Data for Good: Using population health data to teach justice at a Jesuit college

Karen Jiggins Colorafi, PhD, RN[1]; Mirjeta Beqiri, PhD,
Doreen Yumang-Ross, MPH, MS, ARNP-C, CPH
Gonzaga University

Abstract

Graduates of Doctor of Nursing Practice programs complete a scholarly project that relies on the interpretation of data. To facilitate skill development, students are introduced to data analysis techniques during a population health outcomes course. We used a data-driven classroom experience to highlight issues of justice, producing rigorous research results to promote action and social impact in an initiative named "data for good."

There is no better time to examine population health outcomes than during the first pandemic in 100 years. More than 26 million Americans have contracted COVID-19. The overall death rate in the U.S. is 85% higher than other high-income countries at 27.2 per 100,000 people. Scientists recognize the widespread impact of the pandemic and the unequally distributed consequences across social strata, with low-income people more likely to contract the virus and suffer severe health problems. This creates an opportunity to reflect on justice and perceptions about poverty and inequity.

This article outlines an educational innovation and the incredulous context in which it was carried out. We describe the educational objectives of the experience and present results from one analysis. We offer lessons learned, including the need to maintain focus on the story of

[1] Corresponding author: Karen Colorafi, PhD, RN. Assistant Professor, Gonzaga University. EE.UU.

justice these data reveal, and offer opportunities for improvement, including the use of more focused reflection questions.

Description

There are over 350 programs in all 50 states that prepare registered nurses to become advanced practice nurses, earning the Doctor of Nursing Practice (DNP) degree (American Association of Colleges of Nursing [AACN], 2006). Nurses who choose to pursue a Jesuit education make an important choice: they will integrate mind, body, and spirit in a way that prepares them to contribute to the common good as individuals of faith, which compels nurses to work toward justice in the service of others (Quinn, 2016). The concept of justice in the Catholic faith is a cardinal virtue, a moral quality or habit which "renders to each and to all what belongs to them" (Slater, 1910). The moral quality of justice is commonly understood in assertions that all of the nation's children have a right to an education, to not be hungry, or have access to healthcare. However, morality is a complex and difficult concept to teach. Dalton and Crosby (2006) suggest that the use of activities such as community service learning and diversity education promote moral reflection and ethical decision-making among college aged students. This article documents our experience with a classroom data-driven assignment that sought to promote service learning around justice, using publicly available COVID-19 data.

Type of experience

During the fall of 2020, at the height of the pandemic, DNP students at Gonzaga University (GU) took a newly designed population health outcomes class for the first time. Students spent the first ten weeks of the 16-week semester using data analysis techniques to query datasets related to common population health issues such as hypertension, diabetes, heart attack, and stroke. For example, a chi square test was used to examine gender differences in hypertension and linear regression was used to examine the relationship between age and blood glucose. This work prepared students to examine population health outcomes independently during the last six weeks of class. The course manager secured datasets by partnering with local community agencies and commissioned the curation of publicly available datasets from the National Health

and Nutrition Examination Survey (NHANES) and from the Centers for Disease Control and Prevention (CDC) Behavioral Factor Surveillance System (BRFSS). Students were encouraged to select a dataset project that matched their personal and professional interests. Students proposed a population health related research question, performed a review of the literature, analyzed the data, and presented their findings in the form of a scholarly, academic poster worth 30% of their grade in this culminating course experience. We present a sample in this article to illustrate the power of using population health level datasets to inform our understanding of health equity and justice.

Context in which the project was carried out

The context in which these analyses were carried out was striking. This new population health course ran during the first pandemic in one hundred years. Nearly 500,000 Americans have lost their lives to COVID-19, an impact felt disproportionately by the poor and vulnerable, which highlights justice issues in a dramatic way for a generation of students who have only read about the 1918 Influenza pandemic in textbooks (Beaubien, 2020; Boserup et al., 2020; CDC, 2019; Mahase et al., 2020; Wiwad et al., 2021). The dataset selected for this exemplar contained variables related to social determinants of health as they predicted mortality and morbidity intra-pandemic. The World Health Organization (WHO) defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 2021). Many factors influence health, including genetics, behavior, medical care, social factors, as well as environmental and physical effects (CDC, 2021a). Researchers estimate that up to 20% of a person's health is due to social factors or determinants of health such as: economic stability, education access and quality, health care access and quality, neighborhood and built environment, and social and community context (Braveman & Gottlieb, 2014; O'Neill Hayes & Delk, 2018; U. S. Department of Health & Human Services, n.d.). Of these, economic instability can lead to poverty and homelessness, resulting in decreased life expectancy of 10-15 years and poor health throughout the lifespan (Chetty et al, 2016). The U.S. poverty rate in 2019 was 10.5%, representing about 34 million people (Semega et al., 2020) and 567,715 homeless people (National Alliance to End Homelessness, 2020). It is important to note that these figures

represent all Americans; poverty and homelessness is associated with every part of the country, every gender, every racial and ethnic category, and every type of family unit (National Alliance to End Homelessness, 2020). Poverty and homelessness are linked to the need for community food banks, charitable resources, and federal nutrition programs such as Supplemental Nutrition Assistance Programs (SNAP), which are essential to address food insecurity and end hunger among low-income individuals and families (U.S. Department of Agriculture, n.d.). Poverty is also connected to violence, whereby persons living in households at or below the poverty level experienced violent victimization at rates more than twice that of high-income households (Harrel et al., 2014).

Poverty is one of many barriers to obtaining healthcare despite the abundance of programs designed to serve the poor. While the Affordable Care Act (ACA) improved access to health insurance for many Americans, the number of uninsured increased by more than one million between 2018 and 2019 and by 2.2 million from 2016 (Tolbert et al., 2020). In 2019, more than eight in ten (82.6%) uninsured people were in families with incomes below 400% of poverty (Tolbert et al., 2020). The number of uninsured rose steadily during the pandemic as millions of American workers lost their jobs.

The poor represent one of the most vulnerable populations in the COVID-19 crisis. Those who live in poverty were more likely to have poor health before the pandemic, and during it, lost access to services that provided regular food, water, and shelter, further exacerbating the problem. Many of the recommendations to prevent the spread of COVID-19 issued by the CDC may be difficult for persons experiencing poverty, for example, avoiding crowded places is impossible if you are sleeping in a shelter and using public transportation (CDC, 2020). It is reasonable to predict that people suffering poverty and homelessness will be disproportionately affected by COVID-19. A plethora of high quality research studies report that a variety of vulnerable populations experience COVID-19 mortality at disproportionate rates, for example, ethnic minorities (Lynn & Meisenberg, 2020) including African Americans (Kim & Bostwick, 2020; Williamson et al., 2020) and South Asians (Williamson et al., 2020), prisoners (Saloner et al., 2020), older adults (Mahase, 2020; Olsen et al., 2020; Williamson et al., 2020), people with low

socioeconomic status (Strang, Furst, & Schultz, 2020), the chronically ill (Pachiega et al., 2020; Williamson et al., 2020), and those living in rural locations (Rashid et al., 2020).

The population health analysis assignment we created afforded nurses the opportunity to discover for themselves the impact of poverty, homelessness, and access to healthcare on COVID-19 mortality, highlighting an important aspect of justice in the Catholic, Jesuit, and humanistic sense.

Objectives, methodology, and results

The objectives of the population health assignment were to: (i) provide an opportunity to work with real-world population level data, (ii) pose research questions, (iii) apply data analysis techniques learned in class, (iv) describe insights gained from analysis, and (v) create a scholarly poster presenting results. In addition, students completed a review of the literature as it pertained to their topic and posted weekly project management updates, reflecting on their progress and experience. In this way, students were exposed to the Ignatian Pedagogical Paradigm of context, experience, reflection, action, and evaluation.

Given that the focus of this article is not data analysis, we provide a general synopsis of what one sample analysis entailed and focus primarily on the ways DNP students could use those findings to address justice and promote change. The datasets were created from publicly available data from BRFFS. The purpose of the sample study was *"to explore potential factors affecting COVID-19 cases and deaths"* as well as *"to identify differences that exist across states."* Data was collected for counties of the following states: California, Idaho, Montana, Nevada, Oregon, and Washington. Variables included: population by county; reported number of COVID-19 cases and deaths related to COVID-19 (as of 08/12/2020); a homelessness indicator; violent crimes per 100K people; and the population of the county in poverty, living in single-parent households, with no health insurance, and who receive SNAP benefits. Several variables were transformed to per 100K rates to account for the population of each county. No significant issues with collinearity were found.

The reported number of COVID-19 cases per 100K people ranged from 0 to 3,139 (*M* = 665), while the number of reported COVID-19 -related deaths per 100K people ranged from 0 to 57 (*M* = 8). A description of the dataset can be found in Table 1.

Table 1.

Description of dataset, per 100,000 people

Variable	Mean	Standard Deviation	Range
Living in poverty	14,715	4,293	4,600 – 29,100
No health insurance	10,374	3,308	4,300 – 20,500
Receiving SNAP benefit	12,018	5,410	0 – 28,000
Violent crimes	257	166	0-78

To explore the impact of potential factors on the reported number of COVID-19 cases per 100K people, a multiple regression analysis was performed. The regression model was significant; F (3, 234) = 13.96, $p = 0.000$; yet explained only 14.1% of the variance, indicating that there are other factors of influence. The number of violent crimes per 100K people in the county ($p = 0.007$); population of the county per 100K people who do not have health insurance ($p = 0.001$); and population of county per 100K people who receive SNAP benefits ($p = 0.000$) were all statistically significant while poverty and homelessness were not (Table 2).

Table 2.

Significant variables in multiple regression analysis

Variables (per 100K people)	Stand. β	t	p
Violent crimes	0.174	2.715	0.007
No health insurance	0.203	3.262	0.001
Receiving SNAP benefit	0.294	4.621	0.000

A higher number of COVID-19 cases was associated with: higher numbers of violent crimes, higher population without health insurance, and higher population who receive SNAP

benefits. Poverty as a variable was not statistically significant, yet poverty was moderately correlated with receiving SNAP benefits (r = 0.599). Moreover, the population receiving SNAP benefits and the population living in a single parent household was also moderately correlated (r = 0.523). Homelessness was moderately correlated with the population who has no health insurance (r = 0.583). These correlations suggest that poverty and homelessness may be represented by other, more specific variables such as lack of health insurance and food assistance programs. This finding is worthy of further study.

To address the second research question: "*Are there significant differences in the number of reported COVID-19 cases per 100K people across different states*" an analysis of variance (ANOVA) was performed. The ANOVA demonstrated that there were significant differences, F (5, 232) = 7.330, $p = 0.000$. The results of a post hoc analysis revealed that California's mean number of reported COVID-19 cases (M = 944.72) was statistically significantly higher than that of Montana (M = 294.88), $p = 0.000$, and Oregon (M = 544.60), $p = 0.042$; and Idaho's mean number of reported COVID-19 cases (M = 885.76) was higher than Montana, $p = 0.000$. There were no differences in the mean number of reported cases between other pairs. Similar results as it pertains to the difference across states were found when the number of the reported deaths related to COVID-19 was used instead of the number of reported COVID-19 cases. In Washington state, where GU is located, a regression analysis using the reported number of related COVID-19 deaths per 100K people as the dependent variable revealed that the most significant factor is population of the county per 100K people who has no health insurance t (35) = 4.430, $p = 0.001$; moreover, this variable by itself explained 35.9% of the variance. This sample study provides insight into factors that impact the reported number of COVID-19 cases and COVID-19-related deaths per 100K people in various counties, as well as differences that exists across states. The population of the county who has no health insurance was among the most significant factors.

Lessons learned

We offer the following take-aways from our reflections on this classroom activity, designed to highlight an area of justice for students studying to become nurse practitioners. First, students were given an option during class to work closely with a community agency to make a

discovery that was important to the partner or to use a dataset that was curated from public sources of de-identified data. We felt a moral obligation to confirm the analysis when a student selected a community agency dataset before the results of the analysis were provided to the community member. This created a great deal of extra work for faculty who were not just evaluating a deliverable, but also performing independent analysis.

Second, securing publicly available datasets for student work is not as easy as it may sound. Clinical data, especially those that come from electronic health records and registries is notoriously "messy" and requires a great deal of manipulation before it can be analyzed in a clean dataset. This process, known as "extract, load, transform (ELT)" relies on data and computer science skills that most clinical faculty and students do not have. We were fortunate that our Provost's office approved a one-time expenditure of approximately $1000 to pay for a contractor to build 12 datasets. Each dataset contained five to seven variables and we anticipate students registered in the class will re-use these datasets to answer many different questions over subsequent semesters. However, the potential exists for datasets to be shared outside of class and re-purposed, necessitating the continual creation of new datasets to ensure that each student is doing original work. This will add to the cost and preparation time for the course in the future.

Third, we were pleased with the feedback we received this semester regarding this assignment. All students reported being "stretched" and "having to work really hard" to learn data analysis techniques. Students enjoyed the service learning experience, believing they were "actually making a difference" in the communities in which they lived and worked. In each case, the student learned something about their community and the people residing in it that they did not know before. Topics highlighted the vulnerable in our society, including the homeless, those who had been sexually assaulted, and those who lacked proficiency with internet-enabled tools, highlighting the digital divide. In exploring these difficult topics, we believe we are promoting the university mission to "foster a mature commitment to dignity of the human person, social justice, diversity … solidarity with the poor and vulnerable" (GU, n.d.).

Fourth, as the exemplar analysis demonstrates, the challenge for faculty who are mindful of Ignatian pedagogy and the Catholic intellectual tradition, is to keep students focused on the

story within these data, not the results themselves. For example, neither poverty nor homeless was statistically significant in the model presented, but does that mean social problems do not contribute to our understanding of population health? Of course not! Instead, students are asked to consider the lives of the poor and the vulnerable and the ways in which that condition relates to other variables. In this case, it is hard to imagine how a person who lost their job or is homeless could sign up for, pay for, or easily access healthcare during the pandemic. In this way, the insights and reflections from this activity can serve to change students' minds about poverty and justice (Wiwad et al., 2021).

Opportunities for improvement

In future iterations of the course, we recommend the addition of course content on the topic of justice beyond the discussion of social determinants of health that commonly appears in population health textbooks (Nash et al., 2021). Jesuit schools are called to integrate the promotion of justice into our teaching (Kolvenbach, 2000). Brackley (2006) offers three methods for accomplishing this task: understanding the real world, focusing on the big questions, and freeing us from bias. We believe that by using publicly available real-world, quantitative data, we have accomplished two of three, and argue for more focused deliberation on the question of justice. Throughout the course, we intended for students to focus on the issue of justice as ethnicity or race is used as a variable in analysis, but this intention could be driven by reflection questions that cause students to pause and thoughtfully consider its impact. For example, a reflection question for a weekly assignment could be "*What does the difference in outcome based on race suggest about us, as American healthcare providers*?" A required element of the final assignment could be to "*Report your discoveries about justice-related issues during this analysis and reflect upon their meaning to you as a healthcare provider*."

Furthermore, as students gain awareness of issues pertaining to justice and the equitable distribution of healthcare resources, they may be encouraged to advocate for policy change in future course work or scholarly projects. Advocacy and leadership for policy change are seen as essential qualities of a DNP (AACN, 2006) and support the achievement of curricular objectives. This is especially powerful when students utilize theoretical constructs, like the Social-Ecological

Model of Health (CDC, 2021b) to explore justice. The model offers perspective on the complex ways that society, community, and various relationships interact with an individual's health. For example, neighborhoods with low-income residents often lack resources to promote health such as sidewalks, parks for recreation, lighting for safety, and access to full-service grocery stores to purchase healthy, nutritional foods (Larson et al., 2009). This can be eye-opening to students who are trained to address health-related needs in the context of an outpatient clinic visit. Exposure to models that prepare a student to take policy-oriented action at a community versus individual level are seen as immensely helpful to reducing health inequity and developing students' leadership capacity.

Conclusion

In conclusion, we offer this sample of a classroom data-based assignment as a best practice exemplar for others who seek to educate students of Jesuit colleges on the importance of the social determinants of health and primary issues of justice. We believe that a hands-on approach to grappling with real-world data that highlights inequity will help develop intellectually and spiritually curious adults for "lives of leadership and service for the common good," according to our mission (GU, n.d.).

References

American Association of Colleges of Nursing. (2020). *Fact sheet: The Doctor of Nursing Practice (DNP)*. https://www.aacnnursing.org/Portals/42/News/Factsheets/DNP-Factsheet.pdf

American Association of Colleges of Nursing. (2006). *The DNP Essentials*. https://www.aacnnursing.org/DNP/DNP-Essentials

Beaubien, J. (2020). *Americans are dying in the pandemic at rates far higher than in other countries*. National Public Radio (13 October, 2020). https://www.npr.org/sections/health-shots/2020/10/13/923253681/americans-are-dying-in-the-pandemic-at-rates-far-higher-than-in-other-countries

Boserup, B., McKenney, M., & Elkbuli, A. (2020). Disproportionate impact of COVID-19 pandemic on racial and ethnic minorities. *The American Surgeon, 86*(12), 1615-1622. http://doi.org/10.1177/0003134820973356

Brackley, D. (2006). *Higher Standards*. https://www.xavier.edu/jesuitresource/understanding-our-heritage/jesuit-core-values/justice-in-higher-education

Braveman, P., & Gottlieb, L. (2014). The social determinants of health: It's time to consider the causes of the causes. Public Health Reports, 129(S2), 19–31. https://doi.org.10.1177/00333549141291S206

Centers for Disease Control and Prevention [CDC]. (2021a). *Social Determinates of Health: Know what affects health. https://www.cdc.gov/socialdeterminants/index.htm*

Centers for Disease Control and Prevention [CDC]. (2021b). *The Social-Ecological Model: A framework for prevention*. https://www.cdc.gov/violenceprevention/about/social-ecologicalmodel.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fviolenceprevention%2Fpublichealthissue%2Fsocial-ecologicalmodel.html

Centers for Disease Control and Prevention [CDC]. (2020). *Homeless and COVID-19 FAQs.* https://www.cdc.gov/coronavirus/2019-ncov/community/homeless-shelters/faqs.html

Centers for Disease Control and Prevention [CDC]. (2019). *1918 Pandemic (H1N1 virus)*. https://www.cdc.gov/flu/pandemic-resources/1918-pandemic-

h1n1.html#:~:text=The%201918%20influenza%20pandemic%20was,spread%20worldwide%20during%201918%2D1919.

Chetty, R., Stepner, M., & Abraham, S. (2016). The association between income and life expectancy in the United States, 2001-2014. *Journal of the American Medical Association, 315*(16). https://doi.org/10.1001/jama.2016.4226

Dalton, J.C., & Crosby, P.C. (2006) Ten ways to encourage ethical values in beginning college students. *Journal of College and Character, 7*(7), 1-3. https://doi.org/10.2202/1940-1639.1239

Gonzaga University [GU]. (n.d.) *Mission Statement.* https://www.gonzaga.edu/about/our-mission-jesuit-values/mission-statement

Harrell, E., Langton, L., Berzofsky, M., Couzens, L., & Smiley-McDonald, H. (2014). *Household poverty and nonfatal violent victimization, 2008-2012.* Bureau of Justice Statistics. https://www.bjs.gov/index.cfm?ty=pbdetail&iid=5137

Kim, S. J., & Bostwick, W. (2020). Social vulnerability and racial inequality in COVID-19 deaths in Chicago. *Health Education and Behavior, 47*(4), 509-513. http://dx.doi.org/10.1177/1090198120929677

Kolvenbach, P. (2000). *The service of faith and the promotion of justice in Americans Jesuit higher education.* https://onlineministries.creighton.edu/CollaborativeMinistry/Kolvenbach/Kolvenbach-SantaClara.pdf

Larson, N. I., Story, M. T., & Nelson, M. C. (2009). Neighborhood environments: disparities in access to healthy foods in the U.S. *American Journal of Preventive Medicine*, *36*(1), 74–81. https://doi.org/10.1016/j.amepre.2008.09.025

Lynn, R., & Meisenberg, G. (2020). Race differences in deaths from coronavirus in England and Wales: Demographics, poverty, pre-existing conditions, or intelligence? *The Mankind Quarterly, 60*(4). https://pesquisa.bvsalud.org/global-literature-on-novel-coronavirus-2019-ncov/resource/en/covidwho-828094

Mahase, E. (2020). Covid-19: Death rate is 0.66% and increases with age, study estimates. *BMJ: British Medical Journal (Online), 369*. http://dx.doi.org/10.1136/bmj.m1327

Nash, D.B., Skoufalos, A., Rabius, R. J., Ogelsby, W.H. (2021). *Population Health: Creating a culture of wellness* (3rd ed.). Jones and Bartlett Learning.

National Alliance to End Homelessness. (2020). *State of Homelessness: 2020 Edition*. https://endhomelessness.org/homelessness-in-america/homelessness-statistics/state-of-homelessness-2020/

O'Neill Hayes, T. & Delk, R. (2018). *Understanding the social determinates of health. American Action Forum.* https://www.americanactionforum.org/research/understanding-the-social-determinants-of-health/

Olsen, W., Manasi, B., Amaresh, D., Kim, J., Wiśniowski Arkadiusz, & Purva, Y. (2020). Hierarchical modelling of COVID-19 death risk in India in the early phase of the pandemic. *The European Journal of Development Research, 32*(5), 1476-1503. http://doi.org/10.1057/s41287-020-00333-5

Pachiega, J., Afonso, A. J. d. S., Sinhorin, G., de Alencar, B. T., de Araújo, Marta dos,Santos Miranda, Longhi, F. G., . . . Espinosa, O. A. (2020). Chronic heart diseases as the most prevalent comorbidities among deaths by COVID-19 in Brazil. *Revista do Instituto De Medicina Tropical De São Paulo, 62*, 1-5. http://dx.doi.org/10.1590/S1678-9946202062045

Quinn, K.P. (2016). Teaching that Transforms. *America Magazine*, May 9, 2016. https://www.xavier.edu/mission-identity/programs/documents/TeachingThatTransforms.pdf

Rashid, A., Williamson, M., Muhammad, A. H., & Ashraf, N. (2020). United States county-level COVID-19 death rates and case fatality rates vary by region and urban status. *Healthcare, 8*(3), 330. http://dx.doi.org/10.3390/healthcare8030330

Saloner, B. P., Parish, K., Ward, J., DiLaura, G., & Dolovich, S. (2020). COVID-19 cases and deaths in federal and state prisons. Journal of the American Medical Association, *324*(6), e602. http://dx.doi.org/10.1001/jama.2020.12528

Semega, J. Kollar, M., Shrider, E. A. & Creamer, J. (2020). *Income and poverty in the United States: 2019.* https://www.census.gov/library/publications/2020/demo/p60-270.html

Slater, T. (1910). Justice. *The Catholic Encyclopedia*. Robert Appleton Company. Retrieved January 24, 2021 from http://www.newadvent.org/cathen/08571c.html

Strang, P., Fürst, P., & Schultz, T. (2020). Excess deaths from COVID-19 correlate with age and socio-economic status. A database study in the Stockholm region. *Upsala Journal of Medical Sciences, 125*(4), 297-304. http://dx.doi.org/10.1080/03009734.2020.1828513

Tolbert, J., Orgera, K., & Damico, A. (2020). *Key facts about the uninsured population.* Kaiser Family Foundation. https://www.kff.org/uninsured/issue-brief/key-facts-about-the-uninsured-population/#:~:text=Individuals%20with%20income%20below%20200,the%20uninsured%20are%20nonelderly%20adults

U. S. Department of Agriculture. (2021). *Economic research service.* https://www.ers.usda.gov/

U. S. Department of Agriculture. (n.d.). *FNS nutrition programs.* https://www.fns.usda.gov/programs

U. S. Department of Health & Human Services. (n.d.). *Healthy People 2030*. https://health.gov/healthypeople/objectives-and-data/social-determinants-health

U. S. Department of Health & Human Services. (2021). *Poverty guidelines.* https://aspe.hhs.gov/poverty-guidelines

U.S. Department of the Treasury. (2020). *The Treasury department is delivering COVID-19 relief for all Americans.* https://home.treasury.gov/policy-issues/cares

Williamson, E. J., Walker, A. J., Bhaskaran, K., Bacon, S., Bates, C., Morton, C. E., . . . Goldacre, B. (2020). Factors associated with COVID-19-related death using OpenSAFELY. *Nature, 584*(7821), 430-3,436A-436G. http://dx.doi.org/10.1038/s41586-020-2521-4

Wiwad, D., Mercier, B., Piff, P. K., Shariff, A., & Ankin, L.A. (2021). Recognizing the impact of COVID-19 on the poor alters attitudes towards poverty and inequality. *Journal of Experimental Social Psychology, 93*, e104083. https://dx.doi.org10.1016/j.jesp.2020.104083

World Health Organization. (2021). *Constitution.* https://www.who.int/about/who-we-are/constitution#:~:text=Health%20is%20a%20state%20of,absence%20of%20disease%20or%20infirmity.