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Health Information Literacy: Early Warning System against Covid 19 Pandemic in Nigeria

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Abstract

Health information literacy is a necessary requirement of all citizens if they must live a healthy life resulting from being informed about health emergencies. It forms the basis upon which different people react to emergency health situation like the COVID-19 pandemic. This paper, therefore, looked at concept of health information literacy, COVID-19 pandemic-its nature and transmission, early warning system against COVID-19 pandemic in Nigeria, implications of health information literacy on COVID-19 pandemic, challenges militating against health information literacy as an early warning system against COVID-19 pandemic in Nigeria, and ways of improving health information literacy as early warning system against COVID-19 pandemic in Nigeria.

Keywords

Health Information, Health Information Literacy, COVID-19, Pandemic, Information

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Introduction

The emergence of novel coronavirus pandemic popularly known as COVID-19 is a health emergency condition that requires tremendous reawakening, especially in terms of better health information literacy across the world. Nigeria has a fair share of the traumatic effects of the COVID-19 pandemic. Thus, Nigerians require health information pertaining to COVID-19 pandemic to enable them make right and timely decision. By simple definition, health information is the data relating to a person's medical history, including symptoms, diagnoses, results, treatments, and management of health issues (Urhiewhu& Edom, 2021). Health information generally involves patient's histories, laboratory results, x-rays, clinical information, and notes. It deals with the science of how health information is technically captured, transmitted, and utilized (Chim, 2015).

However, the monumental effects of the COVID-19 pandemic are enough justification on why every Nigerians should be health information literate. Without doubt, COVID-19 is a major global health challenge with a very high rapidity rate of transmission and other negative implications (World Health Organization [WHO], 2020; Xiang, Jin& Cheung, 2020). COVID-19 pandemic has severely threatened the world, and challenge the existing understanding and prediction of health situations. It has created the need for better capability of people in understanding, creating, acquiring, analysing, sharing, and utilizing

health information to proactively and effectively respond to the pandemic.

COVID-19disease was discovered in Wuhan, Hubei Province, China, in December, 2019 (WHO, 2020). The first index case was recorded in Nigeria on 27th February, 2020, from an Italian citizen who travelled from Italy to Nigeria (Maclean & Dahir, 2020; Nigeria Center for Disease Control [NCDC], 2022).The deadly disease was declared a global public health emergency on 30thJanuary, 2020, and recognized as a pandemic on 11th March, 2020 by the World Health Organization (Okwor, Ugwuanyi, Eze & Onah, 2022; WHO, 2020). COVID-19pandemic has devastating implications, with reported and confirmed cases of over 533 million and more than 6.3 million deaths across the world as of June 12, 2022(WHO, 2022).Particularly, Nigeria has recorded a total of 257,637 confirmed cases and 3,144 deaths in the 36 states and the Federal Capital Territory as of July 5, 2022 (NCDC, 2022).

However, in reacting to this global scourge, series of measures have been put in place to curtail the spread of the virus. Many countries of the world including Nigeria, declared a temporary lockdown of public facilities such as schools, markets, worship centers, social functions, etc., during the early stage of the pandemic. There are series of attempts in scientific research, which sometimes also raise controversies or reversals in infection prevention recommendations, in a relatively short span of time, crowding out the accurate public health management and making the general public more anxious. This is more so, as governments and/or agencies of governments recommended measures like the use of face mask, social distancing, hand washing, etc., as the means of slowing down the spread of COVID-19 pandemic. Other efforts were also made towards educating the world population, including Nigerians on precaution, prevention and management of COVID-19 pandemic using social media platforms, public awareness, healthcare campaigns and advocacies.

Moreover, observations revealed that the fear of COVID-19 pandemic is still palpable in Nigeria. Apart from the nature of the dreaded virus, poor health information literacy of majority of Nigerians has been a serious issue of concern. In reality, there has been a tsunami of information grabbing the public's attention in the form of experts' opinions, with a bombardment of misguided theories or what people called conspiracy theories, half-baked piece of advice, assumed remedies as well as rumors on social media platforms and other information media. This underscores the position of Okwor, et al., (2022) who assert that the increase in the rate of transmission of the virus might be due to inadequate COVID-19 related health information literacy level and other factors among Nigerians. Similarly, Htay, Parial, Tolabing, Dadaczynski, Okan, Leung, & Su (2022)argue that the overabundance of information, (infodemic or information epidemic), is threatening to people, making it more difficult to search for verified facts and information about the COVID-19 pandemic. This is corroborated by Zarocostas (2020) who lamented the increasingly high rate of global epidemic of

misinformation and disinformation in the face of rapid progression of the COVID-19 pandemic. In fact, the rapid amplification of both accurate and inaccurate information about the COVID-19 pandemic on all platforms, globally, calls for high level of health information literacy. This is to facilitate, among other benefits, the ability for information scrutinization, understanding of misinformation, as well as dissemination and/or sharing of accurate information about COVID-19 pandemic. It requires Nigerians to acquire good health information literacy in dealing with the multifaceted impacts of the COVID-19 pandemic, including misinformation.

Therefore, in the light of the above, this paper conceptually examines health information literacy, Covid-19 pandemic-its nature and transmission, early warning system against COVID-19 pandemic in Nigeria, implications of health information literacy on COVID-19 pandemic, challenges militating against health information literacy as an early warning system against COVID-19 pandemic in Nigeria, and ways of improving health information literacy as early warning system againstCOVID-19 pandemic in Nigeria.

Concept of Health Information Literacy

Health information literacy falls within the various domains of literacy. Health information literacy refers to a set of abilities needed to recognize health information need, identify likely information sources and use them to retrieve relevant information, assess the quality of the information and its applicability to a specific situation, analyze, understand, and use the information to make good health decisions (Medical Library Association as cited in Urhiewhu & Edom, 2021). Okwor,et al., (2022) posit that health information literacy is the ability to search for health-related information using the most appropriate and authentic sources, access, retrieve and evaluate health information and use such health information for healthy daily living. In the same vein, Norman (2011) defines health information literacy as the skill to search, find, understand, and evaluate health information and employ this information to make diagnoses or appropriate health-based decisions. Health information literacy entails knowledge, competence and skills of an individual to attain, process, communicate and comprehend health information and services to promote and improve personal and community health through effective health decisions (Vaishnav, Galhotra, Raj, & Rai, 2020; Broucke, Levin-Zamir, Schaeffer, Pettersen, Guttersrud, Finbråten, de Arriaga, Vrdelja, Link, &Pelikan, 2020). It is critical in controlling infectious diseases and in avoiding the devastating effects of pandemic situations like theCOVID-19 pandemic (Abel & Mcqueen, 2020; Paakkari&Okan, 2020).In the context of this work, health information literacy is seen as the abilities and capabilities to harness the potential of health information and health information tools for healthy living. Itis also considered as the level of knowledge and skill possessed by individuals or members of a particular community which enable them to understand

issues pertaining to their health and wellbeing.

Health information literacy is fundamental in every area of health-related decision making. It helps in effective diagnosis of diseases, prevention of diseases and management of diseases. It typifies the ability to find, understand, appraise, and apply health information in order to make decisions about health and wellbeing across the domains of health care, disease prevention, and health promotion (Sørensen, Van-den-Broucke, Fullam, Doyle, Pelikan, & Slonska, 2012). This is corroborated by Okwor, et al., (2022) who observe that a good health information literacy level facilitates the ability of people to know or detect health emergencies like the outbreak of corona virus disease. It enhances people's ability to understand available health information, the most appropriate and authentic sources of health information and how to make best use of such health information for effective health decision making. It also builds the capacity of the individual to actively respond to the abundance of information that spreads faster than even the infectious disease. Health information literacy is a prerequisite for informed health decisions (Broucke, et al., 2020; Nair, Satish, Sreedharan, & Ibrahim 2016; Okan, Bollweg, Berens, Hurrelmann, Bauer, & Schaeffer, 2020).Health information literacy of Nigerians is very important in living a healthy life. It shows the level to which Nigerians can prevent the spread of the deadly virus. It can also help in managing the virus by the various organizations saddled with such responsibilities. For example, health information literacy on COVID-19 can ease the works of the Nigeria Center for Disease Control (NCDC), World Health Organization (WHO), Nigerian government, and other organizations involved in public health education. This is by equipping Nigerians with the right and timely health information for healthy decision-making pertaining to theCOVID-19 pandemic.

Moreover, health information literacy is a growing concept that can be discussed for better understanding, according to Eichler, et al. as cited in Zakar, Iqbal, Zakar, & Fischer (2021), under three prisms or domains, viz: functional health information literacy, interactive health information literacy and critical health information literacy.

- ***Functional health information literacy:*** This indicates the task-based knowledge and skills to acquire and act on health information regarding defined risks, recommended use of health services and adherence.
- ***Interactive health information literacy:*** This describes more advanced cognitive and social skills and competence to extract, comprehend and differentiate between varied sources of health information, through higher level of interaction with experts/professionals.
- ***Critical health information literacy:*** This represents the most advanced cognitive and social skills, and competence to critically analyze health information from varied sources and apply this information to exert effective control in both personal and

community health decisions (Eichler, et al. in Zakar, et al., 2021; Vaishnav, et al., 2020).

These three dimensions of health information literacy typify the level of knowledge and skills, which progressively extend from individual health information level to societal health information literacy level. The primary purpose of acquiring the varied levels of health information literacy include enabling autonomy in health decision making, ensuring active and effective health engagements in wider actions and improving health outcomes in an emergency health situation like the COVID-19 pandemic.

COVID-19 Pandemic, its Nature and Transmission

Corona virus pandemic (commonly known as COVID-19) is an infectious disease caused by the SARS-CoV-2 virus (WHO, 2020). COVID-19 is a novel virus, which was first identified in December 2019 in Wuhan, China. According to Encyclopedia Britannica (2022), corona virus is any virus belonging to the family Coronaviridae. Corona viruses have enveloped visions (virus particles) that measure approximately 120 nm (1 nm = 10^{-9} metre) in diameter. The corona virus genome consists of a single strand of positive-sense RNA (ribonucleic acid), and is an important agent of gastrointestinal disease in humans, poultry, and bovines. In humans, a species known as severe acute respiratory syndrome corona virus2 or simply, SARS corona virus (SARS-COV-2), causes a highly contagious respiratory disease that is characterized by symptoms of fever, cough, and muscle ache, often with progressive difficulty in breathing(Encyclopedia Britannica, 2022).

The World Health Organization [WHO] (2020); as well as the Center for Disease Control and Prevention [CDCP] (2020) designatedCOVID-19 as a global health challenge with unprecedented effects. WHO (2020); and CDCP (2020) further clarified that COVID-19 pandemic has varied symptoms which manifest differently in different people depending on their underlying health conditions. The symptoms range from the most common ones like fever, cough, tiredness or exhaustion, shortness of breath or difficulty breathing, loss of taste or smell, and the less common symptoms such as sore throat, headache, nausea, vomiting, runny nose, aches and pains, diarrhea, a

rash on skin, or discoloration of fingers or toes and red or irritated eyes (WHO, 2020; CDCP, 2020).The symptoms are generally mild and kick in gradually, while the virus persists on surfaces for up to several days: 4 hours on copper, 24 hours on cardboard and up to 2-3 days on plastic and stainless steel (Felman, 2021; WHO, 2020; WHO, 2021). It has an incubation period in human from 1-14 days (WHO, 2021).

With regards to the spread or transmission of the deadly virus, the CDCP (2020); and WHO (2020) posit that COVID-19 pandemic can spread from an infected person's mouth or nose in small liquid particles when they cough, sneeze, speak, sing or breathe. These particles range from larger respiratory droplets to smaller aerosols (WHO, 2020). Its health effects vary from person to person, with more and quicker manifestations in older people and persons with underlying health conditions such as high blood pressure, heart disease, kidney problem, diabetes, etc. (WHO, 2020; CDCP, 2020).

Moreover, just like all viruses, SARS-CoV-2, the virus that causes COVID-19 pandemic, has since the first case was reported in Wuhan, China in December 2019, evolved over the years into several variants (CDCP, 2022; WHO, 2022). A variant is a viral genome (genetic code) that may contain one or more mutations, while a mutation refers to a single change in a virus's genome (genetic code) (CDCP, 2022). The change manifests in the virus's properties with regards to the mode of transmission,
associated disease severity,
performance of vaccines, therapeutic medicines, diagnostic tools, and other public health and social measures (CDCP, 2022; WHO, 2022). During late 2020 and early 2022,the emergence of variants that posed an increased risk to global public health necessitated the categorization of specific variant being monitored (VBM), variants of interest (VOIs),variants of concern (VOC)and variant of high consequence (VOHC) (CDCP, 2022; WHO, 2022).These classifications fall within what are commonly known as Alpha, Beta, Gamma, Delta, Omicron variants, etc. (CDCP, 2022; WHO, 2022). The classification of the virus enabled the prioritization of global monitoring and research, as well as ongoing response to the COVID-19 pandemic (WHO, 2022). However, the Delta variant is said to be more contagious than the original form of the virus, causing illness and hospitalization among unvaccinated people, while Omicron variant was even much more infectious than the Delta strain (WHO, 2022). Meanwhile, Omicron variant produced less severe illness in most persons but like Delta variant, was a major cause of hospitalization in unvaccinated individuals (WHO, 2022).

As precautions or protocols for preventing the spread of COVID-19, the WHO (2020); CDCP, (2020); NCDC, (2020), recommended frequent cleaning of hands using alcohol-based hand sanitizer or rub, washing of hands with soap and water, covering the nose and mouth with a flexed elbow or disposable tissue when coughing and sneezing, as well as avoiding close contact with anyone that has a fever and cough.

Early Warning System againstCOVID-19 Pandemic in Nigeria

According to Milken Institute (2022), the COVID-19 pandemic has had enormous health, social, and economic consequences across the globe. This is notwithstanding the unprecedented advances in science and technology that have enabled easy acquisition and dissemination of information on the symptoms of the disease as well as the development of novel vaccines and therapies in record speed. As a matter of, the emergence of COVID-19 disease took the world by storm and severely exposed deep deficiencies in the world's ability to detect, prevent, and respond to global health threats.

However, in a study conducted by Milken Institute (2022) between 2020 and 2021,a global early warning system against COVID-19 pandemic involves critical component of prioritized steps for action. According to the Institute, the early warning systems against COVID-19 pandemic include:

- Monitoring and detecting microbe, animal, and human interfaces at their earliest stage;
- Providing strategic information on the geographies and animal populations at highest risk of zoonotic spillover to humans;
- Capturing traditional and nontraditional sources of outbreak information; characterizes pathogens in preandearly event settings to provide information on their evolution and risk.
- Capturing and integrating human behaviours such as population migration, conflict, and climate events to better identify potential areas of risk;
- Leveraging on data collected from historical events and outbreaks for insights such as on the behaviours and practices that drive spillover;
- Leveraging on the newest genomic sequencing technologies and most advanced prediction methods; and
- Ensuring that all data captured are translated into insights to support outbreak response and decision-making.

Implications of Health Information Literacy on COVID-19 Pandemic in Nigeria

The implications of health information literacy on COVID-19 pandemic in Nigeria cannot be overemphasized. In fact, it is imperative to note that awareness of COVID-19 pandemic is an essential part of the wider COVID-19 health information literacy. Health information literacy is a necessary requirement of all citizens if they must live a healthy life resulting from being informed about health emergencies. It forms the basis upon which different people react to emergency health situation like the COVID-19 pandemic. According to Neter and Brainin (2012), health information literacy helps in the ability to self-manage chronic illness and treatment, as well as react positive and effectively to emergency health situations like the Covid-19 pandemic. Adequate health information literacy facilitates

improved personal care, achievement of an enabling and healthy environment, implementation of health policies and achievement of quality health outcomes, particularly in reducing health inequity and stress (Nair, et al., 2016; Nguyen, Nguyen, Do, Tran, Nguyen, Pham, Pham, Tran, Duong, & Tran,2020).

However, this paper considers the implications of health information literacy on Covid-19 pandemic in Nigeria from two fronts: positive and negative implications.

Positive Implications of Health Information Literacy on COVID-19 Pandemic

On a positive note, the implication of health information literacy on COVID-19 disease begins with the awareness of the existence of COVID-19 and perhaps, in knowing some of the common symptoms of the virus, which include: fever, dry cough, tiredness, aches and pains, sore throats, diarrhea, conjunctivitis, headache, loss of taste or smell, rash on the skin, or discolouration of fingers or toes, etc. (Center for Disease Control and Prevention, 2021; NCDC, 2020; WHO, 2020).Health information literacy enhances people's knowledge, adapts their existing lifestyles, reduces carelessness, prevents over-reactions, and adopts preventive behaviors (Abdel-Latif, 2020; Abel& McQueen, 2020; Maverick Insider, 2020; Naveed &Shaukat, 2020; Nguyen, et al. 2020). Adequate health information literacy is essential to deal with the prevailing scenario of COVID-19 as it not only enables individuals to utilize credible health information but also prepares for the adoption of preventive behaviors.

Adequate health information literacy also provides necessary support to understand and act upon COVID-19 health information. It helps some groups of the population, especially those who are more prone to low health information literacy, such as old age adults, migrants, ethnic or racial minorities, less educated people, and people with a low socio-economic and poor health status to be educated and informed about the COVID-19 pandemic and other health-related information (Paakkari & Okan, 2020). Good health information literacy equips people to fully and critically analyze information and take appropriate decisions and responsibility for their personal and community health-related issues. Good health information literacy makes a healthy society, and promotes effective health decision making. It provides preventive measures of COVID-19 that slows the spread of the Covid-19 disease, and encourages individuals to observe necessary Covid-19 protocols like social distancing, regular hand washing, mask wearing, etc.

Negative Implications of Health Information Literacy on COVID-19 Pandemic

Generally, the implications of low health information literacy on COVID-19 pandemic can be very overwhelming. For instance, inadequate health information literacy on the Covid-19 pandemic promotes massive misinformation and disinformation, the infodemic pertaining to COVID-19pandemic (Zakar, et al., (2021). The absence of health information literacy proficiency increases stress, anxiety, depression, and risks of other morbidities, particularly among vulnerable people (Eichler, et al., 2009; Mian & Khan,

2020).Meppelink(2016)opines that people with limited health information literacy usually finds it more difficult to understand and acts positively on health information.

Similarly, Berkman, Sheridan, Donahue, Halpern& Crotty (2011) assert that low health information literacy results in more hospitalizations, lack of understanding when interpreting health messages and following treatment plans. In the case of older adults, low health information literacy on COVID-19 disease worsens health status, leading to increased mortality, as well as results in poor self-management, miserable health outcomes such as depression, high blood pressure and death (Nutbeam, 2017).This further underscore the position of Zarocostas (2020) who argues that poor health information literacy of COVID-19 among a population is an underestimated public health problem globally. More so, poor health information literacy compounds the problems of handling the complexity, contradictory, and false information about the COVID-19 pandemic and the nature of spreading such false information about the pandemic.

Challenges Militating against Health Information Literacy as Early Warning System against COVID-19 Pandemic in Nigeria

Health information literacy as early warning systems of COVID-19 pandemic in Nigeria is practically faced with a lot of problems. However, based on personal observation and available literature, the following are summarized as the challenges confronting health information literacy and earning warning system on COVID-19 pandemic in Nigeria.

i. ***Inadequate infrastructure:*** It is common knowledge that amidst the increasing advancement in infrastructural technologies for the acquisition, processing and sharing of health information literacy programmes on COVID-19 in developed countries, Nigeria's health information systems are still struggling under inadequate facilities. This focuses on the fact that no Nigerian health information system can truly boost of a dedicated radio, television or publishing outlay. There are also the problems of poor internet connectivity, and epileptic power supply. These facilities are capital intensive and health information systems in Nigeria are practically unable to acquire them.

ii. ***Inadequate health information literacy professionals:*** Training people on health information literacy is practically a professional responsibility that ought to be performed by health information literacy professionals. However, there is a glaring gross shortage of information personnel who are qualified in health information system.

iii. ***Lack of involvement of most information professionals:*** During the peak of the COVID-19 pandemic, most information professionals where obviously not involved in health information literacy training programmes on COVID-19 pandemic. The reason could be attributable to inadequate exposure of most information professionals to the idea of health information literacy on COVID-19 pandemic.

iv. ***High rate of illiteracy and ignorance among Nigerians:*** It is never in doubt that most Nigerians cannot read, write or understand certain COVID-19 pandemic health-related issues. Thus, this situation has a profound effect on their ability to understand and give proper meaning to the possible symptoms, transmission and management of COVID-19 pandemic.

v. ***High rate of poverty among the Nigerian populace***: Most Nigerian families are living in severe poverty, a situation that has affected their ability to afford necessary information and communication technology (ICT) tools such as radio, television, mobile phones, etc. However, the inability of Nigerians to acquire these necessary tools affects the ease of acquiring and sharing relevant COVID-19 pandemic related-health-information.

vi. ***Cultural belief of Nigerians:*** Cultural beliefs are ways of life of a people and how they react to a particular phenomenon. It could positively or negative influence people's disposition to a situation. Thus, the cultural beliefs of Nigerians affect, to a large extend, the way Nigerians react to the COVID-19 pandemic and their attitude towards obtaining health information on the pandemic.

vii. ***Inappropriate health information contents:*** Inappropriate health information content is a serious barrier to health information literacy on COVID-19 pandemic. It is not debatable that due to information explosion, there is a lot of conflicting information about the pandemic from many unconfirmed sources. Thus, this high rate of inappropriate health information content poses a threat to health information literacy on the COVID-19 pandemic.

viii. ***Language barriers:*** Most health information is packaged in foreign languages and of course, alien to the indigenous people. This language barrier therefore, poses a big threat to health information literacy on COVID-19 pandemic.

Ways of Improving Health Information Literacy as Early Warning System against COVID-19 Pandemic in Nigeria

The following are the essential ways of improving health information literacy as early warning system against COVID-19 pandemic in Nigeria:

i. There should be collaborative efforts such as sponsoring health information literacy seminars, and encouraging multi-organizational collaborations among all stakeholders in the information and health system so as to enhance

better health information literacy delivery against COVID-19 pandemic in Nigeria.

ii. There should be better coordination among information and health system operators in order to facilitate better health information literacy programmes against COVID-19 pandemic in Nigeria.

iii. There should be sustainability of political commitment, partnerships, and financing by government for better health information literacy programs against COVID-19 pandemic in Nigeria.

iv. Governments should provide, integrate, and strengthen existing infrastructure in order to boost health information literacy training against COVID-19 pandemic in Nigeria.

v. Information professionals should get involved and actively galvanize better health information literacy system against COVID-19 pandemic in Nigeria.

Conclusion

The study examined health information literacy and early warning systems against COVID-19 pandemic in Nigeria. It concludes that health information literacy is an essential panacea for understanding the nature, spread and effective management of the COVID-19 pandemic. It facilitates better understanding of the early warning systems against COVID-19 pandemic, which involves monitoring and detecting microbe, animal, and human interfaces at their earliest stage, as well as providing strategic information on the geographies and animal populations at highest risk of zoonotic spillover to humans, among others. However, health information literacy is hampered by a number of factors, which include: inadequate infrastructure, inadequate information professionals for health information literacy programmes on COVID-19 pandemic in Nigeria, high rate of illiteracy and ignorance among Nigerians of the COVID-19 pandemic, etc.

References

Abdel-Latif, M. M. (2020). The enigma of health literacy and COVID-19 pandemic. *Public Health*, *185*, 95.

Abel, T. & McQueen, D. (2020). Critical health literacy and the COVID-19 crisis. *Health Promotion International*, 1–2. https://doi.10.1093/heapro/daaa040

Berkman, N. D., Sheridan, S. L., Donahue, K. E., Halpern, D. J. & Crotty, K. (2011). Low health literacy and health outcomes: An updated systematic review. *Annals of International Medicine,* 2011, 155, 97–107.

Broucke, S. V. D., Levin-Zamir, D., Schaeffer, D., Pettersen, K., Guttersrud, Ø., Finbråten, H., de Arriaga, M. T., Vrdelja, M., Link, T., &Pelikan, J. (2020). Digital health literacy in general populations: An international comparison. *European Journal of Public Health,* 30, 5.

Center for Disease Control and Prevention [CDCP], (2022). SARS-CoV-2 variant classifications and definitions.

https://www.cdc.gov/coronavirus/2019-ncov/variants/variant-classifications.html

Centers for Disease Control and Prevention [2020]. Use of cloth face coverings to help slow the spread of COVID-19. https://www.cdc.gov/coronavirus/2

019-ncov/prevent-getting-sick/diy-cloth-face-coverings.html

Eichler, K., Wieser, S., &Brügger, U. (2009). The costs of limited health literacy: A systematic review. *International Journal of Public Health,* 54, 313–324.

Encyclopedia Britannica (2022). What is corononavirus? https://www.britannica.com/science/coronavirus-virus-group

Felman, A. (2021). What to know about coronaviruses. https://www.medicalnewstoday.com/articles/256521

Htay, M. N. N., Parial L. L., Tolabing, M. C., Dadaczynski. K, Okan, O., Leung, A. Y. M, & Su, T. T. (2022). Digital health literacy, online information-seeking behaviour, and satisfaction of Covid-19 information among the university students of East and South-East Asia. *PLoS ONE*, 17(4). https://doi.org/10.1371/journal.pone.0266276

Milken Institute (2022). A global early warning system for pandemics: Mobilizing surveillance for emerging pathogens. https://creativecommons.org/licenses/by-nc-nd/30/

Maclean, R. &Dahir, A. L. (2020). Nigeria responds to first coronavirus case in Sub-Saharan. *The New York Times*. 10th March, 2020.

Maverick Insider. (2020). Virus literacy for beginners: Influenza and Covid-19. https://www.dailymaverick.co.za/article/2020-03-12-virusliteracy-for-beginners-influenza-and-covid-19/

Meppelink, C. S. (2016). Designing digital health information in a health literacy context. Ph.D. Thesis, University of Amsterdam, Amsterdam, The Netherlands. https://pure.uva.nl/ws/files/2769622/172651_Meppelink_Thesis_complete_.pdf

Mian, A. & Khan, S. (2020). Coronavirus: The spread of misinformation. BMC Medical Journal, 18, 89.

Nair, S. C., Satish, K. P., Sreedharan, J., & Ibrahim, H. (2016). Assessing health literacy in the eastern and middle-eastern cultures. *BMC Public Health*, 16, 831.

Neter, E. &Brainin, E. (2012). e-Health literacy: Extending the digital divide to the realm of health information. Journal of Medical Internet Resources, 14, e19.

Nguyen, H. C., Nguyen, M. H., Do, B. N., Tran, C. Q., Nguyen, T. T., Pham, K. M., Pham, L. V., Tran, K. V., Duong, T. T., & Tran, T. V. (2020). People with suspected COVID-19 symptoms were more likely depressed and had lower health-related quality of life: The potential benefit of health literacy. *Journal of Clinical Medicine,* 9(4), 965.

Nigeria Center for Disease Control [NCDC] (2022). Confirm cases of COVID-19 in Nigeria. www.ncdc.gov.ng

Nigeria Center for Disease Control [NCDC] (2022). COVID-19 Nigeria. https://covid19.ncdc.gov.ng/

Nutbeam, D. (2017). *Discussion paper on promoting, measuring and implementing health literacy: Implications for policy and practice in non-communicable disease prevention and control.* Geneva, Switzerland: World Health Organization.

Okan, O., Bollweg, T. M., Berens, E., Hurrelmann, K., Bauer, U., & Schaeffer, D. (2020). Coronavirus-related health literacy: A Cross-sectional study in adults during the COVID-19 Infodemic in Germany. International Journal of Environmental Resources and Public Health, 17, 5503.

Okwor, O. M., Ugwuanyi, L. I., Eze, E. C., & Onah, J. C. (2022). Assessment of health information literacy of Nigerians on the preventive measures of Covid 19 pandemic: A cross sectional online survey. *Library Philosophy and Practice (e-journal).* 7060. https://digitalcommons.unl.edu/libphilprac/7060

Paakkari, L. &Okan, O. (2020). COVID-19: Health literacy is an underestimated problem. *Lancet Public Health*, 5, 249–250.

Sørensen, K., Van-den-Broucke, S., Fullam, J., Doyle, G., Pelikan, J., &Slonska, Z. (2012). Health literacy and public health: A systematic review and integration of definitions and models. *BMC Public Health*, 12, 80. https://doi.org/10.1186/1471-2458-12-80

Urhiewhu, L. O., & Edom, B. O (2021). Health literacy in the era of Covid-19 pandemic: The roles of medical librarians. International Journal of Academic Library and Information Science, 9(6), 319-324. http://www.academicresearchjournals.org/IJALIS/Index.htm

Vaishnav, K., Galhotra, A., Raj, U., & Rai, N. (2020). Need of the hour, health literacy: The drug of choice for the current Pandemic. International Journal of Community Medicine Public Health, 7, 2841–2844.

WHO (2020). Coronavirus disease 2019 (COVID-19) Situation Report – 94. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200423-sitrep-94-covid-19.pdf

World Health Organization [WHO] (2020). Managing the COVID-19 infodemic: Promoting healthy behaviours and mitigating the harm from misinformation and disinformation. https://www.who.int/news/item/23-09-2020-managing-the-covid-19-infodemic-promoting-healthy-behaviours-andmitigating-the-harm-from-misinformation-and-disinformation

World Health Organization [WHO] (2021). WHO Coronavirus disease (COVID-19) Dashboard. https://covid19.who.int/

World Health Organization [WHO] (2022). Coronavirus disease (COVID-19) outbreak: Rights, roles and responsibilities of health workers, including key considerations for occupational safety and health. https://www.who.int/docs/default-source/coronaviruse/who-rights-roles-respon-hw-covid-19.pdf

World Health Organization [WHO] (2022). Tracking SARS-CoV-2 variants. https://www.who.int/activities/tracking-SARS-CoV-2-variants

World Health Organization [WHO] (2022). Weekly epidemiological update on COVID-19. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports

Xiang, Y. T., Jin, Y. & Cheung, T. (2020). Joint international collaboration to combat mental health challenges during the coronavirus disease 2019 pandemic. *JAMA Psychiatry,* 77(10), 989–90. https://doi.org/10.1001/jamapsychiatry.2020.1057

Zakar, R., Iqbal, S., Zakar, M.Z. & Fischer, F. (2021). COVID-19 and health information seeking behavior: Digital health literacy survey amongst university students in Pakistan. *International Journal of Environmental Resource Public Health,* 18, 4009. https://doi.org/10.3390/ijerph18084009.

Zarocostas, J. (2020). How to fight an infodemic. *Lancet,* 395, 676.