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Original Research

Determinants of Non-Insurance in A-Duiem Administrative Unit, White Nile State, Sudan 2018

Samia Y. I. Habbani, MBBS, MD¹; Egbal A. B. A. Karaig, MBBS, Fel-SMSB, FPH-UK^{2*}; Elfatih M. Malik, MBBS, MD, FPH-UK³; Sumaia M. Al-Fadil, MBBS, Fel-SMSB⁴; Maisa El-Fadul, BDS, MPH, MD⁵; Siddik M. A. Shaheen, BSc, MSc, PhD⁶; Nahid A. A. Gadir, BSc, PGDip⁷; Hashim Al-A. S. AbuZaid, BSc, PGDip, MSc, PhD⁸

¹Clinical Community Medicine and Public Health Consultant, Khartoum, Sudan

²Clinical Community Medicine and Public Health Consultant, Planning Directorate, Federal Ministry of Health, Khartoum, Sudan

³Department of Community Medicine, Faculty of Medicine, University of Khartoum, Khartoum, Sudan

⁴Department of Community Medicine, Faculty of Medicine, Nile University, Khartoum, Sudan

⁵Public and Tropical Health Programs, University of Medical Sciences and Technology, Khartoum, Sudan

⁶Department of Econometrics and Statistics, Faculty of Economic and Social Studies, University of Khartoum, Khartoum, Sudan

⁷International Health Directorate, Federal Ministry of Health, Khartoum, Sudan

⁸Statistician, Khartoum, Sudan

*Corresponding author

Egbal A. B. A. Karaig, MBBS, Fel-SMSB, FPH-UK

Clinical Community Medicine and Public Health Consultant, Planning Directorate, Federal Ministry of Health, Khartoum, Sudan; E-mail: drigbal@gmail.com

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ABSTRACT

Background

Population knowledge and attitudes toward health insurance are important factors that facilitate health insurance coverage. National studies on these parameters are limited.

Aim

This study aims at assessing determinants of non-insurance in A-Duiem Administrative Unit and calculating as a secondary objective the household's health insurance coverage.

Methods

The study was a descriptive cross-sectional community-based conducted in A-Duiem Administrative Unit, Sudan. It collected quantitative data from non-insured households and qualitative data by interviewing community leaders and conducting focus group discussions with community organizations members. Quantitative data analyzed using the Statistical Package for Social Sciences (SPSS) version 20, and the thematic analysis for the qualitative data.

Results

The study interviewed 419 non-insured households' heads and thirteen community leaders and conducted eight focus group discussions with sixty community organizations members. Around 37.9% (95% CI: 33.4-42.7) of the heads of the non-insured households did not know the health insurance, while only 2.4% (95% CI: 1.5-4.7) had good knowledge. The knowledge of non-insured community leaders and members of the community organizations was moderate. The study participants showed positive attitudes towards health insurance, as 97% (95% CI: 95.1-98.4) of the heads of the non-insured households wanted to join the health insurance and 65% (95% CI: 59.2-70.1) of them stated that they could pay its premium. Most of the community leaders and members of the community organizations had health insurance cards. Those who were not enrolled, have limited knowledge about health insurance while almost all believe they should join it. The study identified 52.4% of non-insured households (95% CI: 48.9-55.8). The study showed low health insurance coverage among families, despite their positive attitude. This is mostly attributed to poor awareness of the heads of the non-insured households about health insurance. The National Health Insurance Fund (NHIF) should address this gap through effective communication strategies using motivated community institutions.

Keywords

Health insurance; Non-insured; Population coverage; Knowledge; Attitudes; Sudan.

BACKGROUND

Universal Health Coverage (UHC) is defined by the World Health Organization (WHO) as “ensuring all people have access to needed health services (including promotion, prevention, treatment, rehabilitation, and palliation) of sufficient quality to be effective, while also ensuring that the use of these services does not expose the user to financial hardship”. This definition entails assurance of equitable access to quality health-services, that improves the health of those receiving services and ensuring that the cost of services does not put people at the risk of financial hardship.^{1,2}

Globally about 150 million people annually suffer from financial hardship and nearly 100 million people are in poverty due to out of pocket (OOP) spending on healthcare.³

Sudan, with an estimated population of 43,660,260 in 2020,⁴ has a health care system that is mainly financed through the (OOP) payments, that accounted to 79.4% in 2015.⁵ This situation, where 46.5% of the population live below the poverty line,⁵ hinders much the overall accessibility of considerable percentage of the population to health services and has an impact on impoverishing others.

Health insurance (HI) is a system of social solidarity that enables different groups of society to access health services without financial barriers. It is a method of health financing where an entity provides the needed fund to cover the whole or part of a person incurring health expenses and hence replaces the user fees charged.⁶ The implementation of the current HI system in Sudan started in 1995 and achieved a coverage rate of 53.8% of the total population by the end of June 2017.⁷

In mid-2017, HI coverage rate in White Nile State ranked the 12th of the 18 States at an estimated rate of 46.9%.⁷ Community awareness on HI and the knowledge about how to be enrolled, service package and premium of HI are key parameters that facilitate HI coverage increment among any community.⁸ Attitudes defined as overall evaluations of things are important, because they affect both the way people perceive things and how they behave.⁹ Thus attitudes regarding the need for and value of HI may affect HI coverage.¹⁰

This study aims at identifying the determinants that encourage or otherwise impede the community in DAU to enroll in HI. As well it seeks to understand the knowledge of the population in DAU and their attitudes towards HI as important determinants for enrolment and as a secondary objective, to calculate the household's coverage with health insurance.

MATERIALS AND METHODS

Study Design and Area

The study was a descriptive cross-sectional, community-based study involving mixed quantitative and qualitative methods. It was

conducted in DAU, A-Duiem Locality in the White Nile State, which lies 190 km southwest of Khartoum, the capital of Sudan. The study area is an important center for the trade of agricultural and pastoral crops and has played a significant role in the political life, educational, and intellectual development in the country.¹¹ DAU is composed of 34 smaller Popular Administrative Units called “Hai” composed of 11,681 house-holds (HHs) accommodating 76,000 inhabitants.¹²

The study population included the heads of HHs, the heads of the non-insured HHs (HNIHs), community leaders, and members of the community organization.

Sample Size and Sampling

The sample size for the HNIHs was calculated to be 420 using the formula $n = Z^2 P Q / d^2 * RR$ where $Z = 1.96$ (the value in the normal distribution that cuts an area 95% which corresponds to the level of confidence); $p = 0.5$ (Estimated proportion of population knowledge/awareness about health insurance); $Q = 1 - p = 0.5$; deff. (Design Effect) taken as 1.5; $d = \text{Margin of Error} = 0.06$ and RR (Response Rate) = 0.95.

A cluster sampling technique was used where the Hai represents a cluster. Twenty of the 34 Hai were randomly selected. One Hai was chosen twice in the sampling process and 40 non-insured households (NIHs) were included from it, whereas 20 NIHs were included from each one of the others.

The selection of the NIHs was done following a systematic random sampling where the number of the households of each Hai was divided by the sample size in the Hai to determine the sampling interval. The first HH in each Hai was selected randomly and other households were selected according to the sampling interval.

The community leaders and the community organizations were purposively¹³ selected based on their proactive role, acceptability by the community, and representation to community organizations such as religious groups, women and youth unions, local Non-Governmental Organisations (NGOs), etc.

Data Collection

The study collected data using four tools developed and tested by the research team. The first two were used for the collection of data from the heads of the HHs through face to face interviews. A preliminary form which was completed with heads of all selected HHs to identify the HNIHs, then an extended, structured, pre-coded, and a pre-tested interviewer-administered questionnaire was completed with HNIHs using Android Tablets. The data collectors visited the first randomly selected HH in each Hai to identify the HI status if the family is not insured they fill the extended questionnaire, and if insured they skip to the next household according to the sampling interval. They did so till they reached their target of the NIHs in each Hai.¹⁴

The third tool was an in-depth interview guideline, used to collect data from the community leaders, including tribal leaders, chairpersons of women; youth; community organizations; and sports clubs.

The fourth tool was interview guidelines, used to collect data through focus groups discussions (FGDs) with selected community organizations such as members of students, youth, and women unions together with members of community organizations, religious leaders, and chairpersons of the community committees. The sample selection process ensured the representation of all enumerated community groups. Two data collectors conducted the FGDs, one was a chairperson and the other recorded the responses manually.

Before the starting the discussion, the data collectors registered names and characteristics of the group's members. Data collectors were carefully selected, trained, and supervised by two expert field supervisors: one for quantitative and the other for qualitative data.

The study variables included dependent variables such as knowledge, attitudes, out of the pocket expenditure on diseases, and the insurance status and independent variables such as age, sex, education, occupation, monthly income, presence of illness in the family during the last month, and presence of chronic disease in the family.

Data Analysis

The data supervisors revised the questionnaires in the field to ensure completeness and consistency. The statistician analyzed the quantitative data from the preliminary form manually to calculate the HI coverage in the administrative unit, and she used the Statistical Package for Social Sciences (SPSS) version 20 to analyze data from the extended questionnaire.

The study team agreed on three key indicators to assess the level of knowledge including the process of enrollment into HI, service package offered by HI, and HI premium's cost. The results were qualified as good, moderate, poor, or did not know when the interviewee knew the three, two, one, or zero of the specified indicator/s respectively.

Descriptive statistics were carried out for quantitative data and inputs summarized as frequencies and proportions at a 95% confidence level. Inferential statistics using chi-square (χ^2) were conducted to test the association between knowledge level and HNIHs characteristics that considered a probability value of 0.05 or less as statistically significant.

Qualitative data were revised in the same day. It was transcribed, ordered, coded, summarized, and analyzed manually using the thematic approach. The outcome was presented in terms of texts and quotes. This was performed by a qualitative data specialist.

RESULTS

Sample Coverage and Characteristics of the Study Population

A total of 800 HHs were visited to encounter the targeted 420 HNIHs, one HNIH refused to participate revealing a 99.8% response rate.

The majority (77.6%) of the HNIHs were males. Almost half of them (48.9%) were in the age group 25 to 44-years, (38.1%) were 45 to 64-years-old, while fewer were elderly (8.9%), and (4.1%) were younger than 25-years-old. About 42% of the study population received eight years of education or less, 39.4% received secondary and higher education and 18.6% were illiterate. Almost half (51.6%) of the HNIHs work in small enterprises and 10.5% were laborers. On the other hand, 69% have monthly income more than 1000 Sustainable Development Goals (SDGs) (Table 1).

Table 1. Characteristics of the HNIHs in DAU, A-Duim Locality, White Nile State, Sudan 2018

Characteristic	Count (%)	Knowledge about HI (p-value)
Sex		0.068
Male	325 (77.6)	
Female	94 (22.6)	
Educational Level		0.000
Illiterate	78 (18.6)	
Khalwa	43 (10.3)	
Primary school	133 (31.7)	
Secondary School	118 (28.2)	
University Graduate	45 (10.7)	
Postgraduate	2 (0.5)	
Monthly Income in SDGs		0.838
Less than 500	37 (8.8)	
500-1000	93 (22.2)	
1001-1500	87 (20.8)	
More than 1500	202 (48.2)	
Occupation		0.03
Government Employee	29 (6.9)	
Laborer	44 (10.5)	
Farmer	10 (2.4)	
Enterprises	257 (61.3)	
Unemployed	28 (6.7)	
Other	51 (12.2)	

In more than three-quarters (75.4%) of the NIHs, at least one member was sick during the previous month of the survey, of them, 95.9% spent 70 SDGs or more on medicines. Almost a quarter (24.8%) of the families had at least one member with a chronic disease, out of them, 85.6% use medications on regular basis and

the cost of the monthly medications of 80.9% of them were equal or more than 70 SDGs (Table 2).

Table 2. Morbidity and Chronic Diseases among the NHHs' Family Members During the Previous Month and the Cost of their Medication Bill in DAU, A-Duiem Locality, White Nile State, Sudan 2018

Disease Prevalence among the NHHs' Family Members	Response	Count (%)
Was sick during the last month	Yes	316 (75.4)
	No	103 (24.6)
The cost of medicines incurred last month in SDGs	Less than 50	10 (3.2)
	50-69	3 (0.9)
	70 or more	303 (95.9)
Having a chronic disease	Yes	104 (24.8)
	No	315 (75.2)
Use of medications continuously for the chronic disease	Yes	89 (85.6)
	No	15 (14.4)
Average monthly cost of medicines for the chronic disease in SDGs	Less than 50	9 (10.1)
	50-69	8 (9.0)
	70 and more	72 (80.9)

About 30.5% of the HHs said that they were not able to pay the premium. Twelve of the community leaders were males, the majority were 30-46-years-old. All of them had secondary education or above and most of them were businessmen.

Knowledge about Health Insurance

Around 37.9% (95% CI: 33.4-42.7) of the HNIHs were not aware about the health insurance. The least (4.1%) was about the premium (95%CI: 1.5-4.7), while only 2.4% respondents had good knowledge about HI. About 59.2% were informed about HI by neighbors and relatives, (34.7%) through mass media and (33.3%) by community committees.

The knowledge of the non-insured community leaders and members of the community organizations was good regarding the enrollment process and the services package and poor about the premium. A statistically significant association was found between education (*p*-value 0.03) and occupation (*p*-value 0.00) of the HNIHs and knowledge. Association between sex and monthly income to respondents' knowledge was insignificant (*p*-values were 0.068 and 0.838 respectively). The HNIHs suggested many methods to assist in community awareness raising on HI, the higher percentage was through TV programmes and community committees (40.3% and 39.6% respectively), and the least was the health personnel (12.9%).

Attitudes Towards Health Insurance

Ninety-seven percent (97%) (95% CI: 95.1-98.4) of the HNIHs were willing to be enrolled in HI and 65% (95% CI: 59.2-70.1)

confirmed that they were financially capable to pay the premium. All the non-insured community leaders and members of the community organizations were willing to join the HI.

The HNIHs mentioned the high-cost of the premium (30.5%), poor quality of services (15.5%), and far distance to services (14.3%) as reasons for why they were not able to join HI (Table 3). Almost three quarters (76.3%) of the HNIHs regarded, as reasons to be enrolled in HI, the management of common illnesses, (50.1%) mentioned the emergencies/injuries and the cost of operations, while (26%) mentioned the management of chronic diseases and others. As well (18.1%) regarded HI as a religious matter of solidarity. As depicted from (Table 3), twelve of the HNIHs were reluctant to enroll in HI, because of the poor quality of services, low demand, poor geographical access, and inability to pay the premium (some mentioned more than one reason).

Table 3. Distribution of the HNIHs by Reasons of Non-enrollment and Reasons for Willingness for Enrollment, in HI in DAU, A-Duiem locality, White Nile State, Sudan 2018

Characteristic	Count (%)
Reasons for Non-enrollment in HI*	
Couldn't pay the premium	128 (30.5)
Services are not good	65 (15.5)
Services too far to reach	61 (14.6)
Don't need the HI	30 (7.2)
Others	195 (46.5)
Reasons for Willingness for Enrollment in HI*	
Religion matter	76 (18.1)
Chronic diseases	109 (26.0)
Emergency cases and injuries	210 (50.1)
Operations	213 (50.8)
Common illnesses	303 (72.3)
Others	17 (4.1)
Reasons for Unwillingness for Enrollment*	
Can't pay the premium	8 (66.7)
Services are not good	6 (50)
Services too far to reach	2 (16.7)
Don't need the HI	1 (8.4)
Others	2 (16.7)
*Multiple answers	

Almost half of the community leaders rated the insurance services as either very good or better, while the other half think that it was moderate or less. Overall, the members of the community organizations were satisfied with the quality of the insurance services, however, concerns were raised about administrative processes "Issuance of the insurance card may take two months" said a 50-years lady from the Women Union executive board.

With respect to the health services provided by the HI,

some of the leaders rated it as good or less, while few rated it as more than good. The availability and quality of medicines was the major problem mentioned by the leaders; “*HI Fund avail cheap and low-quality medicines*” stated a 70-years-old man from the community committees and a religious man of the same ages, “*there are no medicines in the remote health facilities*” said a member of the University Student’s Union. The same was also mentioned by a 30-years old man from the Youth Union. . Other problems included poor referral procedures “*If you were referred to Khartoum you do not know where to go, how to start and what the procedures are; all are not clear*” said a 75-years-old man who is the tribal leader in A-Duiem Locality.

Coverage with Health Insurance

As a byproduct of this study, the HI population coverage was found to be 47.6%. Almost all community leaders and community organizations members were ensured.

DISCUSSION

In this study, the association between the HNIHs knowledge about HI and education background of the study population was statistically significant, whereas it was not for gender. This finding is supported by a study in Imphal, India; however, it contrasts with occupation background which was significant with our study.⁸

Almost three-quarters of HNIHs working in the small informal sector, where their education background might be below average, and no entity takes the responsibility of paying the premiums for them. This situation is also noted in a study in Douala, Cameroon, in which the informal sector had inadequate knowledge about the basic concepts of the HI scheme.¹⁵ This situation should encourage the government to sensitize the small private sector to enroll in HI and enact legislation to ensure compliance of the sector towards employees.

The study showed that the monthly income of more than two-thirds of HNIHs was more than one thousand SDGs, this may enable them to pay the monthly family premium of 70 SDG. Most of the families pay equal or more than the monthly premium on medicines at each episode of sickness and/or for chronic diseases, confirming that financial limitation was not the cause for the low coverage.

Awareness about HI was poor among HNIHs and moderate among the community leaders and the members of the community organizations. The knowledge of the community organizations members about the HI premium was notably poor. This is consistent with the result of a study in Sennar State in Sudan, which revealed that the lack of awareness among the community was a key factor behind the dropout from HI services.¹⁶ As well it is consistent with two similar studies in Nigeria capital city and a Suburb in Lagos, in which levels of awareness of the studies’ population about the HI were estimated at 13% and 19.8% respectively.^{17,18} The main source of knowledge about HI for the HNIHs, was neighbors and relatives (59.2%) which was in line with a

study in an urban community, Imphal, India.⁸ It is recommended to the National Health Insurance Fund (NHIF) to implement evidence-based policies and communication strategies to raise the awareness of the target population. This can include home visits by volunteers using the network of the members of the community organization in DAU and television (TV) programmes which were suggested by respondents. Social media, in general, might also play a great role in health promotion.

The positive attitudes of the HNIHs, community leaders and members of the community organizations who were willing to enroll in HI scheme is in line with the study in Sennar State, in which the study participants were willing to be enrolled in HI.¹⁶ It is also in line with the studies in Nigeria capital city and Lagos suburb where (97%) and (62.5%) of the respondents, respectively, had the interest to join the HI.^{17,18} It seems that the lack of awareness about HI was the cause of the low insurance coverage in the DAU, as the study showed that the participants had the intention to be enrolled and most of them could pay the premium. Even when they were asked about reasons for not being enrolled in HI only 30.5% said that they were not able to pay the premium.

The underlying factors (mainly access to and quality of medicines) for not enrolling in HI as perceived by the HNIHs, community leaders and members of the community organizations were similar to those claimed in the study in Sennar, where poor awareness along with the poor quality of health services, mainly access to medicines and organization of work at the facility level as factors to drop out of HI.¹⁶ This is consistent with results of a study among health workers in the University of Nigeria Teaching Hospital, where most of the respondents were concerned about bureaucracy, unavailability of expensive drugs and long queues while using the HI Scheme services.¹⁹

Despite the package of the health services offered by HI scheme is one of the best packages compared to similar countries²⁰⁻²² it was not appreciated by the HNIHs. This might be due to unfamiliarity of respondents with the contents of the service package. It is important to build community trust, this necessitates a huge effort in advocacy for HI, quality improvement in HI management systems; improved organization, distribution and quality of health services, focusing on access to and provision of quality medicines and laboratory services as well as overall referral system.

The estimates of HI coverage at DAU (47.6%), was consistent with coverage estimates (49.1%) of the While Nile State in 2017; yet it was very low compared to two localities in the same State, namely Kosti (87.2%) and Al Gabalain (83.2%) and higher than that of Goli (26.7%). As well, it was lower than the national coverage (55.7%), Central Darfur State (100%), and Khartoum State (72%) for the same year.²³ Compared to regional and international levels it was also lower than the coverage of Amman (73%) in 2018 and the United States of America (87.8%) in 2018 for the age group 19-65-years.^{24,25}

This low coverage might be due to the knowledge gap

about HI, scope, or inadequate quality of services. As mentioned above the Sudan NHIF should adopt a strategic communication plan and try improvements in other aspects of the services to increase the coverage rate of HI.

CONCLUSION

In conclusion, the HI coverage of the heads of HHs in DAU was low, especially among those working in the small informal sector, despite the positive attitude of almost all the HNIHs, community leaders, and members of the community organizations. The information received from the HNIHs indicated a knowledge gap about enrollment processes, premium cost, and contents of the service package.

The community leaders and the members of the community organizations had negative perception of the quality of the insurance service and the health services provided, mainly the problems of the availability and the quality of medicines, geographical in-accessibility, long queues and delayed administrative enrollment process, and misconception about the low quality and unavailability of some investigations.

STRENGTH AND LIMITATIONS OF THE STUDY

Though the study included different categories of populations and used both quantitative and qualitative methods for data collection, however, the study was limited to one administrative unit and the group of seniors might be too small (13 members) to generalize the results to other localities in Sudan. Nevertheless, it will encourage the NHIF to promote the HI and engage community leaders and organizations.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical and administrative approvals were obtained from the Ministry of Health in the White Nile State and DAU respectively and oral informed consent was obtained from the study population according to the guidelines of the National Health Research Ethics Committee.

CONSENT FOR PUBLICATION

Not applicable.

AVAILABILITY OF DATA AND MATERIALS

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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Scoping Review

Scoping Review and Expert Reflections: Coronavirus Disease 2019 - Preparedness and Response in Selected Countries of East Africa, West Africa, and Southeast Asia

Ednah Madu, PhD, MSN, FNP-BC, RN^{1*}; Elfatih M. Malik, MBBS, MD, FPH-UK²; Sharath B. Nagaraja, MBBS, MD³; Renu Tyagi, PhD⁴; Gregory Fant, PhD, MSHS, MPA, MACE, IPFPH-UK⁵

¹College of Nursing and Public Health, Adelphi University, Garden City, New York, USA

²Planning and International Health Directorate, Federal Ministry of Health, Nile St, Khartoum, Sudan

³Department of Community Medicine, ESIC Medical College and PGIMS, Rajajinagar, Bangalore 560010, Karnataka, India

⁴Department of Anthropology, University of Delhi, Delhi 110007, India

⁵US Department of Veterans Affairs, VHA/Patient Care Services, Population Health Services (10P4V), Washington, DC 20420, USA

*Corresponding author

Ednah Madu, PhD, MSN, FNP-BC, RN

Assistant Professor, College of Nursing and Public Health, Adelphi University, Garden City, New York, USA; Tel. 516.877.4531; E-mail: emadu@adelphi.edu

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ABSTRACT

Background

The coronavirus disease 2019 (COVID-19) outbreak, started in the Hubei province of China in December 2019. On January 31, the World Health Organization (WHO) declared COVID-19 a worldwide pandemic. We wondered what countries in Africa and South-East Asia had done to prevent infectious disease, specifically, COVID-19, from impacting the population of specific countries in that region, and what disease control measures were successful. Expert reflections on findings could guide continued successful public health approaches in managing this complex infectious disease pandemic.

Methods

Using a scoping review, published papers, or program descriptions for specific geographic regions (i.e., Africa or Southeast Asia) were searched using specified key terms. Three targeted countries classified by World Bank as lower-middle-income in the two WHO selected regions [Africa (Sudan and Nigeria); Southeast Asia (India)] were reviewed with respect to COVID-19 preparedness and response. Findings were organized, highlighting key points that seem particularly useful for regional learning. The evidence from each region was summarized in the aggregate to determine some common, noteworthy themes. COVID-19 epidemiologic data for these regions were also reviewed.

Results

Our findings indicate experience from prior infectious disease outbreak seems to have prepared the selected countries in their preparedness for COVID-19 outbreak on various levels. Incidence of COVID-19 increased across the selected countries. WHO recommended basic public health strategies to reduce disease transmission was initiated by the selected countries at different levels. However, feasibility and lockdown practices raise public health concerns and questions across the target regions reviewed.

Conclusion

This scoping review and expert reflections uncovers important preparedness and responses to the COVID-19 pandemic in the selected WHO regions. Further exploration and possible public health strategic plans may be needed.

Keywords

COVID-19 Pandemic; Health system; Preparedness and response; Sub-Saharan Africa; Southeast Asia; Developing countries.

INTRODUCTION

As we reported in our earlier publication,¹ the coronavirus disease 2019 (COVID-19) pandemic shows how disease out-

breaks can connect people in different regions of the world in a significant way. The interconnectedness of people and disease is a hallmark of the concept and practice of global health.^{2,3} It has long been recognized that public health professionals can assist popula-

tions in responding to complex public health emergencies.⁴ In fact, Burkle reminds us: “The emergence of complex global public health crises such as climate change and extremes, biodiversity loss, emergencies of scarcity, rapid unsustainable urbanization, migrant and refugee surges, domestic and international terrorism, cyber-security, the civilianization of war and conflict, and the global rise of resistant antibiotics has resulted in an unprecedented rise in direct and indirect mortality and morbidity”.⁵ The global response to the COVID-19 pandemic may be seen as illustrating the characteristics of a complex global public health crisis.

However, an increase in the number of cases within a few weeks raised public health concerns.⁶ The existence of diseases caused by coronaviruses are not, however, new. Severe acute respiratory syndrome coronavirus (SARS-CoV) virus epidemic of 2003 was thought to be an animal virus from an uncertain animal reservoir and transmitted to other animals (possibly originating from bats). Interestingly, the first infected humans were traced to the Guangdong province of southern China in 2002 leading to an epidemic of SARS, a resultant transmission to 26 countries resulted in more than 8000 cases in 2003.⁷

COVID-19 is, already, a pandemic and complex, public health emergency. With the alarming transmission rates of the current COVID-19 infectious disease which has claimed many lives, we want to help our public health peers in Africa and South-East Asia prepare for COVID-19 using good, public health science and thinking to reduce morbidity and mortality. We were curious as to what countries in Africa and Southeast Asia have done to prevent infectious disease (specifically, COVID-19), from affecting the population of specific countries in that region. We also wanted to know what disease control measures they embarked on were successful.

METHODS

To address our interests, we crafted two questions: First, between March 2015 and March 2020 what actions have been taken to prepare for the impact of infectious diseases in countries in either Africa or Southeast Asia? Second, between the dates of March 2015 to March 2020, what actions have these same nations taken to successfully stop or control the infectious disease? These questions were best answered using a scoping review approach whose purpose is “to provide an overview of available research evidence” on a broad question/broad questions of interest.⁸ We looked for good quality published papers or program descriptions for specific geographic regions (i.e., Africa or Southeast Asia), and searched the published literature using these terms: “COVID-19”, “Corona”, “Pandemic”; “Preparedness”, “country preparedness”, “health system preparedness”; “country response”, “health system response”; “COVID-19”, “Africa”, “Sub-Sahara”, “developing countries”; “COVID-19”, “Southeast Asia”, “developing countries”. Then, we organized our findings by the two questions, highlighting key points that seem particularly useful for regional learning. The evidence from each region was summarized in the aggregate to determine some common, noteworthy themes. COVID-19 epidemiologic data and administrative data for selected countries were also reviewed. The World Health Organization (WHO) regions of Eastern Africa (Sudan); Western Africa (Nigeria) and South-East Asia (India) were included.

RESULTS

The COVID-19 epidemiologic data along with administrative data provided a profile of the available information pertinent to public

Table 1a. Comparison Table of WHO Countries, selected, as of 23 April 2020 and 31 May 2020

Countries	Sudan, 23-APR	Sudan, 31-MAY	Nigeria, 23-APR	Nigeria, 31-MAY	India, 23-APR	India, 31-MAY
COVID-19 (2020)*						
Confirmed Cases	162	4,800	541	9,855	21,393	182,143
New Cases	22	279	0	553	1,409	8,380
Deaths	13	262	19	273	681	5,164
New Deaths	0	29	0	12	41	193
General Statistics (2020)[^]						
Total Population (2016)	39,579,000		185,990,000		1,324,171,000	
Gross National Income per capita (PPP international \$, 2013)	2,370		5,360		5,350	
Total Expenditures on health per capita (Intl \$, 2014)	282		217		267	
Total expenditure on health as % GDP	8.4		3.7		4.7	
Health workforce per 10,000 population (2019)**						
Density of physician	4.1		3.8		7.8	
Density of nurse	8.3		14.5		21.1	
Density of pharmacist	2.1		0.5		1.9	
World Bank income group (2014)^{^^}						
Classification	Lower-middle		Lower-middle		Lower-middle	

Source: *WHO COVID-19 Situation Report-94, 23 April 2020; Situation Report-132, 31 May 2020; ^WHO Country Profile page, as of 22 April 2020; **WHO World Health Statistics 2019, Annex 2, Annex B-4; ^^WHO Global Atlas of Medical Devices-2014

health efforts for COVID-19 pandemic prevention preparedness and disease control (Tables 1a and 1b).

Table 1b. Comparison Table of WHO Countries, Selected, as of 31 May 2020 and 15 June 2020

COVID-19 (2020)*	Sudan, 23-APR	Sudan, 31-MAY	Nigeria, 23-APR	Nigeria, 31-MAY	India, 23-APR	India, 31-MAY
Confirmed Cases	4,800	7 220	9,855	16 085	182,143	332 424
New Cases	279	213	553	904	8,380	11,502
Deaths	262	459	273	420	5,164	9,520
New Deaths	29	12	12	21	193	325

Source:WHO-Situation Report-132 and 147

Table 1a displays a comparison between the three selected countries with respect to COVID-19 cases (2020), General Statistics (2020), Health workforce (2019), World Bank income group (2014). Regarding COVID-19, the number of confirmed cases and deaths in the three countries, and the differences between April 23rd, 2020, and May 31st, 2020, are displayed. From the data provided, it can be noted that the three selected countries: Sudan, Nigeria, and India are all classified by the World Bank in the “lower middle income” group. Note the gross national income per capita for each country. The comparison data between these countries seem to justify the joint consideration of these three lower-income countries. Table 1b displays the comparison between the three selected countries from the updated WHO Situation Reports.

Preparedness for COVID-19 Outbreak in East Africa (focus: Sudan)

Epidemics of infectious diseases including epidemics caused by the coronavirus family constitute a risk worldwide including the African continent.⁹ In Africa, the most devastating ones are Ebola, viral haemorrhagic fevers, cholera, SARS, MERS, malaria, measles, and many others.¹⁰ Recognizing the threat to health and public system, the International Health Regulation (IHR) 2005, calls for a list of actions; some to be carried out by WHO and international community and the others to be carried out by countries and regions.¹¹ To reduce the health and socio economic impact of these epidemics countries need to work together and to be prepared. Each country basically to have strategic and contingency plans, trained rapid response teams, functioning surveillance systems and buffer stock of essential commodities to initiate action before asking for help. Sudan and countries in Eastern Africa are at particular risk to these epidemics considering the challenges facing the economic, public, and health system and unrest.¹²

During the period 2016-2018; the WHO and countries jointly assessed the IHR core capacities of countries to meet the health security requirements; an exercise which was done in all countries including Sudan and Ethiopia.^{13,14} An international team of experts worked together with their national peers (joint external evaluation (JEE)) through discussions and site visits using the WHO/IHR-JEE tool. They also jointly developed a report with recommendations and priority actions for each country.

Response to COVID-19 Outbreak in East Africa (focus: Sudan)

In response to COVID-19, the “Resolve to Save Lives”- an initiative of vital strategies¹⁵-provides country-level information on epidemic preparedness using data from WHO/JEE missions. The “ReadyScore” tool created by “Resolve to Save Lives” determine whether a country prepared to detect, contain and prevent epidemics and classified countries into 3 categories: Better prepared (score 80% or higher), have work to do (score 40-79%) and not ready (39% or lower).

Sudan and countries in Eastern Africa (Ethiopia, Eritrea, Djibouti, Somalia, South Sudan, Kenya, Uganda, and Tanzania) overall ReadyScore ranged between 29% to 57%. No country scored 80% or higher “better prepared”. Djibouti (31%), Somalia (29%), and South Sudan (30%) are classified as “Not ready” and the rest of countries as having “Work to do” to detect, contain and prevent epidemics. Countries are doing better in the national laboratory systems, real-time surveillance and risk communication, and scoring generally between 40-79% with few exceptions. The picture changes a lot and countries under study were found better prepared with the exception of Somalia and South Sudan.¹⁶ In fact, Africa is better prepared than ever before.¹⁷ This may be attributed to the JEE report as the team identified for each country what to do and the process was also enhanced by the Ebola epidemic in Western Africa.

Sudan and countries in East Africa have taken preparedness and response actions to detect and contain COVID-19 following WHO guidelines.¹⁸ Measures directed towards strengthening surveillance, prevention of introduction at point-of-entry, testing of suspected cases. All countries adopted home isolation for suspected cases but some countries have public isolation centres where people coming from certain countries isolated for 14-days. Severe confirmed cases admitted to specialized treatment centres, the number of these centres varies between countries but generally, there is one advanced centre at the capital city. Non-severe cases asked to stay at home with a daily phone calls from the 24-hour call desk. The call centre also counters rumours and misinformation about the disease. Countries also adopted partial or complete lockdown with mass public awareness campaigns.^{19,20} All countries enhance infection prevention and control practices at health facilities and communities.

Preparedness for COVID-19 Outbreak in West Africa (focus: Nigeria)

As discussed earlier, the initial surge of the alarming COVID-19 cases seen in Asia, Europe, and the United States seemed to have spared most African countries including the western African regions. However, an increase in the number of cases within a few weeks raised public health concerns.⁶ Prior Ebola outbreaks in regions of West African between 2014 and 2019, for which Nigeria was notable for swift action had demonstrated the importance of adequate preparedness in handling infectious disease outbreaks²¹ With vulnerable health systems in most West African countries, were they prepared enough to maintain successful, sustainable ap-

proaches for this new public health challenge.²² To determine a country's capacity to detect and respond to cases with two using preparedness and vulnerability indicators, Nigeria and Ghana were among the countries deemed of moderate risk for having the variable capacity and high vulnerability.²³

Nigeria was one of the first countries to recognize the risk and start planning the response for COVID-19. A multi-sectoral National Coronavirus Preparedness Group was established by Nigeria Centre for Disease Control (NCDC) on January 7, 2020, one week after China first reported the cases and three weeks before WHO declared the disease to be of international concern. Within one month, three laboratories with diagnostic capacity for COVID-19 was established. The first confirmed COVID-19 case in Nigeria was recorded in February, 2020. A multi-sectoral emergency operations center (EOC) led by NCDC was activated on the 28th of February at Level 3, the highest level of response to public health emergencies. Lagos and Ogun State Ministries of Health activated State-level EOC. The Executive Governors and Honorable Commissioners in both States had held a press briefing. Two NCDC Rapid Response Teams were deployed to Lagos and Ogun State to support response activities on 28th February. The ongoing risk communications campaign was set in place across the country.²⁴⁻²⁶

Other countries in the region equally set up plans to address the pandemic. Without an early surge of COVID-19 cases in West African countries, they potentially had enough time to adequately prepare before the dreaded pandemic broke out in their region. Notably, Senegal partnered with the United Kingdom to develop an affordable point of care COVID-19 testing.²⁷ Ongoing research, publications, media, and community awareness efforts continued in most countries in the West African region.^{21,22,24,27} Would the public health measures in place be sufficient when the COVID-19 outbreak hits the region?

Response to COVID-19 Outbreak in West Africa (focus: Nigeria)

The first recorded COVID-19 death in West Africa was in Burkina Faso on Wednesday, March 18, 2020, the 2nd and third were both recorded on Friday 20th March 2020 in Gabon and the Democratic Republic of Congo. Nigeria recorded her first death on the 21st March 2020,²⁶ although her first identified case was on February, 27th 2020.²⁵ Abdalla & Galea (2020) recommend that different countries in Africa chart their own paths in responding to the COVID-19 pandemic through testing, contact tracing, and isolation, as well context-specific guidelines around physical distancing based on stratified risk aimed at protecting those at high risk.²⁸

In response to the arrival of COVID-19 to the West African region, countries embraced public health measures to identify and contain the disease including public awareness, testing, provision of personal protective equipment to healthcare workers, and the use of mandatory lockdown in many regions. Conflicting media and oral reports question the efficiency of the measures in place.

As of May 7, 2020, Nigeria has recorded 3526 confirmed cases, 601 discharges, and 107 deaths from 34 states and the Federal Capital Territory. On the 7th of May 2020, 381 new confirmed cases and 4 deaths were recorded. The 381 new cases from 18 states-Lagos (183), Kano (55), Jigawa (44), Zamfara (19), Borno (9), Bauchi (19), Katsina (11), Kwara (8), Kaduna (7), Gombe (6), Ogun (5), Sokoto (4), Oyo (3), Rivers (3), Niger (2), Akwa Ibom (1), Enugu (1), Plateau (1). No new state reported a case in the last 24-hours. Of note, many states in the country are not represented in the list.²⁵ As noted, a similar lower prevalence of confirmed cases are reported in other West African countries. As of May 2nd, 2020, the following represents the number of confirmed cases of COVID-19 in West African countries starting with the highest prevalence to the lowest: [Nigeria (3,145), Ghana (3,091), Cameroon (2,264), Guinea (1,856), Guinea (1,856), Ivory Coast (1,516), Senegal (1,433), Burkina Faso (729), Mali (631), Sierra Leone (225), Liberia (178), Zambia (146), Togo (128)].²⁹

With respect to testing resources, researchers in Senegal have been commended for initiated a \$1 COVID-19 rapid testing responsible for testing more people upon entry to healthcare facilities. Such a noteworthy endeavor could be emulated by other West African countries. As in other African countries, in West Africa, mandatory lockdowns, curfews, closure of some public offices, and markets are employed as efforts to reinforce physical distancing with the goal of limiting COVID-19 transmission. However, mandatory lockdowns have posed economic and psychosocial challenges threatening the survival of persons, particularly for those who depend on daily employment for living sustenance and deemed unjustifiable by some in the context of low identified COVID-19 cases or lack of symptomatology. Barriers to successful lockdown efforts are linked to health-care systems with limited financial resources, infrastructures less resilient to the consequences of lockdown and curfew measures, as well as cultural, geographical, and relationship differences between governments and residents.²⁸ Critical questions arise if universal lockdown is an equitable practice in areas of unidentified COVID-19 cases, particularly if daily survival sustenance is not provided by the government in low-income areas. Of note, new cases of COVID-19 continued to increase in all states in Nigeria as presented in Table 3 below. However, lower identified cases remain considerably low in most Southern States of the country.

Preparedness for COVID-19 Outbreak in South East Asia (focus: India)

The Southeast Asia region is more vulnerable due to climate change and emerging diseases. Most of these countries had prior experience of tackling disasters in the recent past. India, in particular, had battled cyclone Fani and Nipah virus and had significantly reduced the deaths during these emergencies.³⁰ In September 2019, all the countries had signed the 'Delhi Declaration' to scale up preparedness to respond to health emergencies.³¹ The four key initiatives include (1) to identify risks by mapping and assessing vulnerabilities for evidence-based planning; (2) invest in people and systems for risk management;³² (3) implement plans; and (4) interlink sectors and networks to engage and involve all, beyond the health sector, who can and have a role in responding to public health emergen-

cies. These countries had conducted regular simulation exercises and annual self-assessment to strengthen their response and contingency plan.³²

The eleven countries of South-East Asia were more susceptible to the COVID-19 infection because of their proximity to China. As on 4th March 2020, five of the eleven countries had reported COVID cases Thailand (43), India (28), Indonesia (2) and Sri Lanka and Nepal one each and only nine countries in the region were equipped with laboratory testing facilities for COVID. However, over next two months; as on 15th May 2020, the number of cases and deaths (#) recorded in these countries were: India 81,970 (2649), Bangladesh 20,065 (298), Indonesia 16,496 (1076) and Thailand 3025 (56), Maldives 1020 (4), Sri Lanka 925 (9), Nepal 258 (0), Myanmar 181 (6), Timor-Leste 24 (0), Bhutan 20 (0), Democratic People's Republic of Korea 0 (0). In India, the National Taskforce was formed which included experts from across the country and belonging to various disciplines in collaboration with the Indian Council of Medical Research (ICMR). The task force works closely with the Ministry of Health and Family Welfare, Government of India and provides technical inputs to the Government to contain the spread of the disease in the country.

Response to COVID-19 Outbreak in Southeast Asia (with focus on India)

The WHO provided technical inputs in all these countries during

the COVID pandemic. In India, the first COVID death was reported in Gulbarga district, Karnataka on 13th March 2020. The Ministry of Health and family welfare, Government of India assess the situation after obtaining the reports from the 33 states across the country and then issues necessary actions and guidelines for further implementation by the states.³³ All the states are closely monitored by the centre. The country adopted '5' P for disaster management. (1) Proof of concept with a social environment where the curfew was in place in the whole country for a period 40-days (b) proactive approach to ban international flights and have screened more than 1.5 million passengers (c) The impact of COVID is not just physical health but it caused huge stress among people due to which there were some cases of even prominent people committing suicide or died of a heart attack. The Prime Minister of India, Shri Narendra Modi announced an initiative called #9PMfor9Minutes Challenge on April 5th to turn off lights and lit lamps for 9 minutes at 9 pm as a mark of unity (d) Partnerships: the country dwelled upon interaction with stakeholders of state governments, exchanging knowledge and empowering state governments. They also have supplied Hydroxychloroquine tablets and personal protective equipment kits to other countries (e) Preparation and collaboration: The country had devised and implemented various strategies to contain the spread and avoid the spike in the sudden increase of cases. The health facilities were further equipped with ventilators, personal protective equipment (PPE), and established isolation wards, COVID care centres, and

Table 2. Synthesis Table from Scoping Reviews, Preparations, and Responses to Infectious Disease Outbreak (including COVID-19), from March 2015 to March 2020

	Preparation for Infectious Disease Outbreak	Response to Infectious Disease Outbreak
Eastern Africa (Sudan)	<ul style="list-style-type: none"> Sudan and countries in Eastern Africa are at particular risk to these epidemics considering the challenges facing the economic, public and health system and unrest Experience from the Ebola period 2016-2018 helped with preparation: The World Health Organization and countries jointly assessed the IHR core capacities to meet the health security requirements. Sudan and Ethiopia participated in the exercise Embraced the WHO/ Joint External Evaluation- JEE tool: jointly developed by the international team of experts with recommendations and priority actions Overall ReadyScore ranged between 29 to 57% in East African countries and improving; "Resolve to Save Lives"- 	<ul style="list-style-type: none"> Sudan and countries in East Africa adopted preparedness and response actions to detect and contain COVID-19 following WHO guidelines. National Call centres implemented. Adoption of home isolation for suspected cases, public isolation centres where people coming from certain countries isolated for 14 days. Severe confirmed cases admitted to specialized treatment centres. Despite the adoption of public health recommended measures, cases of COVID-19 are increasing raising the need for measures relevant to the context of Africa Partial or complete lockdown is ongoing with relatively high commitment from the people. The possibility of extending is concerning due to the impact on individuals' income and the overall economy.
Western Africa (Nigeria)	<ul style="list-style-type: none"> An initial surge of the alarming COVID-19 cases seen in Asia, Europe, and the United States seemed to have spared most African countries including the western African regions. Nigeria was one of the first countries to recognize the risk and start planning the response for COVID-19. A multi-sectoral National Coronavirus Preparedness Group was established by Nigeria CDC (NCDC) on January 7, 2020, one week after China first reported the cases and three weeks before WHO declared the disease to be of international concern. Prior Ebola outbreaks in regions of West African between 2014 and 2019, for which Nigeria was notable for swift action had demonstrated the importance of adequate preparedness 	<ul style="list-style-type: none"> Within one month, three laboratories with diagnostic capacity for COVID-19 were established in Nigeria. Senegal Commended for \$1 COVID-19 testing through collaborative research with the United Kingdom WHO recommended Public health preventive/containment measures publicized through community awareness, testing, and provision of personal protective equipment to healthcare workers Use of mandatory lockdown in many regions including regions with low confirmed cases and/or deaths in Nigeria (approx. 200million. Most the southeast States with minimal cases and no deaths. Conflicting media and oral reports question efficiency of mandatory lockdown with its attendant psychosocial/economic strains challenging day to day survival, particularly among persons living in poverty in areas of low COVID-19 cases
South-East Asia (India)	<ul style="list-style-type: none"> Prior experiences tackling disasters helped most southeast Asian countries prepare for the epidemic. India, in particular, had battled cyclone Fani and Nipah virus and had significantly reduced the deaths during these emergencies. Signed 2019 'Delhi Declaration' to scale up preparedness to respond to health emergencies helped with preparedness with four key initiatives and simulation exercises In India, a multidisciplinary National Taskforce collaborated with the Indian Council of Medical Research (ICMR). The task force works closely with the Ministry of Health and Family Welfare, Government of India to provide technical inputs to help reduce disease spread 	<ul style="list-style-type: none"> The WHO SEARO countries have witnessed the increase in the number of cases despite the appropriate public health measures India, in particular, is leveraging on mobile applications that track patients and prophylaxis for health care workers It is a challenge to control the spread of disease as the countries are gearing up to ease the lockdown fearing the slump in the economy. Intense measures to build the public health system and changing the mindset and behavior of the population to effectively implement the protective measures remain the key strategy for control of COVID-19.

COVID hospitals to manage a huge influx of patients in the future. The government also launched the ‘AarogyaSetu’ app that helps in curbing the spread of infection by tracking the movement of infected persons and alerting their presence to nearby persons.³⁴ It also provides updates on the recent developments in the travel advisory, updates on containment areas, and guidelines.

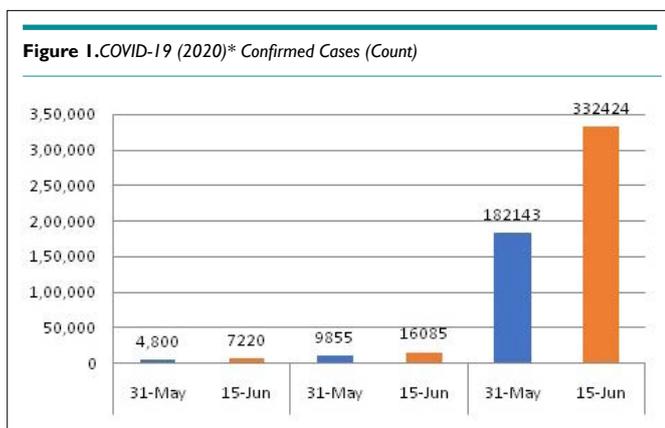
DISCUSSION

Following our earlier piece,¹ this scoping review is written because the COVID-19 pandemic shows us that disease outbreaks connect the people of the world in a significant way. Our broad interests motivated two questions regarding preparedness and responses by the three selected countries in two WHO regions: Africa: Sudan (East) and Nigeria (West), and Southeast Asia: India. Comparable data between these countries presented in Table 1 seem to justify the selection of these low middle-income countries. Table 2 displays the summary synthesis from the scoping review, preparations, and responses of the selected countries during the specified period.

A narrative or descriptive account of available information on the public health efforts at COVID-19 pandemic prevention preparedness and responses for disease control in the three countries have been presented. A synthesis table from scoping reviews, preparations, and successful response to infectious disease outbreak (including COVID-19) in these regions are highlighted in Table 3.

CONCLUSION

Infectious disease continues to have a severe impact on developing nations. In the face of the COVID-19 pandemic, countries in Africa and South-East Asia have taken steps to both prepare for the spread of the pandemic and respond to the virus impacting the population (Figure 1) (see “dashboard”).



Dashboard

In the face of the number of confirmed COVID-19 cases, how have Sudan, Nigeria, and India prepared and responded to the virus to protect their populations?

In addition to country-specific public health strategies to reduce COVID-19 transmission and its associated morbidity/mortality, it is interesting to note the similarities and differences noted among these countries. Upon reflection, the period of communicability of the disease suggest the need to help populations understand the seriousness of the treatment of this virus and, in the short-term, the need to conduct the activities of daily living differently than in the past. Overall, COVID-19 is a complex pandemic posing significant public health and economic challenges worldwide including the countries discussed in this paper. The similarities noted among Sudan, Nigeria, and India with respect to preparedness for the COVID-19 pandemic show that each country has established infectious disease preparedness protocols based on prior experiences with disease outbreaks. Countries in Africa including Sudan and Nigeria seem to have been spared of the initial COVID-19 surges seen in other parts of the world. In spite of reports of instituting WHO-recommended measures to reduce disease spread, consistent increasing trends in the number of COVID-19 confirmed cases and deaths were noted across Sudan, Nigeria, and India.

Differences noted in the preparedness and responses to the COVID pandemic between the three countries of interest are largely due to administrative and technological differences. For example, India’s use of an “app” to track cases was not noted in Sudan or Nigeria. Of interest is the low number of identified COVID-19 cases in Nigeria with a population of about 200 million. The low number of identified cases in the many Nigerian States in the South-Eastern regions. Possible explanations could be linked to inequitable testing resources, individual defense mechanisms/group attributes against COVID-19.

Perhaps the issue of disease containment through enforcing mandatory lockdowns even in regions with very few identified COVID-19 cases have raised the most controversial concerns. This is particularly noted in the low-income African regions where the adverse effects of such lockdowns result in economic and psychosocial issues challenging daily survival of those living in poverty. Such observation seems to validate concerns and questions posed by Abdalla Galea (2020) regarding the workability of lockdowns in African countries with respect to handling coronavirus.²⁸

Adhering to WHO recommended public health strategies for prevention, case identification, quarantine, and treatment remains paramount. Of great interest, in addition to promoting the necessary public health measures to identify and treat COVID-19, is the need to address the urgent and overwhelming psychosocial strain, economic challenges, and unmet daily needs associated with lockdowns, particularly in low-income regions of Sudan, Nigeria and India. Timely data collection, analysis, and dissemination to public health decision-makers are, also, critical actions in favor of disease prevention and control efforts. The results of our scoping review has implications for clinical practice, policy making and planning public health strategies. In addition to clinical issues of morbidity and mortality associated with the COVID-19 pandemic in these regions, concerns regarding equity, economic, and psychosocial consequences COVID-19 seem to have serious implications from a public health standpoint.

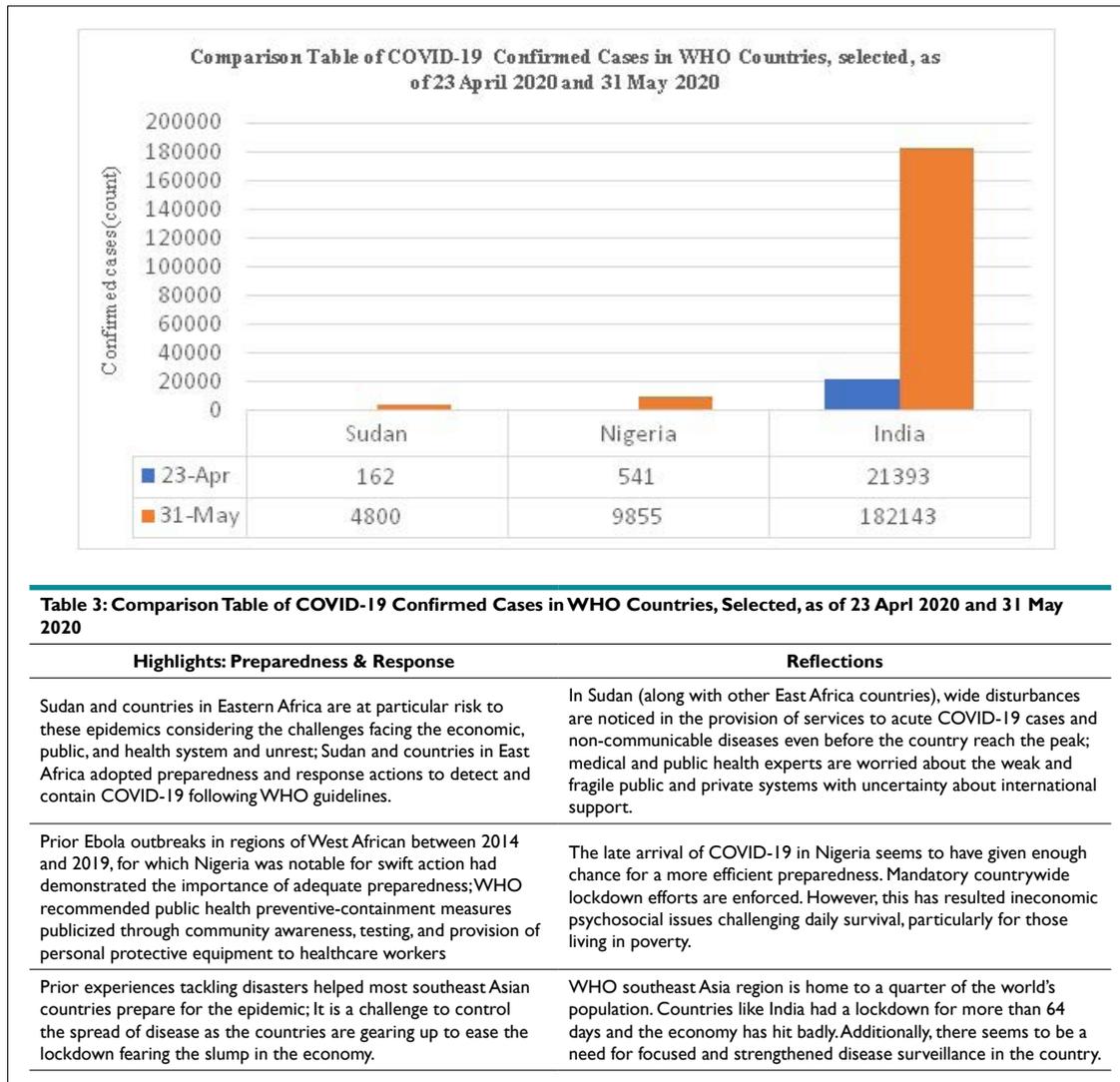


Table 3: Comparison Table of COVID-19 Confirmed Cases in WHO Countries, Selected, as of 23 April 2020 and 31 May 2020

Highlights: Preparedness & Response	Reflections
Sudan and countries in Eastern Africa are at particular risk to these epidemics considering the challenges facing the economic, public, and health system and unrest; Sudan and countries in East Africa adopted preparedness and response actions to detect and contain COVID-19 following WHO guidelines.	In Sudan (along with other East Africa countries), wide disturbances are noticed in the provision of services to acute COVID-19 cases and non-communicable diseases even before the country reach the peak; medical and public health experts are worried about the weak and fragile public and private systems with uncertainty about international support.
Prior Ebola outbreaks in regions of West African between 2014 and 2019, for which Nigeria was notable for swift action had demonstrated the importance of adequate preparedness; WHO recommended public health preventive-containment measures publicized through community awareness, testing, and provision of personal protective equipment to healthcare workers	The late arrival of COVID-19 in Nigeria seems to have given enough chance for a more efficient preparedness. Mandatory countrywide lockdown efforts are enforced. However, this has resulted in economic psychosocial issues challenging daily survival, particularly for those living in poverty.
Prior experiences tackling disasters helped most southeast Asian countries prepare for the epidemic; It is a challenge to control the spread of disease as the countries are gearing up to ease the lockdown fearing the slump in the economy.	WHO southeast Asia region is home to a quarter of the world's population. Countries like India had a lockdown for more than 64 days and the economy has hit badly. Additionally, there seems to be a need for focused and strengthened disease surveillance in the country.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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Review

The Review on the European and the United States Healthcare Systems

Andrew S. Targowski, PhD*

Western Michigan University, Kalamazoo, MI 4908, USA

*Corresponding author

Andrew S. Targowski, PhD

Professor Emeritus, International Society for the Comparative Study of Civilizations President (2007-2013), Western Michigan University, Kalamazoo, MI 4908, USA; E-mail: Andrew.targowski@wmich.edu

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ABSTRACT

The paper investigates the main ideas and solutions of healthcare systems in leading countries such as Switzerland, the Netherlands, Denmark, Sweden, Austria, France based on the international ranking indexes such as the United Nations Human Development Index, Genuine Progress Indicator (GPI), Blumberg's Global Health Index, World Health Organization (WHO), The Healthcare Access & Quality Index (HAQ), the European Health Consumer Index (EHCI). In conclusion, the health of society depends to a great extent on lifestyle and climate, where such countries as Spain and Italy have fewer sick people, and it results in a lower burden on healthcare. Unites States of America healthcare must compensate for lifestyle defects with intensive treatment and expensive medicines. This costs money and, what is worse, it doesn't bring any noticeable progress. As evidenced by the dramas caused by the 2020 pandemic.

Keywords

Healthy life; Healthy lifestyle; American healthcare; Healthcare indexes.

INTRODUCTION

About 1000-years-ago, the average life expectancy of people was surprisingly short, lasted only 24-years. Since the Industrial Revolution (1820+), it increased to 36-years after the Second World War, in 1950th—reached 66-years, and in 1999 it covers 78-years for developed countries. Such a promising extension of people's lives because it was up to three times thanks to the development of medicine, and thus people are living longer and longer. Knowledge, including medical, proved to be an excellent engine for the development of civilization. It is worth noting that the development gap between the leader, which is the United States and Africa, is currently 20 to 1.¹ And in 1000 developed countries (belonging to Western civilization) were more unfortunate than countries in Asia and Africa! Nowadays, the situation reversed people live longer in Western civilization but perhaps reached their potential. Due to the unhealthy lifestyle, the next generations may live shorter.

THE PURPOSE OF HUMAN LIFE

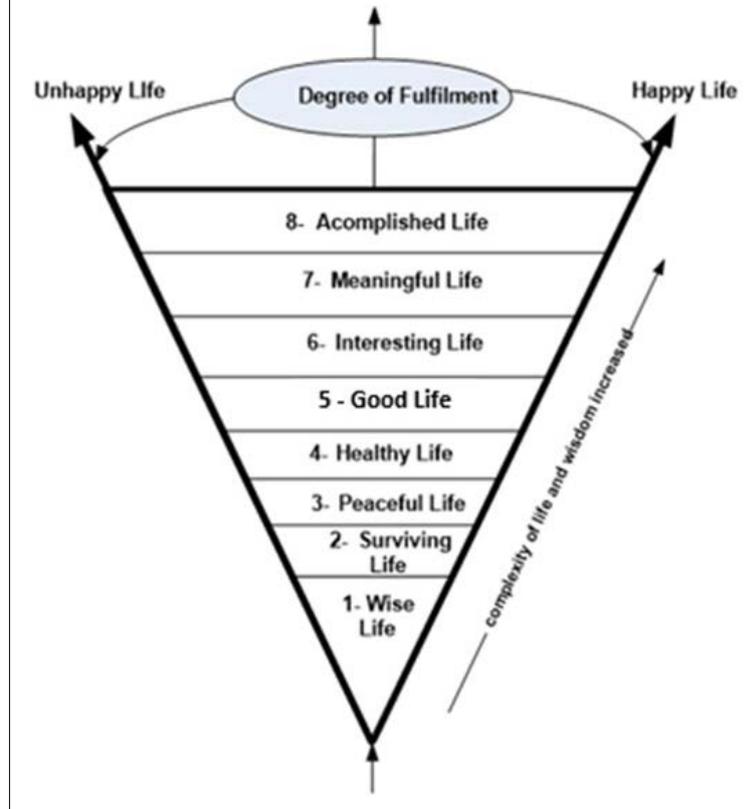
The present man not only dreams but demands that the healthcare

service take care of his/her health, to be able to achieve his ambitious goals in his long life. The condition for this is above all good health, without affecting the fact that there is no *raison d'être*. Aristotle 2350-years-ago claimed that people are stupid because they do not know the purpose of life, so you can not make wise decisions in everyday life. Well, then man lived under 24-years, and his goal was to survive until tomorrow so as not to be killed, starve or be taken a prisoner. Now people can live up to 100-years and worry what to do in such a long life.

Before you develop a healthcare information strategy, you need to think about what it should be, make it computerized in favorable conditions. Therefore, first, you need to think about the idea of good health services that are worth informing and then deal with strategic solutions for its computerization. The human life purpose model is shown in Figure 1, which indicates that to live a long and happy life, people should know their live purposes, which change along with their experience.

According to the Model of the Hierarchy of Life Purposes (MLP), living a healthy life, after securing life in peace, is the

Figure 1. The Model of the Hierarchy of Life Purposes seen in the 21st Century (the Targowski Model²)



basis for achieving several advanced life goals. It is evident that to achieve these goals, a man should be wise. Hence the questions about our wisdom of social life:

- Do people set proper operational and development priorities for their communities?
- What is the position of the health service among these priorities?

Caring for patients' health and prevention should be at the top of every priority list of the state and its society.

PUBLIC HEALTHCARE INDICATORS

The assessment of people's quality of life is dominated by economic indicators, such as Gross Domestic Product (GDP), Consumer Confidence Index, and several others, etc. They are calculated and published daily (e.g., GDP), weekly, monthly, quarterly, or annually. There are several indicators regarding health care, and they are updated and published in cycles of several months (child abuse), annual (life expectancy), and even every 2-3-years (infant mortality, number of adolescent suicides). Only some countries calculate and publish concentrated assessments of the health quality of their society. Without this type of comprehensive public health assessment, the state of the economy is misleading. Today, unfortunately, there are countries where the economy is developing well, but soci-

ety's health is deteriorating. Can politicians be proud of their policy in such a situation?

In the United States, the Fordham Institute of the University Index of Social Health (FISH) published by Fordham Institute Social Health is based on 16 indicators³:

1. Infant mortality
2. Child abuse
3. Poverty among children
4. Teen suicide
5. Drug abuse
6. Early school leaving
7. Average weekly earnings
8. Unemployment
9. Scope of health insurance
10. The poverty of older people
11. Health insurance for the elderly
12. Deaths on the highway due to alcohol
13. Murders
14. Distribution of food stamps
15. Apartment
16. Inequality of income.

Since 1973, the FISH index has fallen with the growth of US GDP. In Canada, the FISH index has remained stable since

1985. together with GDP growth. So economic success is obtained at the expense of human health. Is it worth it?

Another social health index used by the United States is.

Genuine Progress Indicator

Genuine Progress Indicator (GPI) which aims to change the dominant definition of progress from economic growth to a sense of people's quality of life. GPI attributes value to life-sustaining functions of households, communities, and the environment so that their destruction and replacement with substitutes are no longer visible as growth and profit. GPIs include⁴:

1. Unpaid work (housework, parenting, and care)
2. Crime
3. Family break up
4. Work at home
5. Volunteer work
6. Division of income
7. Depletion of resources
8. Pollution
9. Expenses for defense
10. Long-term environmental damage (wetlands, ozone, arable fields),
11. Changes in free time
12. The durability of durable goods and public infrastructure
13. Dependence on foreign assets
14. Services (highways, streets)
15. Loss of free time (for dedicating the community, yourself, hobby, relaxation, spending time with family)
16. Costs of car accidents
17. Insufficient employment costs
18. Costs of noise pollution and household pollution (disease syndrome)

Quality of life has deteriorated at a faster pace since 1970-GPI has decreased along with the increase in US GDP. In Canada, when the GDP increased, the GPI did not rise but remained stable.

The GPI index puts emphasis on the economic factors which supposedly define "genuine progress." However, the health-oriented criteria are not included in it. The United Nations Human Development Index (UNHDI) includes the health-driven factors together with the economic ones.

The United Nations Human Development Index

The United Nations Human Development Index is based on the assumption that growth in economic development does not necessarily mean human development or an increase in prosperity. This indicator measures the impact of growth (or lack thereof) on people and not on the economy. The United Nations Development Program developed this index and displayed in Table 1. The rating can range from 1,000 (highest rating) to 0.000 (lowest score).

The topscore is above 0.890. Canada took first place in the last four-years (0.960), the USA (0.942), which ranks fourth is slightly behind Norway and France (1997). UNHDI measures health, education, and income according to the following indicators⁵:

1. Expected life expectancy
2. Access to education and literacy for adults
3. Years of learning
4. Fair distribution of income
5. PPP per person (control of indicators over resources) is adjusted to reflect the basketry purchasing power parity
6. Achievements in the field of health
7. Gender equality
6. The quality of the environment, people, resources and development, and the impact of their changes on national income and wealth
7. Impact of global concerns on the economy
8. Prosperity, quality of life and economic development of future generations
9. Expenses on pollution, health, floods, car accidents
10. Resources and production capacity of exploited people and ecosystems
11. Impact of economic growth on biodiversity
12. The impact of social costs, health costs on future generations and nation's income.

Blumberg's Global Health Index

Blumberg's Global Health Index⁶, published by Blumberg's media, measures the state of health of the country. It is important to remember that although this is also included in the calculation, the state of health care is not measured. For various reasons, the latter is more often aimed at treating diseases than health and healthy life. The index analyzes life expectancy, primary mortality risk, high blood pressure, obesity, smoking rates, alcohol consumption, childhood malnutrition, sanitation, and clean water—number of smokers, physical movement, but also child malnutrition, mental health, and vaccinations.

Spain - with its Mediterranean diet and high life expectancy is the healthiest country in the world, according to the blumberg' 2019 Index. This year, five European countries were on the list of the top 10. Meanwhile, the United States took a distance 35th place.

What makes Spain the healthiest country? One of the likely factors is the universal healthcare system. Primary care is generally provided by public suppliers, specialized family doctors, and nurses who offer preventive services for children, women, and elderly patients as well as care for acute and chronic diseases. Another reason may be the Mediterranean diet (Figure 2), which includes olive oil, vegetables, nuts and fruit; moderate amounts of fish, wine and dairy products; and low meat consumption other than fish. Adherence to this heart-healthy diet is associated with longer life and fewer cardiovascular severe events. But just to be sure, some say it's not just about ingredients, it's about a healthy lifestyle.

Table 1. United Nations Human Development Index

Rank	Country	Human Development Index Value	Life Expectancy at Birth	Expected Years of Schooling	Mean Years of Schooling	Gross National Income per Capita
1	Norway	0.954	82.3	18.1	13	68,059
2	Switzerland	0.946	83.6	16.2	13.4	59,375
3	Ireland	0.942	82.1	18.8	12.5	55,660
4	Germany	0.939	81.2	17.1	14.1	46,946
4	Hong Kong	0.939	84.7	16.5	12	60,221
6	Australia	0.938	83.3	22.1	12.7	44,097
6	Iceland	0.938	82.9	19.2	12.5	47,566
8	Sweden	0.937	82.7	18.8	12.4	47,955
9	Singapore	0.935	83.5	16.3	11.5	83,793
10	Netherlands	0.933	82.1	18	12.2	50,013
11	Denmark	0.93	80.8	19.1	12.6	48,836
12	Finland	0.925	81.7	19.3	12.4	41,779
13	Canada	0.922	82.3	16.1	13.3	43,602
14	New Zealand	0.921	82.1	18.8	12.7	35,108
15	United Kingdom	0.92	81.2	17.4	13	39,507
16	United States	0.92	78.9	16.3	13.4	56,140
17	Belgium	0.919	81.5	19.7	11.8	43,821
18	Liechtenstein	0.917	80.5	14.7	12.5	99,732
19	Japan	0.915	84.5	15.2	12.8	40,799
20	Austria	0.914	81.4	16.3	12.6	46,231
21	Luxembourg	0.909	82.1	14.2	12.2	65,543
22	Israel	0.906	82.8	16	13	33,650
22	Korea	0.906	82.8	16.4	12.2	36,757
24	Slovenia	0.902	81.2	17.4	12.3	32,143
25	Spain	0.893	83.4	17.9	9.8	35,041
26	Czechia	0.891	79.2	16.8	12.7	31,597
26	France	0.891	82.5	15.5	11.4	40,511
28	Malta	0.885	82.4	15.9	11.3	34,795
29	Italy	0.883	83.4	16.2	10.2	36,141
30	Estonia	0.882	78.6	16.1	13	30,379
31	Cyprus	0.873	80.8	14.7	12.1	33,100
32	Greece	0.872	82.1	17.3	10.5	24,909
32	Poland	0.872	78.5	16.4	12.3	27,626
34	Lithuania	0.869	75.7	16.5	13	29,775
35	United Arab Emirates	0.866	77.8	13.6	11	66,912
36	Andorra	0.857	81.8	13.3	10.2	48,641
36	Saudi Arabia	0.857	75	17	9.7	49,338
36	Slovakia	0.857	77.4	14.5	12.6	30,672
39	Latvia	0.854	75.2	16	12.8	26,301
40	Portugal	0.85	81.9	16.3	9.2	27,935
41	Qatar	0.848	80.1	12.2	9.7	110,489
42	Chile	0.847	80	16.5	10.4	21,972
43	Brunei Darussalam	0.845	75.7	14.4	9.1	76,389

In terms of life expectancy at birth, Spain ranks first in the European Union and third in the world, behind Japan and Switzerland. According to the forecasts of the Institute of Metrics and Health Assessment of the University of Washington, by the

year 2040, the average life expectancy in Spain will reach almost 86-years, the highest in the world.

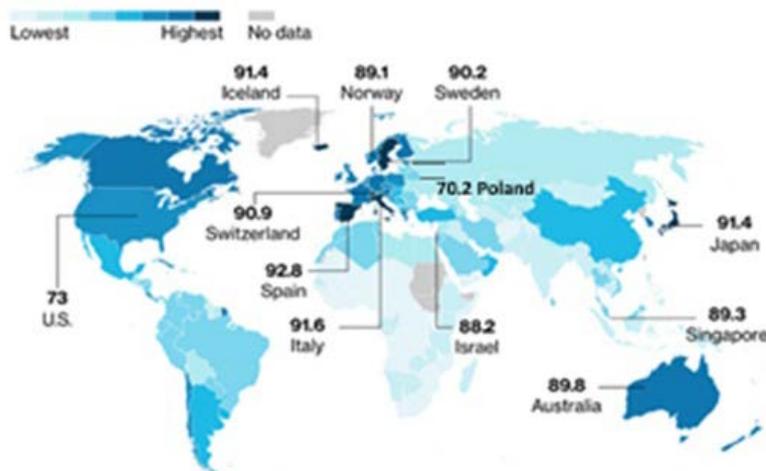
The next nations on the list are Iceland, Japan, Switzer-

Figure 2. Typical Ingredients of a Healthy Mediterranean Diet Used in Spain



(Photo: public domain)

Figure 3. The Healthiest Countries in the World, According to the Blumberg Global Health Index⁶



land, and Italy, which in 2019 fell from the highest position. It is worth noting, however, that it is difficult to assess the health of nations accurately, and the results of different indexes differ when they use different methodologies. For example, the Legatum Prosperity Index 2018 stated that Spain took 22 places on the list of the healthiest countries in the world (Singapore was number one).

Interestingly, both indexes agreed that the United States is not a particularly healthy country - both came in 35th place. Why is the United States lagging? One of the evident factors is diet. Almost half of Americans suffer from some chronic illness due to poor diet, including heart disease. What's more, two-thirds of American adults and nearly a third of children are overweight or obese. This overweight is partly related to the prevalence of processed and cheap and unhealthy food in the United States. But perhaps the worst feature of Americans' eating habits is eating huge portions-something that can be seen in the increased size of tableware since the 1960s. As the result of the unhealthy diet in recent years, more Americans are more likely to die from suicide and drug

overdose than in car accidents. The Blumberg Global Health Index index illustrates this issue in Figure 3.

HEALTHCARE SERVICE EFFICIENCY INDICATORS

Healthcare is maintaining or improving health by preventing, diagnosing, and treating diseases, injuries, diseases, and other physical or mental disorders. Health care includes dentistry, psychology, nursing, medicine, physical therapy, occupational therapy, and many others. Access to healthcare varies between countries, municipalities, and individuals, and is mostly influenced by economic and social factors.

According to the World Health Organization (WHO),⁷ a well-functioning healthcare system requires a permanent financing mechanism, a properly trained and adequately paid workforce, well-maintained facilities, and access to reliable information based on which decisions are made.

Table 2. The European Health Consumer Index in 2018

 Switzerland	1	893	 Slovakia	17	722
 Netherlands	2	883	 Serbia	18	699
 Norway	3	857	 Spain	19	698
 Denmark	4	855	 Italy	20	687
 Belgium	5	849	 Slovenia	21	678
 Finland	6	839	 Ireland	22	669
 Luxembourg	7	809	 Montenegro	23	668
 Sweden	8	800	 Croatia	24	644
 Austria	9	799	 North Macedonia	25	638
 Iceland	10	797	 Cyprus	26	635
 France	11	796	 Malta	27	631
 Germany	12	785	 Lithuania	28	622
 Portugal	13	754	 Greece	29	615
 Czech Republic	14	731	 Latvia	30	605
 Estonia	15	729	 Bulgaria	31	591
 United Kingdom	16	728	 Poland	32	585
			 Hungary	33	565
			 Romania	34	549
			 Albania	35	544

Many people see access to healthcare as a fundamental human right. Lack of high-quality healthcare can result in poor quality of life and shorter life expectancy than in countries with stable and accessible healthcare system.

How is the quality of healthcare defined? Several factors determine the level of quality of healthcare in each country and include:

- Care process (preventive measures, safe care, coordinated care, and patient involvement and preferences)
- Access (availability and timeliness)
- Administrative efficiency
- Equality in access
- Healthcare outcomes (population health, health-related mortality, and disease)
- Specific patient health outcomes.

Healthcare outcomes are resulting from specific measures or investments. Healthcare outcomes include acceptable mortality, readmission, and patient experience. The Healthcare Access & Quality Index (HAQ) evaluates healthcare outcomes on a scale of 0 to 100, with 100 being the best. Countries with the best healthcare systems in the world have scores from 90 to 96.1. In 2020, France comes first.⁷

In Europe, the most popular is the European Health Consumer Index (EHCI), compares European healthcare systems based on (Table 2):

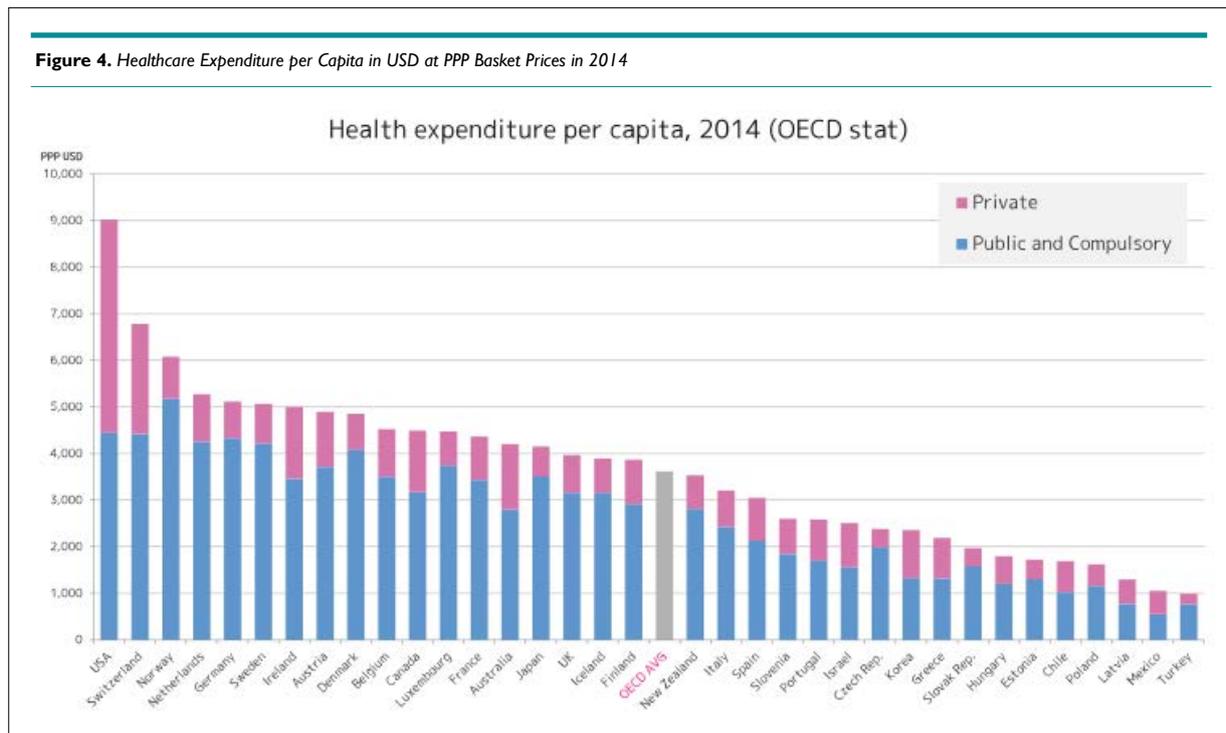
- Patient rights and information,
- Waiting time for a medical service,
- Treatment results,
- The scope and range of medical services,
- Prevention.

The data is presented as a graphic index (in which table or figure?). The index measures the ‘consumer-friendliness’ of healthcare systems. He (Who?) does not claim to measure which European country has the best healthcare system but creates specialized indexes for diabetes, cardiac care, HIV, headache, and hepatitis. In 2006, France was the champion, with 768 points per 1000. In the 2015 results, the same result would give 13th position among 35 countries.

THE REVIEW OF THE HEALTHCARE SYSTEMS IN SEVERAL COUNTRIES⁸

Switzerland

In 2018, healthcare was the friendliest in this country, which is



widespread and subject to the Swiss Federal Health Insurance Act. There are no free health services provided by the state. Still, private health insurance is compulsory for everyone residing in Switzerland (within three months of living or being born in the country). Health insurance covers the costs of medical treatment and hospitalization of the insured. The insured, however, covers part of the costs of treatment.

The Netherlands

The Netherlands has universal healthcare, but the government requires that all adults living or working in the Netherlands have basic insurance. The basic plan costs 100-120 € out of pocket. If employed, the employer pays a small percentage of the insurance costs. Children under the age of 18 do not pay for health insurance. The basic plan includes a basic standard of care, such as visits to the general practitioner (GP) and hospital. Some treatments may have a surplus, for which you have to pay part from your pocket. Many people also decide to obtain a higher level of insurance coverage for an additional fee, which compensates for other treatments not covered by the basic insurance package. To give an overview of some of the costs that can be encountered, here are typical costs for healthcare in the Netherlands:

- Basic monthly insurance plan 100 €
- One-day hospital stay 146 €
- Visit the emergency room 256 €
- Doctor visit during regular business hours 47 €
- Doctor visit outside regular working hours 92 €

Denmark

Healthcare in this country is mostly provided by the self-govern-

ments of five regions, with coordination and regulation by the central government. At the same time, 98 municipalities are responsible for nursing homes, home care, and school health services. Some specialized hospital services are centrally managed. The Danish government's healthcare expenditure is around 10.4% of GDP, of which about 84% is financed from regional and city taxes redistributed by the central government. Since taxpayers finance the necessary healthcare, personal expenses are minimal and usually involve the co-financing of certain services. These expenses are typically covered by private health insurance. The use of electronic medical records is widespread, and efforts are being made to integrate this data at the regional level.

Sweden

The Swedish healthcare system is funded mainly by the government, universal for all citizens, and decentralized, although private healthcare also exists. The healthcare system in Sweden is financed primarily from taxes collected by the county and municipal councils. In the country, 21 councils supervise primary and hospital care. Private healthcare is rare in Sweden, and even those private institutions operate under the authority of city councils. City councils regulate rules and establish potential private practices. Although in most countries, care for the elderly or those in need of psychiatric assistance is provided privately, in Sweden, local, publicly funded authorities are responsible for these types of care. The Swedish government is trying to restrict private healthcare companies. The government is taking precautions to eliminate profit-seeking in the social welfare and public health sectors.

Austria

Austria has one of the best healthcare systems in the world, and access to medical services can be considered exemplary interna-

Table 3. The characteristics of health in selected nations in 2016-2019 years

State	Society Health Blumberga Indeks	Lifespan	Ranking of Healthcare (EHCI)	Funding as % of GNP	Funding PPP Per Capita in Euro
Spain	92.8	83.4	19	6.4	1,535
Italy	91.6	83.6	20	6.6	1,847
Switzerland	90.9	83.4	1	12.2	6,917
Sweden	90.2	82.7	8	9.2	4,272
Norway	89.1	82.3	3	10.4	5,485
France	86.9	82.5	11	9.5	3,193
Austria	86.3	81.4	4	7.7	3,136
Netherlands	85.9	82.1	2	8.4	3,478
U. Kingdom	84.9	81.2	16	7.7	3,874
Portugal	83.6	82.11	13	9	1,684
Germany	83	81	12	11.4	4,714
Danmark	82.7	80.8	4	8.6	4,217
Czech Republik	77.6	79.2	14	5.9	978
USA	73	78.9	Not in Europe	16.9	8,643
Poland	70.2	78.5	32	4.6	510

Source: the author

tionally. The modernization program has a clear goal: the welfare of citizens. The principle of statutory health insurance combined with co-insurance for children and non-working partners guarantees that 99% of the entire population will be covered by health insurance. With the introduction of the minimum income system, its beneficiaries are also covered by compulsory social security. In the event of temporary incapacity for work, employees are entitled to sickness benefits that occur in connection with the continued payment of wages by the employer (employers are obliged to continue paying wages for six to twelve weeks). If the illness continues, depending on the employee's insurance history, sickness benefits can range from six months to one year. The minimum level of monthly sickness benefits is 50% of the individual's previous gross wage. Eight weeks before and eight weeks after the birth of a child, mothers usually receive maternity allowance corresponding to their current income from work.

France

Insurance for all residents of France is compulsory. The social security system covers 70% of the cost of treatment. All citizens pay to the state health insurance system which is managed by three central funds. The rates are regulated by law, and must be charged to the percentage of patient's or employer's income. One of the reasons why the French system is widely cited is that long-term medical problems are 100% covered by the state. Otherwise, patients will pay a fee for the doctor or dentist and then receive a partial refund.

Further, refunds occur when a person pays for health insurance. All employees are entitled to plans subsidized by the

company. That means that healthcare in France is one of the most subsidized and cheapest in the world. The government's insurance program is managed through a French social security office, where 70% of services cover all everyday healthcare needs, including general practitioners, hospitals, dentists, and pharmacy costs. Services for the elderly who are 65-years of age and older or chronically ill are fully covered. To pay for additional services, such as chiropractors or long-term care in private hospitals, individuals can take out private insurance. They can either pay for it themselves or, in some cases, the employer will pay the extra amount. Residents of France can sign up for a mutuelle, non-profit insurance plan, or private plan for additional protection. Often this private care can fill a gap where people should pay co-costs or want to receive elective treatment. If the employee is employed, he will automatically be covered by a plan in which his company spends at least half of the additional costs.

The Czech Republic

The Czech Republic has a healthcare system based on the compulsory insurance model, and care for services has been financed from mandatory employment-related insurance plans since 1992. Czech healthcare ranks 13th, followed by Sweden and two positions ahead of Great Britain. The Czech healthcare system is characterized by a high degree of decentralization and uses market forces compared to other universal European systems.

The quality of health care also largely depends on the expenditure imposed on it. Figure 4 illustrates healthcare expenditure per capita in USD.

HEALTHCARE IN DEVELOPING NATIONS

According to Benyoussef et al⁹ some developing countries have developed healthcare programmes at the most peripheral level to meet the health and development needs of the deprived populations in the following manners:

- China uses mass education programmes and “barefoot doctors” to deliver primary health services.
- Tanzania has instituted massive rural population re-location efforts to facilitate delivering healthcare and other government-sponsored development service, by subordinating health care per se to the related projects of agriculture, water supply and housing.
- India have encouraged village acceptance of primary health care.
- Iran has a good referral systems at local levels to highly specialized hospitals.
- Cuba has extended coverage to nearly all of its population.
- Niger applies voluntary workers who help keeping costs at a minimum.
- Sudan has a National Health Programme has.

None of these approaches have reported enough data to be completely evaluated, but each has attained some degree of success in serving deprived populations”.

CONCLUSION

Table 3 characterizes indicator profiles of selected countries in the EU and the USA.

It is striking comparing the healthiest countries in the world such as Spain and Italy which are spending on health services per capita 5-times less than the most developed country in the world the United States, whose habitants stragelling with health. The Americans’s health is in the range of post-Soviet Bloc countries such as the Czech Republic and Poland where the spending on health per capita is about 10 times smaller than in the U.S. It is indicating that the healthy life style is the key solution in the effort of improving health of habitants.

From those shown in Table 3, the health characteristics of the countries follow the following observations:

1. The health of society depends to a great extent on lifestyle and climate. While both factors are reasonable, there are fewer sick people and the resulting lower burden on healthcare as evidenced by the following examples:
 - a. Spain has the healthiest society in Europe (92.8) and health service 19th place in the 19th place, which was visible in its problems during the cross-i-out 2020 pandemic.
 - b. Italy, as well as Spain, has a healthy society (91.6) in Europe, which is only 20% in health status, which was visible in its problems during the 2020 pandemic.

2. Countries with a worse climate than the Mediterranean climate, maintain their health due to the excellent efficiency of health care (well-healing), as evidenced by the following examples:

- a. Switzerland has a healthy society (90.9), but due to the high mountain climate, it must have efficient healthcare, which is number one in Europe, functioning at a very high cost, as high as 12.2% of GDP.
- b. Norway also has a healthy society (89.1), but due to the northern climate, it must have an efficient health service, which is in third place in Europe, functioning at a very high cost, as high as 10.4% of GDP.
- c. Similar relationships in public health are between France with a pleasant climate and a light diet, and Germany and the Netherlands with a northern climate, and a heavy diet.
- d. Similar relationships in public health are between Portugal with a pleasant climate and a light diet, and Germany and Denmark with a northern climate, and a heavy diet.

3. The example of health and quality of the United States healthcare service shows how, despite the high quality of private health care, the health of the society is low (worse than Czechs and similar to Poles) due to the highly unhealthy lifestyle, characterized by fat and large portions, diet and almost immobility of people who are always in cars. Also, 30+% of people have no health insurance. That is why American healthcare must compensate for lifestyle defects with intensive treatment and expensive medicines. This issue was at the financially painful test during the 2020 pandemic.

4. Knowledge of the best health care systems in the world should be universal knowledge available to all people in the world. On its basis, health care systems in individual countries should be developed and implemented, adjusted to the traditions and financial capabilities of given citizens and the state. It is strange that the WHO does not develop this knowledge and does not motivate its members to improve the health care systems of their inhabitants. As for the United States, its health care system should result from the synthesis of the best solutions in the world to break with its parish character, unworthy of the country with the largest number of the best universities and the largest number of Nobel laureates who can solve almost any challenging problem.

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Mini Review

Elderly People During the Coronavirus Disease 2019 Epidemic: Selected Problems

Małgorzata Schlegel-Zawadzka, PhD*

Collegium Masoviense High School of Health Sciences, Narutowicz str. 35, 96-300 Żyrardów, Poland

*Corresponding author

Małgorzata Schlegel-Zawadzka, PhD

Collegium Masoviense High School of Health Sciences, Narutowicz str. 35, 96-300 Żyrardów, Poland; E-mail: m.schlegelzawadzka@gmail.com

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ABSTRACT

The coronavirus disease 2019 (COVID-19) infection mainly affected elderly patients in many countries. The care of elderly patients, especially in countries where the percentage of people over 65-years of age is significant, is an important public health problem now during the COVID-19 pandemic. In this review particular attention to the problem of proper nutrition of such patients was paid, which must be preceded by an appropriate assessment of their nutritional status. The important role of physical activity and adequate rehabilitation is highlighted. The care of elderly patients should be in line with the recommendations of the relevant scientific societies and international organizations in this respect.

Keywords

COVID-19; Elderly people; Malnutrition; Food insecurity; Nutritional risk; ESPEN recommendations; Physical activity.

INTRODUCTION

European Geriatric Medicine Society signed on March 23rd, 2020, a special statement on the coronavirus disease 2019 (COVID-19) epidemic. Society informs that analysis showed that mortality rates are about 15% in contaminated subjects over 80-years, whereas it is less than 0.5% in people below 50-years-old. It also draws attention that "... *Advanced age should not by itself be a criterion for excluding patients from specialized hospital units...*". It also stresses the need for rapid rehabilitation of people who are not carriers of the virus.¹

Globally as of 3.59 pm CEST, 12 September 2020, there have been 28,329,790 confirmed cases of COVID-19 including 911,877 deaths reported to World Health Organization (WHO). According to WHO COVID-19 affects different people in different ways. Most infected people will develop mild to moderate illness and recover without hospitalization. Most common symptoms are fever, dry cough and tiredness. Aches and pains, sore throat, diarrhea, conjunctivitis, headache, loss of taste and smell, a rash on skin, or discoloration of fingers or toes are considered to be fewer common symptoms. Serious symptoms are difficulty breathing or shortness of breath, chest pain or pressure and loss speech or movement.²

An important factor in any disease is the problem of the patient's nutritional status, especially when he or she is older. Malnutrition is three times more likely to cause the risk of infection and prolong patients' stay in a hospital.³ Food insecurity and lack of physical activity along with malnutrition seem to be particularly important considerations for elderly patients with COVID-19.

MALNUTRITION

Among the many reports about COVID-19 deaths there is information about the mortality of the elderly, and the reason is cited as multimorbidity. One important cause may be malnutrition of these people, which is a basic problem, regardless of the country of residence of the elderly person and increased morbidity.³ Malnutrition may be caused by reduced food intake, reduced nutrient use or increased body demand for nutrients. European Society for Clinical Nutrition and Metabolism (ESPEN) diagnoses malnutrition when person's body mass index (BMI) is below 18.5 kg/m² or by meeting two of these three criteria: unintentional weight loss (>10% in an indefinite time period or >5% over the last three months) combined with either a low BMI (BMI of <20 kg/m² if <70-years of age, or <22 kg/m² if >70-years of age) or a low fat-free mass index (FFMI) score (FFMI of <15 and <17 kg/m²

in women and men respectively).⁴ In elderly people, defined by the WHO as people over 60-years of age, there are other causes of malnutrition (Table 1).⁵

Table 1. Causes of Malnutrition in People over 60-years⁶

Reasons	Nature of Causes
Physiological changes	Changes in the mechanisms for regulating hunger and satiety; reduced ability to feel thirsty; reduced ability to feel taste and smell.
Physical constraints	Limited functioning of arms, hands and fingers; weakness of gait, staying in bed, immobilization; weakness of sight; ailments during chewing (inflammations, loose dentures); swallowing disorders.
Mental status	Tangle and dementia; depression; widowhood, mourning; anxiety.
Social state	Loneliness, isolation; poor adaptation to the care facility; lack of integration.
Health	Acute and chronic diseases; drugs; digestive diseases and gastrointestinal disorders such as nausea, vomiting, diarrhoea; pain.
Lifestyle	Unfavourable dietary habits; smoking; alcohol; inactivity.
Chronic diseases	Chronic heart failure; chronic lung diseases; chronic polyarthritis; cancer; stroke; chronic infections; gastrointestinal diseases; dementia; Parkinson's disease; depression.
Financial security	Pension - lack of money reduces the quantity of food consumed and the scope for choice and variety within the diet.
Social isolation	Persons living alone are reluctant to invest time in cooking and eating; often they cannot lift more than 5 kg shopping bag.

FOOD INSECURITY

Niles et al⁷ assessed impacts of COVID-19 on food insecurity. They conducted a statewide population-level survey using a convenience sample in Vermont (USA) from 29 March to 12 April 2020. The mean age of survey respondents was 51.5±15.6-years (19-94-years). There was 32.3% increase in household food insecurity since COVID-19 ($p<0.001$), with 35.5% of food insecure households classified as newly food insecure. Authors concluded that a job loss had three times greater odds of living in a household experiencing food insecurity (OR 3.06; 95% CI, 2.107-4.457), and those experiencing a furlough (OR 2.89; 95% CI, 1.856-4.485), or a lost of hours (OR 2.05; 95% CI, 1.446-2.916) also had significantly greater odds. Two-thirds of households eating less since COVID-19 ($p<0.001$).⁷

NUTRITIONAL RISK

The study conducted by Liu et al⁸ was to assess the nutritional risks among older patients with COVID-19. They used four nutritional risk screening (NRS) tools: NRS 2002, malnutrition universal screening tool (MUST), mini nutrition assessment shortcut (MNA-sf), and nutrition risk index (NRI). Patients diagnosed with COVID-19, older than 65-years, and hospitalized with a length of stay (LOS) more than 24 hours were enrolled in this study. COVID-19 was categorized into mild, common, severe and extremely severe in accordance with the 6th edition of Diagnostic Standards

for COVID-19.

In multivariate regression analysis prolonged LOS, more hospital expenses, poorer appetite, and greater weight loss were significantly associated with nutritional risk. Authors concluded that the NRS 2002, MNA-sf, and NRI are useful and practical tools with respect to screening for patients with COVID-19 who are at nutritional risk.⁸

EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM RECOMMENDATION

Appropriate nutritional assessment and treatment are well-documented to effectively reduce complications and improve clinical outcome various conditions, including intensive care unit (ICU) stays. The ESPEN aims at providing concise experts statements and practical guidance for nutritional management of COVID-19 patients. The recommendations are based on current ESPEN guidelines and further expert advice (Table 2).⁹

PHYSICAL ACTIVITY

The results of a study by Coker et al¹³ on the effects of a 10-day bed rest healthy older people (60-85-years of age) published in 2015 showed statistically significant changes. They are losing weight, BMI, total lean mass, muscle quality, isometric and concentric (60°) knee extensions, stair ascent and descent powers and times increased, as well as floor transfer, five-minute walk, walking speed and chair stand. Authors concluded that the consequences of bed rest without appropriate countermeasures may be closely linked to inability to perform activities of daily living, increased hospitalization, and possibly lead to increased morbidity/mortality. After study all individuals participated in a 3-month rehabilitation program that enabled them to return or exceed their baseline strength and physical performance values.¹³

Roschel et al¹⁴ adapted from the WHO's recommendations (2010 years) physical activity for older adults (aged >65-years) to improve health. Isolation with social distancing, despite the later positive effects on disease spread, increase in sedentary behavior in older people and prone to frailty, sarcopenia, and chronic diseases. Authors proposed step-reduction model as better representing inactivity imposed by isolation.¹⁴

According to Italian geriatrists nutritional intervention should be combined with physical exercises. They recognized 4 phases at the recovering time: a) recover of orthostates, b) train balance and coordination of movements, c) regain muscle strength and d) start endurance training.¹⁵

RECOMMENDATIONS FOR OLDER PEOPLE IN SELECTED COUNTRIES

The recommendations announced on the website of the Polish Chief Sanitary Inspector concern the restriction of the movement of persons aged 70+ excluding the exercise of professional activ-

Table 2. ESPEN Expert Statements and Practical Guidance for Nutritional Management of Individuals with COVID-19 Infection⁸

I.	Prevention and treatment of malnutrition in individuals at risk or infected with COVID-19 infection ⁹	Additional criteria
1.1.	Identification of risk and presence of malnutrition. GLIM (Global Leadership Initiative on Malnutrition)—a two-step approach for diagnosis – a) first screening to identify “at risk” status, b) assessment for grading the severity of malnutrition.	MUST criteria or NRS 2002 criteria. Phenotyping and etiologic criteria of malnutrition.
1.2.	Optimization of nutritional status proper diet: Energy needs: a) 27 kcal/kg body weight and day—polymorbid patients aged >65-years; b) 30 kcal/kg body weight and day—severely underweight polymorbid patients; c) 30 kcal/kg body weight and day; Protein needs: a) 1 g/kg body weight and day, amount should be individually adjusted with regard to nutritional status; b) ≥ 1 g/kg body weight and day, polymorbid patients; Fat and carbohydrate needs are adapted to the energy needs—energy ratio 30:70 (patients with no respiratory deficiency) to 50:50 (ventilated patients).	Consultation with experienced professionals - register dieticians, experienced nutritional scientists, clinical nutritionists, specialized physicians.
1.3.	Patients with malnutrition should ensure sufficient supplementation with vitamins (D, A, E, B6, B12, C) and minerals (Zn ¹⁰ , Se).	Vitamin D deficiency has been associated with different viral diseases. Overview of vitamin D deficiency (less than 50 nmol/L) was observed in regions highly affected by COVID-19 (China, Iran, Italy, Spain, United States, France, UK). ¹¹ Based on experiences from treatments of SARS and other viral infections the nutritive supplements administered at an early stage of the infection were important for enhancing host resistance against RNA viral infections, which might also include severe COVID-19. ¹²
1.4.	Patients in quarantine should continue regular physical activity while taking precautions. Exercise at home using various safe, simple, and easily implementable exercises is well suited to avoid the airborne coronavirus. Even outdoor activities can be considered.	Examples of home exercises include walking in the house and to the store as necessary, lifting and carrying groceries, alternating leg lunges. Garden exercise, walking/running in the forest (alone or in small family groups). Every day >30 min or every second day >1 h exercise is recommended to maintain fitness and mental health.
1.5.	Oral nutritional supplements (ONS) should be used to meet patient's need, when dietary counselling and food fortification are not sufficient to increase dietary intake. ONS should provide at least 400 kcal/day including 30 g or more protein/day and shall be continued for at least one month. The oral route is always preferred when practicable.	Nutritional treatment should continue after hospital discharge with ONS and individualized nutritional plan.
1.6.	In polymorbid medical inpatients and in older persons with reasonable prognosis, whose nutritional requirements cannot be met orally, enteral nutrition (EN) should be administered. Parenteral nutrition (PN) should be considered when EN is not indicated or unable to reach targets.	
2.	Nutritional management in Intensive Care Unit (ICU) patients infected with COVID-19 ⁹	If the energy target is not reached with an oral diet, ONS should be considered first, and then EN treatment.
2.1.	Medical nutrition in non-intubated ICU patients.	If there are limitations for the enteral route it could be advised to prescribe peripheral PN in the population not reaching energy-protein target by oral or enteral nutrition.
2.2.	Medical nutrition in intubated ICU patients I.	EN should be started through nasogastric tube; post-pyloric feeding should be performed in patients with gastric intolerance after prokinetic treatment or in patients at high-risk for aspiration.
2.3.	Medical nutrition in intubated ICU patients II.	In ICU patients who do not tolerate if full dose EN during the first week in the ICU is not tolerated, initiating parenteral nutrition (PN) should be weighed on a case-by-case basis.
2.4.	Nutrition in ICU patients with dysphagia.	Texture-adapted food can be considered after extubating. If swallowing is proven unsafe, EN should be administered.

ities, meeting the necessary needs of everyday life, exercising or participating in the exercise of religious worship. Persons aged 60+ from Monday to Friday can do food and goods shopping between 10-12 am. During this time younger persons are not allowed to buy.

Centers for Disease Control and Prevention (CDC) (USA) for people at risk of severe illness from COVID-19 limit their interactions with other people as much as possible. If they decide to engage in public activities should behave according to general rules. Persons have underlying medical conditions should continue medicines and have at least a 30-day supply of prescriptions and non-prescriptions medicines.

The French government imposed a curfew on two-thirds of the country from Friday night (23.10.2020). There are in total 47 areas of France. Greece has declared a night curfew. Spain imposes national curfew to curb COVID spread. As well as a night-time curfew, travel between regions can be banned under the emergency measures. Other European countries – Slovakia, Czech Republic, Republic of Ireland, Portugal decided about partial lockdowns. Australian government prepared special COVID-19 support line and My Aged Care. Register persons 65+ years have My Aged Care ID, which allow them for urgent home support services.

For months elderly Swedes over 70 and other at-risk

groups have been advised to avoid going to shops, including supermarkets and pharmacies. Now they should follow the same coronavirus guidelines as the rest of population. Sweden's Public Health Agency recognized physical and mental health consequences for those groups.¹⁶

PUBLIC HEALTH PLANNING APPLICATION: A COMPLEMENTARY STRATEGY

Given the findings previously presented, it seems that a strategy that focuses only on addressing elderly people with existing malnutrition might not bring them make a full recovery. Instead we propose a complementary strategy. Keeping in mind guidelines to protect persons from a communicable disease, this strategy would include developing an interdisciplinary team consisting of a physician, a nurse, a dietician, a physiotherapist, a psychologist, a social worker, and a person who safeguards spiritual needs according to religion. Also, the team could include a case-manager for helping elderly persons sort out aspects of daily living. Collectively, this team could help meet the needs of elderly people in terms of evaluation of nutrition, material security (self-financing of the aid or the need for financing from other than one's own resources), place of residence - family environment, social welfare homes. This complementary strategy might help elderly people successfully cope with the current pandemic by practically addressing malnutrition, food insecurity, and physical activity needs.

CONCLUSION

Many of the COVID-19 symptoms indicating that elderly people develop coronavirus are superimposed on those related to the ageing process. Researchers draw attention to the need for multidisciplinary teams to care for elderly patients. An important aspect is the proper nutrition of patients, in order to prevent the malnutrition which is still frequent in healthy older people. The lack of appropriate rehabilitation of these patients does not promote full recovery. There is no proper estimation of the costs of care for the elderly during a pandemic and the psychosocial efficiencies of their departure in the cultural aspect-family or social.

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Letter to the Editor

Pandemic--The Role of the Electronic Sharing of Public Health Data, Public Health Data Science, and Public Health Action

Gregory Fant, PhD, MSHS, MPA, MACE, IPFPH-UK*

US Department of Veterans Affairs, VHA/Patient Care Services, Population Health Services (10P4V), Washington, DC 20420, USA

*Corresponding author

Gregory Fant, PhD, MSHS, MPA, MACE, IPFPH-UK

Public Health Epidemiologist, US Department of Veterans Affairs, VHA/Patient Care Services, Population Health Services (10P4V), Washington, DC 20420, USA; Tel. +1.202.266.4568; Fax. +1.202.495.5955; E-mail: Gregory.fant2@va.gov

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Dear Editor,

The ongoing coronavirus disease-2019 (COVID-19) pandemic reminds me of the importance of good, public health data and analysis for public health action to protect the health of the population, especially during a pandemic.

The journal offered early perspectives on the COVID-19 pandemic.^{1,2} The pandemic continues. The weekly epidemiological update from the World Health Organization (WHO) (10 November 2020) summarized the COVID-19 pandemic for the previous week³:

“Globally in the past week, cases of COVID-19 have increased by 8%, compared to the previous week, resulting in over 3.6 million new cases, while new deaths have increased by 21% to over 54,000. This brings the cumulative numbers to over 49.7 million reported cases and over 1.2 million deaths globally since the start of the pandemic.”

Specifically, the COVID-19 Weekly Epidemiological Update (8 November 2020, 10 am CEST) reported that changes in new cases for the prior 7-day period were highest in the following WHO Regions: Western Pacific (19%), Eastern Mediterranean (18%), and Europe (11%). Similarly, during the same time period, the changes in new deaths were highest in Europe (44%), Africa (30%), and Eastern Mediterranean (23%).⁴

Mortality (death) and morbidity (incidence) statistics are useful public health data for public health planning and public health decision-making.⁵ The data reported by the WHO remind me of the importance of good, quality public health data, especially the electronic collection, transfer, and analysis of data for public

health action during a pandemic.

The electronic collection and transfer of public health data is common. Health Information Exchange is defined as the electronic transfer of clinical and/or administrative information across diverse and sometimes competing healthcare settings.⁶ There are four types of Health Information Exchanges (HIE): Private HIEs; Government-facilitated HIEs; Community-based HIEs; and Vender-facilitated HIEs. Successful Health Information Exchanges have two, broad components: social and political component (including collaboration and addressing key ethical principles of privacy, confidentiality, and security); technical component (including master client/patient registry, shared records, interoperability, health information management system). Ineffective workings of the social-political component with technical component may contribute to a less than optimal exchange of health information (e.g., morbidity and mortality statistics) especially during an outbreak when these data are most important.

Technology is an essential aspect of analyzing public health data. The collection and use of health information by official governmental entities and credible, non-governmental partners could permit the application of public health data science methods to help address public health problems.⁷ COVID-19 data could be linked various sources of other data collected at the same level of aggregation in order to ascertain patterns in data that could lead to public health decision-makers finding population level solutions to an outbreak (or similar health outcome) impacting a geographic area. For example, incidence data and mortality data at a geographic unit within a country could be linked to other health resource and social data collected and reported at the same geographic unit. Analysis of these linked data could provide actionable

public health insights for political and public health decision-makers. The need for good quality, up-to-date data available for appropriate analysis is necessary for controlling a disease outbreak (or other health outcome) and for protecting the affected population.

Societies across the world wait for the successful end of the current pandemic. When the public health emergency is over, political and public health leaders may need to re-examine many issues of population health including universal healthcare coverage, public health resources, and public health surveillance—including topics related to health information exchange and the application of public health data science for quality and timely public health data analyses designed to inform global public health action, especially during a pandemic.

Thank-you for allowing me to share these thoughts with you.

Best,
Author

DISCLAIMER

The views presented in the paper are those of the author and do not represent any official position of the US Government.

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