WHO, 2022b).

The first confirmed case of COVID-19 in Nigeria was announced on 27th February, 2020, when an Italian citizen in Lagos tested positive for the virus. On the 9th of March, 2020, a second case of the virus was reported in Ogun State on a Nigerian citizen who had contact with the Italian citizen (Nigeria Centre for Disease Control (NCDC), 2020a). The high rate of transmission of the pandemic has attracted several control measures from the Government of Nigeria. Among the measures were sending information on personal hygiene and cough etiquette to the populace, setting up of a network of State and public health emergency network centres within the country, training of skilled

manpower on contact tracing and treatment amongst others (Adepoju, 2020). There are also measures on social distancing and lockdown/movement restriction (Otache, 2020).

Generally, COVID-19 Pandemic measures were taken to control the spread of the disease and possibly eradicate the effects it has on different sectors of the economy. In education systems, Olapegba, et al. (2020) pointed out that, there have been a ban on social gatherings and many schools (primary, secondary and tertiary) had been closed down. Many businesses, particularly small and medium enterprises (SMEs) had also been closed down as a result of the COVID- 19 Pandemic. According to Musa and Aifuwa (2020), SMEs are badly hit by the outbreak of the Pandemic due to their vulnerability and limited resources. Also, many people had lost their jobs as a result of the outbreak of the COVID-19 Pandemic and many jobs in jeopardy in the near future (African Union, 2020). It also brought threat to lives and livelihood, as it disrupts farmers' agricultural activities including inputs, transportation and processing, labour migration from farm to cities, thus affecting food/feed production (FAO,2020a).

The Pandemic has led to challenges associated with services and access to inputs for farmers due to the restrictions on movement of people (Omekwe and Obayori, 2020). The COVID-19 Pandemic had affected the production and marketing of agricultural produce. The lockdown measures obstructed farmers' access to input and output markets. It also led to shortage of labour for crop production (FAO,2020), In developing countries like Nigeria, any form of obstruction in the distribution of farm inputs like quality seeds, fertilizers, herbicides and other agrochemicals would adversely impact farming activities and by extension, food production (FAO, 2020).

2.0 The objectives of the Study

The broad objective of the study was to assess perceived effects of COVID-19 pandemic on rice production activities in Ebonyi State, Nigeria. The Specific objectives were to:

i. determine the perceived effects of COVID -19 pandemic on rice production
ii. ascertain adaptation strategies used by the rice farmers during COVID -19 Pandemic
iii. identify constraints faced by rice farmers during COVID-19 Pandemic.

3.0 Methodology

3.1 The Study area

The study was conducted in Ebonyi State, Nigeria. The State is located in South-East, Nigeria, with its capital city as Abakaliki. It is found within longitudes $7^{o}30'E$ and 8030'E and latitudes $5^{o}40'N$ and $6^{o}45'N$. Ebonyi State has an area of $5,935km^{2}$ and the population of the State during the 2006 census was 2,176,947. However, with a population growth rate of 3.2%, the estimated population of the State in 2022 was about 2,880,383 people (National Bureau of Statistics, 2023). Ebonyi State is made up of three senatorial zones namely: (Ebonyi North, Ebonyi South and Ebonyi Central). The people of Ebonyi State are predominantly farmers because the State has rich agricultural soils. They produce crops such as rice, yam, cassava, maize, potato, vegetables, oil palm, cocoyam, plantain, banana, melon, cashew, mango, bush mango, beniseed, groundnut etc. (Christian Aid, 2017).

3.2 Population, Sample Size and Sampling techniques

The targeted populations for the study comprises all rural rice farmers in Ebonyi State, Nigeria. Multi-Stage Sampling procedure was used to select rice farmers for the study. In the first stage, two senatorial zones where there is concentration of rice farmers were purposively selected (Ebonyi North and Ebonyi Central). In the second stage, two Local Government Areas were purposively selected because of their popularity in rice production. the local government areas selected were Ohaukwu from Ebonyi North senatorial zone and Ezza North from Ebonyi central senatorial zone.

In the third stage, three dominant rice farming rural communities were purposively selected from each of the two local government areas because of their proven record and popularity in rice production, making a total of six communities for the study. The communities selected from Ohaukwu L.G.A were Okposhi Eshi, Umuakpu and Amoffia autonomous Communities, while the rural communities'selected in Ezza North L.G.A were Umuoghara, Umuezeokoha and Nkomorro autonomous communities.

In the fourth stage, three villages were also purposively selected from each of the selected communities because of the presence of rice farmers in the area, giving a total of eighteen (18) villages. The villages sampled from Okposhi Eshi community were Ndegu

Aleke, Nkoroma and Igweledeoha, the villages sampled in Umuakpu community were Ndegu Obu, Ndegu Onwe and Ndegu Ede, the villages sampled in Amoffia community were Otuokpeye, Abarigwe and Okwerike, the villages sampled in Nkomorro community were Imeli, Ogbaga and Enyibichiri, the villages sampled in Umuoghara were Ukoro, Azuitumo and Agbaesa village and the villages sampled in Umuezeokoha community were Ekerigwe, Ojiegbe and Ndegu village. Finally, eight (8) rice farmers were purposively selected from each of the selected villages, giving a total sample size of 144 respondents.

3.3 Data collection and analysis

Data for this study were collected from the respondents using structured interview schedule which was divided in to 3 sections based on the objectives. section one covered perceived effects of COVID-19 pandemic on rice production, section two dealt with adaptation strategies of the farmers to the effects of COVID-19 Pandemic on rice production in the study area while Section three highlighted the factors constraining rice farmers from adapting to the effect of Covid-19 Pandemic. The study used descriptive statistics such as frequency percentages, mean, standard deviation to analyse objectives i, ii and iii.

4.0 Results and Discussion

4.1 Perceived effects of COVID-19 pandemic on their rice farmers

Table 1 shows the perceived effects of COVID-19 pandemic on rice production in the study area which include: reduction in rice production ($\bar{x}$=3.76), shortage of labour for rice production ($\bar{x}$=3.49), reduction in supply of rice produce to customers because of transportation restriction ($\bar{x}$=3.40), decrease in production inputs because of the poor transportation system, partial lockdown etc ($\bar{x}$=3.09), disruption of agricultural extension services on rice production ($\bar{x}$=2.97), reduction of access to market for purchase of agrochemicals ($\bar{x}$=2.94), reduction of access to credit facilities ($\bar{x}$=2.94), reduction of access to machineries used for rice production ($\bar{x}$=2.94), increase in cost of hiring machines for rice production ($\bar{x}$=2.94), increase in farm production and harvesting cost ($\bar{x}$=2.93), disruption in the rice cultivation season ($\bar{x}$=2.91), Increase in the prices of input for rice production ($\bar{x}$=2.90), increase in rice distribution and transportation cost

($\bar{x}$=2.88), reduction in income generation from rice production (x=2.87) and increase in rice post-harvest loss ($\bar{x}$=2.84). These results point to the major effects of this COVID-19 pandemic to include disruption of the rice production industry in the research area, which may have an impact on residents' livelihood, food security and income.

These findings agree with Lucas (2020) who observed that, there was a sharp decline in agricultural production during the COVID-19 pandemic and arguably the production is yet to attain its full strength**,** making agricultural production quite expensive, thereby having negative effect on the livelihood and income of the farmers.

Also, in line with the assertion of the Food and Agriculture Organization (FAO, 2020a) which stated that COVID-2019 is affecting agriculture in two significant aspects: the hike in price of agricultural crop and demand for food. these two aspects are affecting majority of farmers' livelihood. Lastly, it reaffirms the findings of International Monetary Fund (IMF) (2020), which reported that the pandemic is projected to have devastating effects on the global economy, as attested by the projection of the International Monetary Fund (IMF) in April, 2020 that the world economy would contract sharply by 3.0%, and that the economy of sub-Saharan Africa would contract by 1.60% in 2020.

Oyetoro et al. (2023) identified that most of the rice farmers were unable to get necessary production input resources during COVID-19 pandemic, which was attributed to the sudden rise of price input resources due to lockdown and food shortage. Poor extension contacts, high cost of labour, poor access to farm credit and lack of COVID-19 pandemic palliative by the government were the complaints given by the rice farmers. The high cost of farm inputs can also be attributed to this, that is, the acquisition of necessary production equipment was difficult. They may not only be costly but may also appear scarce for poor farmers, particularly during the period of the pandemic

Table 1: Rice farmers' perceived effects of COVID -19 pandemic on rice production

Perceived effects	Mean	Std. Dev.
Reduction in rice production/yield/output	3.76*	0.72
Shortage of labour for rice production	3.49*	0.89
Reduction in supply of rice produce to customers because of transportation restriction	3.40*	1.03
Decrease in production inputs because of the poor transportation system and partial lockdown	3.09*	1.05
Disruption of agricultural extension services on rice production	2.97*	1.02
Reduction of access to market for purchase of agrochemicals	2.94*	0.86
Reduction of access to credit facilities	2.94*	1.10
Reduction of access to machineries used for rice production	2.94*	1.11
Increase in cost of hiring machines for rice production	2.94*	1.21
Increase in farm production and harvesting cost	2.93*	0.94
Disruption in the rice cultivation season	2.91*	1.27
Increase in the prices of input for rice production	2.90*	1.32
Increase in rice distribution and transportation cost	2.88*	1.15
Reduction in income generation from rice production	2.87*	1.17
Increase in rice postharvest loss	2.84*	1.25

Source: Field survey (2023).

4.2 Rice farmer's adaptation strategies to COVID-19 pandemics

Table 2 shows COVID-19 adaptation strategies used by the rice farmers in the study area, which include: reliance on family and friends for labour ($\bar{x}$=2.54), reliance on self labour for rice production ($\bar{x}$=2.53), selling of agricultural produce in village markets and road side ($\bar{x}$=2.52), diversification to off-farm activities in order to get income ($\bar{x}$=2.51), Reliance on the use of available production inputs ($\bar{x}$=2.51).

Furthermore, these adaption techniques demonstrate the study area's respondents' resourcefulness and fortitude during the COVID-19 pandemic. Policies and initiatives targeted at boosting local economies, improving food security and fostering community resilience in comparable circumstances which can be informed by identifying and assisting these strategies (Park et al., 2019).

Table 2: Rice farmers COVID -19 adaptation strategies

Adaptation Strategies	Mean	Std. Deviation
Reliance on family/friends for labour	2.54*	0.62
Reliance on self labour for rice production	2.53*	0.75
Selling of agricultural produce on village markets/roadside	2.52*	0.68
Diversification to off -farm activities in order to get income	2.51*	0.81
Reliance on the use of available production inputs	2.51*	0.63
Reliance on information from family/friends for rice production	1.16	0.66
Reduction in size of land used for production in order to cut cost	1.13	0.61
Selling of household assets to generate income for rice production	0.95	0.70
Engaging in rice farming contract agreement	0.70	0.77
Observing COVID -19 safety rule in rice production activities	0.68	0.83
Reliance of palliative for rice production	0.54	0.68

Source: Field survey (2023) significant.

4.3 Constraints to Adapting to effects of COVID-19 pandemic

Table 3 shows that constraints to adapting to effects of COVID-19 pandemic in the study area include: inadequate fund to procure inputs ($\bar{x}$=2.55), poor supply of input for rice production ($\bar{x}$=2.54), scarcity of labour for rice production ($\bar{x}$=2.53), poor access to credit facilities ($\bar{x}$=2.52) and high post-harvest losses ($\bar{x}$=2.51). According to Obayelu (2021), there was a shortage of hired labour needed for the production process during the 2020 farming season because of Nigeria's primitive farming practices, which were made worse by the COVID-19 pandemic.

Table 3: Constraints of rice farmers during COVID-19 pandemic

Constraints	Mean	Std. Deviation
Inadequate fund to procure inputs	2.55*	0.66
Inadequate supply of input for rice production	2.54*	0.78
Scarcity of labour for rice production	2.53*	0.59
Poor access to credit facilities	2.52*	0.58
High postharvest losses	2.51*	0.50
High cost of production inputs	1.27	0.70
Poor access to farm machineries	1.19	0.68
Inadequate access to information on rice production	1.18	0.48
Poor extension-farmers contact	1.17	0.58
Increase in farmproduction cost	1.09	0.84
Poor means of transportation of produce or commodities	0.91	0.77
Poor incentive for rice production	0.81	0.76
Poor support by government	0.54	0.68
Poor subsidy on price of input	0.46	0.76

Source: Field survey(2023) Significant

5.0 Conclusion and Recommendations

5.1 Conclusion

The study concluded that C0VID-19 pandemic had negative effects on rice production and supply but rice farmers exhibited resilience and adapted to the situation through strategies such as reliance on family labour, selling of agricultural produce on village markets/roadside and diversification to off-farm activities in order to get income, despite being constrained by factors such as Inadequate fund to procure inputs, inadequate supply of input for rice production and scarcity of labour for rice production.

5.2 Recommendations

i. Government, non-governmental and private organizations should provide farmers with adequate inputs and incentives to alleviate the damages and pains which the outbreak of COVID-19 pandemic has brought to their livelihoods.

ii. Government through the extension agents and Mministry of Agriculture should train farmers on of adaptation strategies in case of outbreak of future pandemic.

iii. Government should make credit facilities accessible to rural rice by farmers to ameliorate the adverse effects of COVID-19 pandemic and other pandemics in the future.

References

African Centre for Disease Control (ACDC) (2020). COVID-19 Scientific and Public

Health
Policy Update1– (31 July, 2020). Retrieved from: https://africacdc.org/download/covid-19-scientific-and-public-health-policy-update-31-july-2020/

African Union (2020). Impact of the coronavirus (COVID-19) on the African economy. Available from: https//www.tralac.org/documents/resources/ covid-19/3218-impact coronavirus-covid-19-on-the-african-economyafrican-union-report-april 2020/file.html

Adepoju, P. (2020). Nigeria responds to COVID-19; first case detected in Sub-Saharan Africa https://www.nature.com/articles/d41591-020-00004-2

Christian Aid (2017). The state of governance in Nigeria: A situational analysis of Abia, Ebonyi, Imo and Kaduna States.Abuja: Christian Aid

Dogara, A. M., & Jumare, A. I. (2019) Origin, distribution and heading date in cultivated rice.*Internationa journal of plant biology and research*, 2(1), 2–6

Fahad, S., Adnan, M., Noor, M., Arif, M., Alam, M., Khan, I.A., Ullah, H., Wahid, F., Mian, I.A., Jamal, Y., Basir, A., Hassan, S., Saud, S., Riaz, M.A., Wu, C., Khan, M.A., & Wang,D. (2019). 'Major constraints for global rice production. In: Hasanuzzaman, M., Fujita, M., Nahar, K., Biswas, J.K. (Eds.), Advances in Rice Research for Abiotic Stress Tolerance. Cambridge, UK:Elsevier

FAO (2020). FAO Director-General urges G20 to ensure that food value chains are not disrupted during COVID-19 pandemic. 2020.

FAO (2020a).The State of food and Agriculture; 2010-2019. Rome:

FAO (2020b).Responding to the impact of the COVID-19 outbreak on food value chains through efficient logistics. Rome. https//doi.org/10.40060/ca8466en.

FAO (2015). Food and agriculture to achieve the SDGs: 20 interconnected actions to guide decision-makers. Food and Agriculture Organization (FAO) of the United Nations, Rome

FAO (2016). Review of the livestock/meat and milk value chains and policy influencing them in Nigeria. Rome.

FAO (2020). FAO Director-General urges G20 to ensure that food value chains are not disrupted during COVID-19 pandemic. 2020.

FAO (2022). FAO in Nigeria: Nigeria at a glance. https://www.fao.org/nigeria/fao-

innigeria/nigeria-at-a-glance/en

FAO (2022). FAO in Nigeria: Nigeria at a glance. https://www.fao.org/nigeria/fao-innigeria/nigeria-at-a-glance/en

International Monetary Fund (IMF) (2020). "World economic outlook, April 2020: The Great Lockdown".Available at https://www.imf.org/en/Publications/WEO/Issues/2020/04/14/weo-april-2020.

Lucas, B. (2020). Impacts of Covid-19 on inclusive economic growth in middle-income countries

Mohammed, U., Olaleye, R.S., Umar,I.S., Ndanitsa, M.A.,&Jibrin , S.(2018). An Assesement of Factors Influencing Adaptation of Special Rice Project Technology Package by Farmers under the Rice Chain in Niger State, Nigeria.*Asian Journal of Agricultural Extension,Economics& Sociology,* 5(4), 183-191.https:doi.org/ 10.9734/AJAEES/2015/15608

Musa, S., &Aifuwa, H. (2020). Coronavirus Pandemic in Nigeria: How can Small and Medium Enterprises (SMEs) cope and flatten the curve? 6, 55-61.

National Bureau of Statistics (2020). COVID-19 Impact Monitoring Baseline May 2020 Available from: file:///C:/Users/dOWNLOADS/Nigeria%203- pager_jUNE4_final.PDF.

National Bureau of Statisticsa.(2019). Nigerian gross domestic product Report.Retrieved from https://www.nigerianstat.gov.ng/pdfuploads/GDP_Report_Q3_2019.pdf.1-17.

Nigeria Centre for Disease Control (NCDC) (2020)."Covid-19 Page". Nigeria centre for disease control.' https://covid19.ncdc.gov.ng/Retrieved 01 August, 2020.

National Agricultural Statistics Service (NASS) (2024) Economic Research Service Situation and Outlook

Nigeria Centre for Disease Control NCDC (2021). NCDC Coronavirus COVID-19 Microsite

Nigeria Centre for Disease Control (NCDC) (2020). "Covid-19 Page". Nigeria centre for disease control.' https://covid19.ncdc.gov.ng/Retrieved 01 August, 2020.

Nosiru, O.M.O., Rahji, M.A.Y., Ikpi, A.E. &Adenegan, K.O. (2014). Scale Efficiency and Determinants of productivity of New Rice for Africa (NERICA) farmers in Kaduna state, Nigeria. *Agrosearch,* 14 (2), 113-128

Noor, A. U., Maqbool, F., Bhatti, Z. A., & Khan, A. U. (2020). Epidemiology of CoViD-19 Pandemic: Recovery and mortality ratio around the globe. Pakistan journal of medical sciences, 36(COVID19-S4), S79.

Omekwe, S.O., & Obayori, J.B., (2020) The Effect of Coronavirus on Agriculture and Education in Nigeria. *Economics And Social Sciences Academic Journal,* 2, (5);

Otache I. (2020). The Effects of the Covid-19 pandemic on the Nigeria's economy and possible coping strategies. Asian Journal of Social Sciences and Management Studies, 7 (3), 173-179

Omoare, A.O., &Oyeleke, O.W. (2017). Assessment of factors affecting rice (oryza spp.) value chain (RVC) in Ogun and Niger States, Nigeria. *Global Journal of Agricultural Research*, 5 (4), 43-59

Omoare, A. M., &Oyediran, W. O. (2015). Assessment of value addition in the value chain of sweet potato (Ipomoea batatas (L.)Lam) in Osun State, Nigeria. World Academy of Science, Engineering and Technology (WASET) 85:537 – 540

Oyetoro J. O, Jolayemi J. O, Afolayan F. O. & Yahaya A, (2023). Effects of Covid-19 Pandemic on rice production levels in South West, Nigeria. *Greener Journal of Social Sciences*, 13(1), 15-20.

Park, S., Marshall, N., Jakku, E., M.Dowd, A., Howden, S., Mendham, E., &Fleming, A. (2019). Informing adaptation responses to climate change through theories of transformation. *Global Environmental Change,* 22 (1), 115-126. http://dx.doi.org/10.1016/j.gloenvcha.2011.10.003

Wang, H.; Wang, Z.b., Dong, Y., Chang, R., Xu, C., Yu, X., Zhang, S., Tsamlag, L., Shang, M., Huang, J., Wang, Y., Xu, G.; Shen, T., Zhang, X., &Cai, Y. (2020). Phaseadjusted estimation of the number of Coronavirus Disease 2019 cases in Wuhan, China. Cell Discovery 6(1) 10, 2-8

World Health Organization (WHO) (2020). Infection prevention and control during health care when COVID- 19 is suspected https://www.who.int/publications-detail/infection-prevention-and-control-during-healthcare-when-novel-coronavirus-(ncov)- infection-is-suspected-20200125

WHO (2020) WHO Director-General's remarks at the media briefing on 2019-nCoV on 11February 2020. Available at https://www.who.int/dg/speeches/detail/who-director-general-s-remarks-at-the-media-briefing-on-2019-ncov-on-11-february2020.February 11, 2020; Accessed: February 13, 2020.WTO. WTO | frequently asked questions: The WTO and COVID-19. 2020.

WHO (2020a). A*nnounces COVID-19 outbreak a pandemic. Europe: World Health Organization*.http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/news/news/2020/3/who-announces-covid-19-outbreak-a-pandemic

WHO (2020b). *Coronavirus disease (COVID-19) outbreak situation. Geneva: World Health Organization*. https://www.who.int/emergencies/diseases/novel-coronavirus-2019

WHO (2020). The classical definition of a pandemic is not elusive. Bull World Health Organ, 89(7), 540-541. doi: 10.2471/blt.11.088815.

WHO (2020) WHO Director-General's remarks at the media briefing on 2019-nCoV on 11

February 2020. Available at https://www.who.int/dg/speeches/detail/who-director-general-s-remarks-at-the-media-briefing-on-2019-ncov-on-11-february-2020.February 11, 2020; Accessed: June 28, 2021.

Yang, J., Zheng, Y., Gou, X., Ke,P., Zhaofeng, C., Qinghong, G., Rui, J., Haojia, W., Yuping. W., & Yongning, Z. (2020). Prevalence of comorbidities in the novel Wuhan coronavirus (COVID-19) infection: a systematic review and meta-analysis. *Int J Infect Dis* 2020; published online March 12. DOI: 10.1016/j.ijid.2020.03.017; Pp:91-95